

## AW1 Award Abstracts session 1

### AW1-540

#### FUNCTION AND QUALITY OF LIFE AFTER REVISION TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** The purpose of this study was to evaluate the function and the quality of life of patients undergoing revision total hip arthroplasty for aseptic loosening.

**Methods:** 122 patients (130 hips) underwent revision total hip arthroplasty. Mean follow up was 9.1 years (sd 2.7) (range 5-16). Mean BMI of the patients was 27.3 (3.8). Monoblock Wagner stem was used for the femoral revision while trabecular metal tantalum cup was used for the cup revision. Extended trochanteric osteotomy was utilised in 73 cases. Patients evaluated with walking speed test, timed up and go test. Patient's function was assessed with the Harris hip score, UCLA activity score, Parker mobility score, lower extremity function score, and with PROMs like Oxford hip score, WOMAC and HOOS. SF12 and EQ-5D-5L was used for evaluating quality of life. Patient's satisfaction was also recorded.

**Results:** At the final follow up, 64% of the patients had no pain. Parker mobility score was 8/9 (range 2-9/9, sd 2) and the walking speed test was 1.15 m/s (sd 0.45). Timed up and go test was 13 sec with range 10-30 sec. 35% of the patients had a score above 13.5 sec. Lower extremity functional (LEFS) score was 48 (sd 17), Harris Hip Score was 85 (sd16), WOMAC score was 86 (sd 13) and the Oxford hip score was 40 (sd 7). The UCLA score had a mean of 5.6, median 6 and range 2 to 8. The physical component score of the SF12 was 44 (sd 10) and the mental component score was 55 (sd 8). The EQ-5D-5L score was 4.35, 4.65, 4.4, 4.65, 3.95 for mobility, self-care, usual activities, pain and anxiety/depression respectively. 78% of the patients were satisfied with the outcome of their revision.

**Conclusion:** Patients who underwent revision total hip arthroplasty demonstrated satisfactory function and quality of life.

## AW1 Award Abstracts session 1

### AW1-103

#### THE EFFECT OF FEMORAL OFFSET ON POLYETHYLENE WEAR IN TOTAL HIP ARTHROPLASTY: A CT-BASED FINITE ELEMENT ANALYSIS OF 15 PATIENTS WITH SIMULATED GAIT

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**Introduction/objectives:** The contact patch to rim distance (CPR) is the distance from the point of intersection of the joint force and the liner to the acetabular rim. We previously described the dynamics of CPR during normal gait. We postulate that changes of femoral offset will affect polyethylene wear. The aim was to quantify the effect of offset changes on CPR and polyethylene wear during normal gait using finite analysis.

**Methods:** THA was virtually performed on 3D models built from CT scans of 15 patients undergoing THA. The acetabular center of rotation and leg length was reconstructed anatomically. Cup orientation was set at 42° inclination and 15° of anteversion. The femoral offset was reconstructed either anatomically, or with + or - 20%. These models were then combined with a generic musculoskeletal model to predict orientation and magnitude of the joint force during normal gait. To calculate CPR, the predicted force vector was converted into spherical coordinates of the cup. Volumetric wear was calculated after for one million gait cycles (constant wear coefficient).

**Results:** The contact patch is mostly moving in the antero-superior quadrant (0° to 90°) of the cup. An INCREASE of 20% of offset was associated with a decrease of wear (by -5±2%), of CPR (-2±2%) and of force (-4±2%). A DECREASE of offset led to an increase of wear (+8±3%), CPR (+2±1%) and force (+7±3%). The effect of offset changes on wear correlated with changes of joint force (R-square=0.88, p<0.001) and with changes of CPR (R-sq=0.36, p=.01).

**Conclusion:** Alterations of the femoral offset after THR have an impact on the direction and magnitude of the joint force and polyethylene wear during gait. The magnitude of the force more significantly contributes to wear compared to the direction of the force.

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## AW1 Award Abstracts session 1

### AW1-427

#### INFLUENCE OF THE VOLUME OF PROCEDURES PER HOSPITAL AND YEAR ON THE RESULTS IN HIP ARTHROPLASTY SURGERY

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**Introduction/objectives:** The volume of arthroplasties performed per year in each hospital could be an influential factor on its outcome. The objective is to evaluate if there are differences in risk of revision according to the volume of arthroplasties / year.

**Methods:** Data of total hip arthroplasties caused by osteoarthritis from the Catalanian Arthroplasty Register (RACat) between 2005 and 2016 was used. The variable volume (low / high) was created according to the cut-off point of 50 procedures hospital / year (fixed a priori based on the data)

To select comparable populations in both groups, a propensity score matching was used considering the following variables: sex, age, comorbidity (Elixhauser), year of intervention, type of cementation and type of admission. The characteristics of the populations before and after the pairing were compared. The risk of revision at 1, 5 and 10 years was calculated using the Kaplan-Meier method and competitive risk models were adjusted, calculating the Sub-Hazard Ratio (SHR).

**Results:** A total of 13,737 patients were included. Statistically significant differences (p <0.05) were observed between the volume groups in all the variables. After the match none remained significant. The risk of revision was 1.3%, 2.9% and 4.7% at 1, 5 and 10 years in high volume, and 0.9%, 2.3% and 3.7% in low volume respectively. The volume of procedures was related to the risk of revision: high volume vs low SHR = 1.25(1.02-1.54)

**Conclusion:** Unlike previous studies in other contexts, the high volume of arthroplasties / year was associated with a greater risk of revision. Future studies considering other variables such as the surgeon's experience or the type of hospital can help to improve the quality of care.

## AW1 Award Abstracts session 1

### AW1-584

#### HOW RELIABLE ARE HIP SURGEONS WHEN DETERMINING THE ELIGIBILITY FOR HIP ARTHROPLASTY

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**Introduction/objectives:** Studies and analysis using insurance data show high inter-hospital variability when performing total hip arthroplasty (THA). A possible explanation for the variations in medical practice can be found in that surgeons follow different criteria when recommending hip arthroplasty to their patients.

The aim of this study is to assess the inter-rater reliability when determining the seriousness of hip osteoarthritis (OA) and the eligibility for THA.

**Methods:** Data from a cohort of 405 patients with symptomatic hip OA were prospectively gathered. Patient data consisted of patient characteristics, physical examination, radiographic severity of OA according to the Kellgren-Lawrence scale and patient reported questionnaires concerning functional status, pain and health related quality of life (HOOS, OHS & EQ5D). Based on these patient data, three different surgeons from different healthcare centers assessed the seriousness of the hip OA for each patient (no, light, moderate or severe) as well as whether the patient was eligible for THA. The multirater-reliability was calculated to measure the level of agreement among the surgeons.

**Results:** Moderate agreement (kappa = 0.552 (95% CI, 0.496 to 0.609)) between surgeons was found when assessing the eligibility for THA (p < .005). When assessing the seriousness of hip OA, a moderate agreement (kappa = 0.495 (95% CI, 0.459 to 0.530)) was also found between surgeons (p < .005).

**Conclusion:** This study shows that the inter-rater reliability when determining both the seriousness of hip OA as well as the eligibility for THA is not strong between hip surgeons. This shows the need for the development of more uniform and objective frameworks.

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## AW1 Award Abstracts session 1

### AW1-248

PTX3 AS A NEW BIOMARKER FOR THE DIAGNOSIS OF PERIPROSTHETIC JOINT INFECTION: A SINGLE-CENTER PILOT STUDY.

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**Introduction/objectives:** Diagnosis of periprosthetic joint infection (PJI) is challenging. Several studies showed a role of the long pentraxin PTX3 as a biomarker in inflammatory diseases and infections. We evaluated the diagnostic ability of synovial fluid and serum PTX3 for the infection of total hip arthroplasty (THA) and total knee arthroplasty (TKA).

**Methods:** Consecutive patients undergoing revision surgery for painful THA or TKA were enrolled. Patients under antibiotic therapy and patients eligible for spacer removal and prosthesis re-implantation were excluded. Quantitative assessment of synovial fluid and serum PTX3 was performed with ELISA. Musculoskeletal Infection Society (MSIS) criteria were used as reference standard for diagnosis of PJI. Receiver operating characteristic (ROC) curve analysis was performed to assess the ability of serum and synovial fluid PTX3 concentration to determine the presence of PJI.

**Results:** One hundred-fifteen patients underwent revision of THA (n=99) or TKA (n=16). According with MSIS criteria, 18 cases were septic revisions. The average synovial fluid concentration of PTX3 was significantly higher in patients with PJI compared to patients undergoing aseptic revision (23.4 ng/mL versus 3.71 ng/mL; P=0.002). There was no significant difference in terms of serum concentration of PTX3 between the two groups. Synovial fluid PTX3 demonstrated an area under the curve of 0.96 (95%CI, 0.89-0.98) with sensibility 94%, specificity 90%, positive and negative predictive values of 67% and 100% for a threshold value of 4.5 ng/mL.

**Conclusion:** Synovial PTX3 demonstrated a strong diagnostic ability for PJI, and it could be a useful biomarker for detection of PJI in patients undergoing revision surgery for painful THA or TKA.

## AW1 Award Abstracts session 1

### AW1-386

SELF-MANAGEMENT VERSUS USUAL CARE PHYSICAL THERAPY AFTER HIP-ARTHROSCOPY. A RANDOMIZED CONTROLLED TRIAL.

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**Introduction/objectives:** Femoroacetabular impingement can be treated by hip-arthroscopy. It is unclear what the postoperative rehabilitation of hip-arthroscopy should like. We developed a rehabilitation protocol supervised by a physical therapist which showed good clinical results. However, it is unknown if rehabilitation based on self-management leads to similar results. The aims of this study firstly are to determine feasibility and acceptability to the self-management intervention. Secondly to obtain a preliminary estimate of the difference in effect between self-management versus usual care physical therapy.

**Methods:** 30 participants scheduled are included and randomized after surgery into a self-management (SM) group and a usual care (UC) group. Both programs take 14 weeks. The SM group performed a home-based exercise program three times a week and received physical therapy treatment once every two weeks. The UC group received treatment two times a week, with additional home-based exercise. Assessment was pre-operatively, at 6, 14, 26 and 52 weeks by ROM, IHOT and single leg squat test (SLS).

**Results:** 15 participants were included in each group. Preliminary data analysis showed that mean IHOT improved 58 post-operative to 82 post-operative. The same was seen in ROM and SLS. The exact data will be analysed and available at the time of presentation because the study finishes in June 2018.

**Conclusion:** Self-management after hip-arthroscopy is feasible and accepted by the patient group. Although the results are preliminary we cannot find a difference in improvement between the SM and UC group as measured by IHOT, Range of motion and Single leg squatting.

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## AW2 Award Abstracts session 2

### AW2-198

BAD PRESS EQUALS BAD PROMS?

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**Introduction/objectives:** As of 2010 concerns were raised about the safety of Metal on Metal (MoM) implants in both orthopaedic and public media. We aimed to gain insight in the potential influence of negative publicity on PROMs in patients who received MoM hip resurfacing arthroplasty (MoMHR).

**Methods:** A cross-sectional study carried out in 2014 among 251 patients who received a MoMHR between May 2004 and January 2012. They answered questions about sources of information on their implant, the type of information (positive/negative) and their concern about complications, as well as the Hip disability and Osteoarthritis Outcome Score (HOOS) and the RAND-36. Regression analysis was used to test the relationship between level of concern and the PROMs.

**Results:** The top three MoMHR information sources consisted of public media with the orthopaedic surgeon coming fourth. The majority had heard only negative information in the media (53%) or both negative and positive (34%). Of all patients, 19% had no concern about complications, 39% a little, 26% quite a bit and 16% very. Patients scored worse on the HOOS as level of concern increased compared to no concern: a little -7.4 (95% CI -1.46;-13.3), quite a bit -16.5 (95% CI -10.2;-22.9) and very -22.0 (95% CI -14.9;-29.05). Patients who were very concerned also had a lower score on the physical component scale of the RAND-36 compared to no concern (-7.5, 95% CI -3.2;-7.5).

**Conclusion:** Public media are the major sources of information on MoMHR. Most patients are concerned about complications and they score progressively worse on the HOOS as their level of concern increases. Further research is needed to investigate if there is a causal relationship between media coverage, concern and patient reported outcomes.

## AW2 Award Abstracts session 2

### AW2-29

IS CERAMIC RELATED TO A LOWER BACTERIAL ADHESION THAN OTHER BIOMATERIALS? AN IN-VITRO ANALYSIS

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**Introduction/objectives:** Although there is some clinical evidence of ceramic bearings being associated with a lower infection rate after total hip arthroplasty (THA), available data remains controversial since this surface is usually reserved for young, healthy patients. Therefore, we investigated the influence of five commonly-used biomaterials on the adhesion potential of four biofilm-producing bacteria usually detected in infected THAs.

**Methods:** In this in-vitro research, we evaluated the ability of *S. aureus*, *S. epidermidis* ATCC 35984, *E. coli* ATCC 25922 and *P. aeruginosa* to adhere to the surface of a cobalt-chromium metal head, a fourth-generation ceramic head, a fourth-generation ceramic insert, a highly-crossed linked polyethylene insert and a titanium porous-coated acetabular component. After an initial washing step, bacterial separation from the surface of each specimen was done with a vortex agitator. The colony-forming units were counted to determine the number of viable adherent bacteria.

**Results:** We found no differences on global bacterial adhesion between the different surfaces. *E. coli* presented the least adherence potential among the analysed pathogens (p<0.001). The combination of *E. coli* and *S. epidermidis* generated an antagonist effect over the adherence potential of *S. epidermidis* individually (58±4% vs. 48±5%; p=0.007). The combination of *P. aeruginosa* and *S. aureus* presented a trend to an increased adherence of *P. aeruginosa* independently, suggesting an agonist effect (71% vs. 62%; p=0.07).

**Conclusion:** Ceramic bearings appeared not to be related to a lower bacterial adhesion than other biomaterials. However, different adhesive potentials among bacteria may play a major role on infection's inception.

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## AW2 Award Abstracts session 2

### AW2-407

#### CONVERSION OF HIP FUSION TO TOTAL HIP ARTHROPLASTY THROUGH DIRECT ANTERIOR APPROACH

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**Introduction/objectives:** Technical difficulties make conversion to total hip arthroplasty (THA) from a fused hip a challenging procedure with mixed results. Here we report our surgical technique and early results of conversion of fused hips to THA via direct anterior approach (DAA).

**Methods:** Between 2013 and 2017 we performed 15 conversions to THA in 13 patients with hip fusions through DAA. The procedure was performed on a standard table, in supine position, and with or without fluoroscopy guidance. Patients were followed up for a mean of 3 years. The clinical and radiographic outcomes of this approach are reported in this study.

**Results:** There were 9 men and 6 women with a mean age of 45 years old. The mean time interval between fusion and THA was 26 years. The mean follow up period was 3 years. All acetabular components were in safe zone. There was one recurrent dislocation due to abductor insufficiency. Harris Hip Score and Womac score were significantly improved in all patients.

**Conclusion:** The DAA is a safe and efficient approach for conversion of fused hips to THA with benefits of having better landmarks and possibility of utilizing intraoperative fluoroscopy.

## AW2 Award Abstracts session 2

### AW2-120

#### NO MEASURABLE LEARNING CURVE OF THE INTRODUCTION OF THE DIRECT SUPERIOR APPROACH IN TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** The direct superior approach (DSA) is a new tissue sparing approach for total hip arthroplasty (THA) by sparing the iliotibial band. The objective of this study was to determine the learning curve of the DSA compared to the mini posterior approach (MPA).

**Methods:** A prospective cohort study was performed including our first 52 DSA cases and as control group, 52 MPA patients matched on age, body mass index (BMI) and ASA classification. Only patients with primary osteoarthritis or osteonecrosis and BMI < 35 were included. We measured the outcome of surgical time, blood loss, postoperative pain, length of stay, implant position, use of walking aids 6 weeks postoperatively, patient reported outcome measures (PROMS) at 3 months and 90 days complications. Unpaired t-tests were used to analyse differences between the DSA and the MPA group for continuous variables and Chi-square tests for categorical variables. Two-way repeated measures ANOVA was used to analyse pain scores and PROMS between the DSA and the MPA group.

**Results:** The mean surgical time of 61 min (SD 8) in the DSA group was longer (P<0.001) compared to 46 min (SD 12) in the MPA group. No differences were found in blood loss, postoperative pain, length of stay and walking ability. Acetabular cup and femoral stem position were not compromised by the DSA. PROMS and complication rate showed no differences between the MPA and the DSA group.

**Conclusion:** The DSA can be introduced safely without a measurable learning curve and without an increase in complications. Only a slight increase in operation time is expected in the early experience.

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## AW2 Award Abstracts session 2

### AW2-294

#### EIGHTEEN YEAR COMPARISON OF HYBRID TOTAL HIP REPLACEMENT AND BIRMINGHAM HIP RESURFACING IN ACTIVE YOUNG PATIENTS

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**Introduction/objectives:** To compare the long-term clinical and radiological results of metal-on-polyethylene hybrid total hip replacement (THA) with metal-on-metal Birmingham hip resurfacing (BHR) in young, active patients.

**Methods:** From the first consecutive 63 hips in young, active patients who underwent BHR by the senior author, 54 (51 patients) were matched to patients who had undergone THA with regard to age, gender, body mass index and pre-operative levels of activity. Radiologically, all hips were assessed for migration and osteolysis, THAs for polyethylene wear and BHRs for a pedestal sign. Patient reported outcomes, mortality and revision rates were compared.

**Results:** The mean follow-up of the patients with a hybrid THR was 19.9 years and for those with a BHR, 17.6 years. 13 patients with a hybrid THR and 5 with a BHR had died. The revision rate of the hybrid THRs was 14/54 and of the BHRs 6/54. Log rank comparison of Kaplan-Meier survival estimates demonstrated a significantly lower mortality in the BHR group (p=0.039; Hazard Ratio=0.37 (95% CI=0.15,0.95)) but a non-significant difference in revision rates (p=0.067; Hazard Ratio=0.43 (95% CI=0.18,1.06)). The BHRs recorded superior OHS (p=0.03), UCLA (p=0.0096), and EuroQol visual analogue scores (p=0.03). Significantly more BHRs had run, played sport and undertaken heavy manual labour in the month preceding follow up.

**Conclusion:** After 15 years, patients with BHRs reported superior patient reported outcome measures and remained more active with a lower mortality rate but no significant difference in revision rates. Both groups demonstrated progressive radiological changes at long-term follow-up.

## AW2 Award Abstracts session 2

### AW2-433

#### SAFE SURGICAL ANATOMY OF THE DEEP GLUTEAL SPACE RELATED TO ARTHROSCOPIC TREATMENT

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**Introduction/objectives:** Determine morphometry and variant anatomical relationships relevant to arthroscopic treatment in the deep gluteal space (DGS).

**Methods:** Twenty deep gluteal spaces of cadaveric specimens were dissected. The anatomical relationship between the sciatic nerve and the piriformis muscle was determined according to the Beaton and Anson classification.

A morphometric study of the distances in the deep gluteal space was carried out to determine the area where the arthroscopic decompression of the sciatic nerve was performed in the piriformis syndrome (A. Greater trochanter (GT) to sciatic nerve emergency (SN); B. GT to ischial tuberosity (IT); C. GT to inferior gluteal artery emergency (IGA); D. IT to SN emergency; E. IT to IGA).

**Results:** The sciatic nerve and the relation with the piriformis muscle in the deep gluteal region followed the typical anatomical pattern (type A of Beaton) in 16 specimens (80%). In 5 specimens of this group (31.25%), the sciatic nerve was divided from its emergence at the level of infrapiriform space. Type B of Beaton was observed in 4 specimens (20%), a pattern in which the common peroneal nerve passes through the piriformis muscle, while the tibial nerve is located at the lower border of the piriformis muscle. The morphometric measurements of the surgical area of study were: A= 72.23 ± 8.3 mm; B= 85.62 ± 10.9 mm; C= 84.62 ± 9.7 mm; D= 52.86 ± 7.3mm. E= 54.67 ± 7.4 mm.

**Conclusion:** When the dissection of the piriformis muscle is necessary for adequate decompression of the sciatic nerve, the surgeon must take into account that, in adult, the emergence of the nerve in the deep gluteal region is approximately 7 cm from the greater trochanter and 5 cm from the ischial tuberosity.

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## O01 Primary THA 1

### O01-457

#### THE NEED FOR PATIENT-SPECIFIC "SAFE ZONES" IN TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** The purpose of this study was to compare pre-operative acetabular cup parameters using this novel dynamic imaging sequence to the Lewinnek safe zone.

**Methods:** We retrospectively reviewed 350 consecutive primary THAs that underwent dynamic pre-operative acetabular cup planning utilizing a pre-operative CT scan to capture the individual's hip anatomy, followed by standing (posterior pelvic tilt), sitting (anterior pelvic tilt), and supine X-rays. Using these inputs, we modelled an optimal cup position for each patient. Radiographic parameters including inclination, anteversion, pelvic tilt, pelvic incidence, and lumbar flexion were analyzed.

**Results:** Mean age of patients was 63 years (range, 18 to 95). Mean supine pelvic tilt was 4.7° (range, -31° to 21°), standing pelvic tilt was -0.3° (range, -33° to 23°), and flex-seated pelvic tilt was -0.7° (range, -42° to 32°). Mean pelvic incidence was 54° (range, 24° to 88°) and mean lumbar flexion was 43° (range, 0° to 78°). Mean inclination was 40° (range, 34° to 49°) and mean anteversion was 24° (range, 3.5° to 39°). Only 56% of the dynamically planned cups were within the Lewinnek safe zone (p<0.05, Figure 1). Mean inclination and anteversion difference between dynamic and Lewinnek safe zone was 1.3° (range, 0° to 12°) and 8.9° (range, 0° to 25°), respectively.

**Conclusion:** Our study demonstrates that historical target parameters for cup inclination and anteversion significantly differ to target values obtained with the use of functional imaging. Understanding the individual spinopelvic motion for each patient allows for more accurate placement of the acetabular component, which may help to reduce the risk of dislocation, premature wear and squeaking of bearing surfaces, and improve functional outcomes.

## O01 Primary THA 1

### O01-133

#### INTRAOPERATIVE CALCAR FRACTURES ARE ASSOCIATED WITH THE CLS SPOTORNO CEMENTLESS STEM DESIGN: BOTH THE SURGEON AND IMPLANT FACTOR ARE INVOLVED

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**Introduction/objectives:** This study reports on the incidence of intraoperative calcar fractures with the Cementless Spotorno (CLS) stem and correlated the incidence with learning curve and geometrical implant positioning.

**Methods:** After introduction of the CLS hip design, 800 consecutive cementless Total Hip Arthroplasties (THA) were analysed. The incidence of calcar fracture in the first 400 THA was compared with the second 400 THA, in order to study a potential learning curve effect. According to the Instruction For Users (IFU), varus positioning of the stem was avoided and a femoral neck cut was aimed relatively close to the lesser trochanter since these are assumed to be correlated with calcar fractures. Radiographic geometrical analysis of implant positioning (neck shaft angle, femoral offset and osteotomy-lesser trochanter Distance) was performed on all THA with calcar fractures and 100 randomly selected uncomplicated cases.

**Results:** Seventeen (2.1%) intraoperative calcar fractures were recorded. The incidence of calcar fracture differed between the first (n=11) and the second cohort (n=6). This difference was not statistically significant (p=0.220), however these numbers indicate a trend towards a learning effect. No correlation was established for stem positioning or the height of the femoral neck cut.

**Conclusion:** Intraoperative calcar fractures are associated with the use of the CLS stem design. A learning curve may play a role; however, the risk for calcar fractures remains clinically significant even after adequate implant positioning in the hands of experienced hip surgeons. Surgeons should be aware of this implant related phenomenon and be alert on this phenomenon intra-operatively.

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## O01 Primary THA 1

### O01-94

#### OCCULT INTRAOPERATIVE PERIPROSTHETIC FRACTURES OF THE ACETABULUM MAY AFFECT CUP STABILITY

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#### Case Study: Objectives

Occult intraoperative periprosthetic acetabular fractures are almost neglected complications of primary total hip arthroplasty (THA), and maybe associated with the potential to impair cup stability and to cause implant loosening. We aimed to investigate the clinical consequences of this complication.

#### Methods

Between 2003 and 2012, a total of 3,390 cementless THA were performed at our institution. We retrospectively reviewed all abovementioned medical histories to identify those patients, who received a thin-layer computer-tomography (CT) scan within the first 30 days postoperatively after THA because of different reasons (suspected bleeding, hip pain, abdominal symptoms, etc.). These CT scans were evaluated and classified by two radiologists independently with respect to the presence of recent acetabular fractures. Cases with acetabular and periacetabular fractures not detected intraoperatively form the cohort of this study.

#### Results

Occult periprosthetic fractures of the acetabulum were identified in 58 (50.4%) out of 115 selected patients. In our study group, fractures outside of the acetabulum, but close to it, occurred in 45% (n=26/58), at the superolateral wall in 17% (n=10/58), at the anterior wall of the acetabulum in 16% (n=9/58) and in 10% (n=6/58) each at the medial wall and the posterior wall respectively. Out of a total of 6 occult medial wall fractures, 3 had to be revised, and 2 showed high migration values. The highest cup migration values showed fractures of the superolateral wall. Partial column fractures did not influence survival of the implant.

#### Conclusion

Central acetabular fractures not recognized during and immediately after surgery may impair the outcome of THA.

## O01 Primary THA 1

### O01-388

#### EARLY CLINICAL OUTCOMES OF A TAPERED WEDGE FEMORAL STEM

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**Introduction/objectives:** Wedge femoral stems used in total hip arthroplasty (THA) have evolved with modifications including shorter lengths, reduced distal geometries, and modular necks. Unlike fit and fill stems which contact most of the metaphysis, tapered wedge femoral stems are designed to achieve proximal medial/lateral fixation. The tapered wedge stem evaluated has further reduced distal geometry to provide a wedge-fit within the metaphysis of the proximal femoral canal for all femur types (Dorr A, B, C). The objective of this study was to evaluate the early clinical outcomes of a tapered wedge femoral stem.

**Methods:** Fifty subjects (28M, 22F; age: 64.7±9.2; BMI: 29.6±4.6) underwent primary THA prospectively with a tapered wedge femoral stem. Clinical outcomes for this IRB approved study included the Harris Hip Score (HHS), the Oxford Hip Score (OHS), revisions, and subsidence. All subjects signed the informed consent. Student t-tests were used to identify significant mean differences (p<0.05).

**Results:** For subjects returning for the 2-year post-op visit (n=39), the HHS improved by 40.8 points to 92.0 from 51.2 and the OHS improved by 23.5 points to 44.6 from 21.1. There was no significant difference between genders with regard to age, BMI, or HHS scores. However, females had significantly lower pre-op and 3 month OHS scores (18.2 vs 23.4; 40.3 vs 43.7). There were no revisions. There were no observations of subsidence at 1 (n=45) or 2 years (n=27).

**Conclusion:** The tapered wedge femoral stem exhibited positive early clinical results as demonstrated by the marked improvement in functional outcome scores from the pre-op visit to 2-years post-op with no reports of subsidence or revisions. This tapered wedge stem design is a promising alternative to conventional femoral stems.

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## O01 Primary THA 1

O01-274

5 YEAR STABILITY OF THE CEMENTED AND UNCEMENTED POROUS COATED TAPERLOC STEM; A ROENTGEN STEREOPHOTOGRAMMETRIC ANALYSIS (RSA) STUDY

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**Introduction/objectives:** There is no clear evidence if cemented or uncemented hip stem designs are preferable for older patients. This RSA study investigates stability and function of the cemented and uncemented porous coated Taperloc hip stems in older patients.

**Methods:** 32 patients of 66-75 years of age (33 total hip replacements) were prospectively randomized to receive a cemented or uncemented porous coated Taperloc stem (N=18,15). Implant stability was evaluated with RSA and implant function was assessed with HHS and PROMs. Follow-up moments were preoperatively, directly postoperative (no PROMs) and at 6 weeks, 3 and 6 months and 1, 2 and 5 years postoperatively. A Linear Mixed effect Model (LLM) analysis was performed for statistical analysis.

**Results:** Maximum mean subsidence was 0.30 and 1.17 mm for the cemented and uncemented stems respectively. Implant stability was obtained between 3 and 6 months. HHS increased from 58 to 95 for cemented and from 58 to 96 for uncemented stems. In both groups HHS and PROMs showed significant improvement in function and pain within 6 months and 3 months respectively. Despite the large difference in maximum subsidence in both groups, the LLM analysis showed no differences for stability and function between the cemented and uncemented porous coated hip stems. No stems were revised during follow-up.

**Conclusion:** Based on the 5 year results of this RCT RSA study there is no difference in stability and function of the cemented and uncemented porous coated Taperloc stems in patients of 66-75 years of age.

## O01 Primary THA 1

O01-25

PRIOR ARTHROSCOPIC TREATMENT FOR FEMOROACETABULAR IMPINGEMENT DOES NOT COMPROMISE HIP ARTHROPLASTY OUTCOMES: A MATCH-CONTROLLED STUDY

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**Introduction/objectives:** Femoroacetabular Impingement (FAI) is known as a predisposing factor in the development of osteoarthritis of the hip. In order to treat this condition hip arthroscopy is considered as the gold standard in nowadays. The number of performed hip arthroscopies has risen immensely in recent years. However, a number of patients will require further surgical intervention up to total hip replacement (THR) at a later stage. The purpose of this study was to analyze whether outcomes of THR are affected by prior hip arthroscopy.

**Methods:** Patients who underwent a THR following an ipsilateral hip arthroscopy were matched to a control group of THR patients with no history of ipsilateral hip surgery. Matching criteria were age, sex, body mass index, implants used and surgical approach. Modified Harris Hip Score, surgical time, presence of heterotopic ossification and postoperative complication were prospectively compared at minimum 2-year follow-up.

**Results:** Thirty-three THR after arthroscopy patients were successfully matched to control patients. There was no significant difference in mean mHHS between both groups (FAI treatment group 92.8 vs. control group 93.8, p=0.07). However FAI treatment group showed a lower mHHS score preoperatively (48 vs 60, p = 0.002). There was no significant difference in surgical time and postoperative complication rate. No heterotopic ossification could be found.

**Conclusion:** A prior hip arthroscopy has no affect to clinical outcomes of subsequent THR

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## O01 Primary THA

O01-168

ZERO PERCENT HIP DISLOCATION WITH 26 MM HEAD FOR 44-48 MM CEMENTLESS CUP

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**Introduction/objectives:** The purpose of this study was to substantiate the efficacy of our prophylactic procedure, using 26mm metal head with cross-linked polyethylene (PE) for 44-48mm cup, in preventing dislocation after cementless total hip arthroplasty (THA).

**Methods:** We evaluated 164 hips (female 145; male 1, age 68.4±9.7 [43-88]) that underwent primary THA using identical PE during 2013-17. Follow-up period/year was 2.63±1.24 (0.25-4.91). The PE-thicknesses/cup-sizes were 4.8mm/44, 5.8mm/46, 48, respectively. Each patient was placed in a precise lateral decubitus position by tilting the surgical table. The cup was meticulously placed for 15° anteversion and 45° abduction in radiographic angle. The stem was inserted, between 15° and 25°, anteverted position following intentional reaming. After provisional reduction, we secured the hip in its optimal position; viz. locked condition with hard-end pointing at not only 90° flexion with internal rotation but also 0° extension with external rotation. Patients were permitted, 3 months after surgery, for any movement in daily living without limitation.

**Results:** Dislocation rate was 0%. Cup abduction, anteversion and stem anteversion (°) were 45.1±/4.6 (24-53), 17.2±/5.0 (0-29), 16.8±/4.9 (3-33), respectively. Limb-length discrepancy (mm) was 1.2±/4.5 (-15.7 to 10.2).

**Conclusion:** Surgeons tend to use 32mm or larger head with highly cross-linked thin PE in order to minimize postoperative dislocation; however, the current data on its endurance display only up to mid-term. On the other hand, our technique of using 26mm head preserves sufficient PE thickness and its long-term durability has already been proven; thus, our method suggests further reliable longevity, provided that hip stability is secured, in preventing dislocation.

## O02 Hip preserving surgery 1

O02-117

PREVALENCE OF CAM AND PINCER DEFORMITIES IN ASYMPTOMATIC INDIVIDUALS

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**Introduction/objectives:** In clinical practice, the presence of radiological signs of femoroacetabular impingement (FAI) is not necessarily associated with symptoms. Hence, the prevalence of cam and pincer deformities in the overall population may be underestimated. The purpose of this study was to screen an unselected cohort of people without hip symptoms for native radiological signs of cam and pincer FAI to determine their actual prevalence

**Methods:** 110 asymptomatic patients with no prior history of hip pain were included in this retrospective study. All of the patients had AP pelvis x-rays and cross-table hip x-rays in internal rotation performed. We evaluated the images for the presence of cross-over signs and measured lateral center edge angles, alpha angles, and femoral offset ratios.

**Results:** Positive cross-over signs were seen in 34%; LCE angles >40°, in 13%; and femoral offset ratios < 0.18, in 43%. In 41% of the patients, alpha angles were >50°, and in 25%, alpha angles were >58°. Male patients showed significantly higher alpha angles, lower offset ratios, and a higher prevalence of cross-over signs. In contrast, female patients had significantly higher lateral center edge angles. Overall, 71.9% of the patients had at least one radiological sign of FAI on plain hip x-rays.

**Conclusion:** According to our data, radiological signs of cam and pincer FAI are common in asymptomatic people. Therefore, in clinical practice, patients presenting with hip pain and native radiological signs of FAI should undergo further diagnostic evaluation. However, in asymptomatic patients with radiological signs of FAI, no further evaluation is recommended.

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## O02 Hip preserving surgery 1

O02-98

### DEROTATIONAL FEMORAL OSTEOTOMIES FOR POSTERIOR EXTRAARTICULAR ISCHIOFEMORAL HIP IMPINGEMENT REDUCE ANTERIOR AND POSTERIOR HIP PAIN

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**Introduction/objectives:** Posterior extraarticular ischiofemoral hip impingement can be caused by high femoral torsion and is typically located between the ischium and the lesser trochanter.  
**Objectives:** To assess (1) hip pain and function, (2) subsequent surgeries and complications and (3) PROMs in patients undergoing derotational femoral osteotomies at minimum 1-year follow-up.

**Methods:** We evaluated 33 hips undergoing derotational femoral osteotomies between 2005 and 2016 retrospectively. Mean follow-up was 3±3 years and 94% were female. 19 hips with a cam-type FAI underwent offset improvement to avoid anterior intraarticular impingement. 18 hips underwent derotational femoral osteotomies combined with varisation (neck-shaft angle >139°). Indication for derotational osteotomies was a positive posterior impingement test in extension and external rotation, high femoral torsion (mean 46° ±7) on CT scans and decreased external rotation (mean 16°±13).

**Results:** At minimum 1-year follow-up (1) the positive posterior and anterior impingement test decreased from preoperatively 100% to 3% (p<0.001) and from preoperatively 97% to 18% (p<0.001). The mean Merle d'Aubigné Postel score increased from 14 (11-16) to 16 (13-17) at latest follow-up (p<0.001).  
(2) At follow-up 32 hips had been preserved and one hip had been converted to THA. (2) In two hips (6%) revision osteosynthesis was performed for delayed healing of the femoral osteotomy.  
(3) WOMAC, HOOS, HHS and UCLA were satisfactory for the majority of patients.

**Conclusion:** Derotational femoral osteotomies with and without offset improvement and varisation for posterior extraarticular ischiofemoral impingement caused by high femoral torsion result in decreased hip pain at midterm follow-up but had 6% delayed healing rate requiring revision surgery.

## O02 Hip preserving surgery 1

O02-45

### HIP ARTHROSCOPY COMPARED TO BEST CONSERVATIVE CARE FOR THE TREATMENT OF FEMOROACETABULAR IMPINGEMENT SYNDROME. A RANDOMISED CONTROLLED TRIAL (UK FASHION)

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**Introduction/objectives:** Femoroacetabular impingement syndrome (FAI) is a common cause of hip and groin pain in young adults. There is no robust evidence of comparative effectiveness of physiotherapy or surgery. UK FASHION compared the clinical and cost-effectiveness of arthroscopic hip surgery (HA) versus best conservative care.

**Methods:** UK FASHION was a pragmatic, multicentre, 2 parallel arm, superiority, randomised controlled trial in patients with FAI syndrome. Eligible patients were over 16 without radiographic signs of osteoarthritis, deemed suitable for arthroscopic FAI surgery. Participants were randomly allocated to HA or physiotherapy (PHT). The primary outcome measure was hip-related quality of life using the patient-reported International Hip Outcome Tool (iHOT-33) at 12 months. Secondary outcomes included EQ5D5L, SF12, adverse events, and cost-effectiveness. Primary analysis compared differences in iHOT-33 scores at 12 months by intention to treat.

**Results:** 348 patients were randomised. Time to surgery was 132 days (SD71) versus 47 days (SD52) to PHT. 92.5% were followed-up at 12 months. Baseline mean iHOT-33 scores were 39.2 (SD21) and 35.6 (SD18) in the surgery and PHT groups, and at 12 months 58.8 (SD27) and 49.7 (SD25) respectively. Mean scores in both groups improved over 12 months, but the mean iHOT-33 score increased more in those allocated to HA than to PHT, with an adjusted mean difference of 6.8 points (95% CI 1.7, 12.0 p=0.009). Mean overall costs were £3713 for HA and £1283 for PHT.

**Conclusion:** Hip arthroscopy and best conservative care both led to improved hip-related quality of life in patients with FAI syndrome. At 12-month follow-up, improvement was greater in those allocated to hip arthroscopy.

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## O02 Hip preserving surgery 1

O02-123

### ACETABULAR CHONDRAL LESIONS ASSOCIATED WITH FEMOROACETABULAR IMPINGEMENT TREATED BY AUTOLOGOUS MATRIX-INDUCED CHONDROGENESIS OR MICROFRACTURE: A COMPARATIVE STUDY AT 8-YEAR FOLLOW-UP

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**Introduction/objectives:** Acetabular chondral lesions require specific treatment in addition to that of FAI. In this single-center retrospective analysis of a consecutive series of patients, we compared microfracture (MFX) with autologous matrix-induced chondrogenesis (AMIC) treatment outcomes.

**Methods:** Acetabular grade III and IV chondral lesions measuring between 2 cm<sup>2</sup> and 8 cm<sup>2</sup> in 109 patients were treated either by MFX in 50 or by AMIC in 59 hips. Outcomes were assessed using the modified Harris hip score until 8 years post-operatively.

**Results:** The pre-operative mHHS was significantly lower in the AMIC group (p = 0.006). The mean mHHS improved significantly in both groups six months post-operatively (77.04 for MFX) and 78.8 for AMIC p < 0.001). The mean improvement of mHHS at 6 months was 30-34 points versus preoperative values. At this time there were no better results in the AMIC group versus the MFX group. Differences in outcomes between the two groups became apparent two years post-operatively. The scores in the AMIC group were significantly better than in the MFX group at all time points from 2 to 8 years (p < 0.005). The respective values of mHHS at 8 years were of 76.4 and 81.4 for MFX and AMIC-treated patients. A total of 11 patients (22%) in the MFX group required THA after 6-12 months (n=2), 2 years (n=1), 3 years (n=1), 4 years (n=2), 5 years (n=2), 6 years (n=1) and 7 years (n=2). None in the AMIC group required THA.

**Conclusion:** We conclude that both MFX and AMIC techniques led to marked clinical short-term improvement. AMIC gave significantly better results up to 8 years post-operatively. 11 patients (22 %) requiring THA in the MFX group, compared with none in the AMIC group.

## O02 Hip preserving surgery 1

O02-347

### BONE WAX CAN LEAD TO GROWING OSTEOLYSIS AFTER OPEN FAI SURGERY

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**Case Study:** Objective: Bone wax is a hemostatic agent consisting of paraffin and beeswax, widely used to prevent bleeding from bone surfaces. Despite its effectiveness in hemostatic control it can lead to foreign body granuloma and osteolysis. It is unknown if osteolysis progresses over time, thus we asked if a persistent foreign body reaction might lead to growing osteolysis.

**Methods:** We identified 471 patients between 01/2002 and 12/2006 that underwent offset correction at FAI surgery with application of bone wax at our orthopedic department. 146 had to be excluded due to previous operation or trauma. Out of those 325 patients we retrospectively observed six hips in five patients with persisting pain and growing osteolysis on the x-rays in the area of the offset correction. We measured the relative area of the osteolysis (area of osteolysis/area of femoral head in %) in the x-ray follow-up over a mean time of 7.8 ± 2.5 years (5-11 years) and compared the first with the last quotient. Additionally, we histologically analyzed a sample of one of those hips, which had a later revision surgery at our hospital.

**Results:** We measured an increase in size of the osteolysis for all six hips. The mean initial quotient was 5.3% ± 2.9% (2.3%-10.7%), the mean quotient at the latest follow-up was 10.3% ± 3.7% (7.1%-17.2%). Comparing the values, the mean increase of the area of osteolysis compared to the initial area of osteolysis was 123.8% ± 81.1% (61.4% - 281%). Histologically we found remaining wax as a foreign material with attached multinucleated giant cells and abundant mononuclear cells.

**Conclusion:** Bone wax as a foreign body can provoke long lasting foreign body granuloma resulting in growing osteolysis.

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## O02 Hip preserving surgery 1

O02-459

MID TO LONG-TERM RESULTS OF BERNESE PERIACETABULAR OSTEOTOMY

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**Introduction/objectives:** Bernese (Ganz) periacetabular osteotomy (PAO) is an accepted treatment for hip dysplasia. In this study, we assessed mid to long-term results of PAO performed for acetabular dysplasia.

**Methods:** Between 1998 -2015, Bernese POA have been performed in 126 hips (112 patients) by a single surgeon (IRT) with a standard technique. Minimum five years follow-up pts were evaluated. Merle d'Aubigne (Mda) and Harris Hip Score (HHS) were assessed pre and postoperatively. Pre and postoperative radiographic parameters were measured with Hip2Norm software. Symptomatic patients were obtained. Kaplan-Meier analysis was used to assess survivorship with an endpoint of total hip arthroplasty (THA).

**Results:** Mean Follow-up period was 9.6yrs (5-18) yrs. Mean age was 30 (12-48) years. Mean HHS and Mda scores were measured 81.4 ±9.8 and 14.8 ± 1.1, preoperatively. At the last follow-up both mean scores were higher; 89.4 ± 11.1 and 16.3 ±1.7, postoperatively. There were significant differences between mean pre- and postoperative values of Anterior and Cranio-caudal Coverage, Lateral Center Edge Angle, Acetabular Index and Extrusion Index. Pre and post-operative mean Tonnis scores were 0.9 and 1.2, respectively. 15 hips were symptomatic. Seven of them were undergone THA at a mean of 9.3 ± 3.6 years. Kaplan Meier analysis revealed a hip survival rate of 91% at tenyear

**Conclusion:** Bernese PAO is a useful technique to postpone performing total hip arthroplasty in hip dysplasia and did well at a mean of ten years.

## O02 Hip preserving surgery 1

O02-68

AMIC (AUTOLOGOUS MATRIX INDUCED CHONDROGENESIS) WITH BONE MARROW DERIVED CELL TRANSPLANTATION FOR TREATMENT OF ACETABULAR CARTILAGE LESIONS IN CAM-TYPE FEMOROACETABULAR IMPINGEMENT (FAI)

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**Introduction/objectives:** Autologous Matrix Induced Chondrogenesis (AMIC) can improve results of microfracturing. A one-step arthroscopic technique based on bone marrow-derived cell transplantation (BMDCT) has shown good results in repairing osteochondral lesions of the talus. We describe a new technique to apply BMDCT to augment the arthroscopic AMIC procedure in the hip.

**Methods:** BMDCT onto a Chondrogide membrane was performed in 16 hips. The original description of the BMDCT technique had to be modified to allow fixation of the collagen membrane to the acetabulum during the arthroscopic procedure. All patients had cam type FAI for which arthroscopic femoroplasty was performed.

**Results:** Mean age was 29 years. In 9 hips a labral repair had also been performed. Mean follow-up was 17 months. There were no complications or adverse events. Subjective results were rated as excellent in 10 and very good in 6. Mean internal rotation improved from 5° to 28°; flexion and extension normalized in all hips. HHS improved from 83 to 93; UCLA Activity Score improved from 6 to 9. No patient developed significant heterotopic ossification. Alfa angle improved from 81° to 52°, bone oedema present on MRI in 3 hips disappeared within 6 months. A relook arthroscopy after one year showed smooth labral-like tissue, well fixed to the underlying bone and labrum. D-GEMRIC MRI confirmed normal hyaline cartilage-like signal. Four patients had previously contralateral FAI surgery and AMIC without BMDCT; they all had a faster return to running and sports with AMIC + BMDCT.

**Conclusion:** Combined arthroscopic AMIC with Chondrogide and BMDCT is safe and technically feasible in the treatment of medium to large cartilage defects in cam-type FAI, with excellent clinical results in the short term.

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## O03 Imaging

O03-415

NATIVE FEMORAL ANTEVERSION CAN BE MEASURED ACCURATELY WITH LOW DOSE BIPLANAR IMAGING

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**Introduction/objectives:** Computed tomography (CT) is presently the gold standard for measuring native femoral anteversion. Recently, a novel low-dose radiographs imaging system has been developed that allows for 3-dimensional femoral modelling with calculated measurements of femoral anteversion. The purpose of this study was to compare biplanar imaging to CT scans, to assess accuracy of predicting pre-operative femoral anteversion

**Methods:** Twenty patients undergoing unilateral total hip arthroplasty (THA) consented to this prospective IRB-approved study. All patients had standing biplanar imaging (EOS Imaging Inc, Paris, France) and supine CT scans pre-operatively. Pre-operative femoral anteversion was measured by a fellowship-trained orthopaedic surgeon and a senior radiologist from biplanar radiographs and pre-operative CT scans. The most posterior part of the femoral condyles was used as an anatomic reference for femoral anteversion. Femoral anteversion was defined between the femoral neck axis and the axis passing through the most posterior points of the medial and lateral condyles.

**Results:** There were 9 males and 11 females (N=20) with a mean age of 61±9 years. Mean BMI was 26.6±4.3. Mean native femoral anteversion as measured on biplanar imaging was 13.09±10.3 degrees. The mean measured native anteversion on CT scan was 14.05±9.08 degrees. The average measured difference between biplanar radiographs and CT measurements was 0.96±2.42 degrees. There was no significant difference found between the measured biplanar and the CT based measurements (P=0.7552).

**Conclusion:** Standard biplanar imaging can accurately and reliably measure native femoral anteversion while exposing patients to a much lower dose of radiation than a CT scan.

## O03 Imaging

O03-145

HIGH VARIABILITY IN FUNCTIONAL PELVIC TILT IN PATIENTS UNDERGOING TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** The sagittal rotation of the pelvis changes during daily activities, which potentially influences the functional anteversion and inclination of the acetabular cup in patients having total hip arthroplasty (THA). The aim of this study was to quantify changes in pelvic tilt between different functional positions.

**Methods:** Lateral full body x-ray images of THA patients were taken with EOS imaging system in the standard low-dose protocol. Pelvic tilts were measured using Centricity Enterprise Web 4.0 2010 GE Healthcare IT at three functional positions - standing, seated and flexed seated (the rising action initiated when leaving from the seated position) by two independent observers. Anterior pelvic tilt was assigned a positive value.

**Results:** Pelvic tilts of 27 patients were measured (mean age: 61-years-old, ranged 30-83; sex: M:F = 13:14). The mean pelvic tilts were 5.02° (-27.80° to 21.90°), -18.73° (-48.10° to 24.40°) and -5.07° (-49.80° to 38.20°) at the three functional positions, respectively. The mean sagittal pelvic rotation from standing to seated was -10° (-46.70° to -10°), from standing to flexed seated was -4.44° (-48.4° to 18.90°) and from seated to flexed seated was 6.12° (-33.60° to 26.80°). In 16 patients (59%), the extent of sagittal pelvic rotation could lead to functional malorientation of the acetabular component.

**Conclusion:** High variability of the sagittal pelvic rotation was observed. The intraoperative positions of acetabular components based on local pelvic anatomy alone may fail to predict clinically significant changes in its orientation when patients resume functional activities. The optimal acetabular component position is patient-specific, and preoperative functional pelvic tilt should be taken into consideration.

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## O03 Imaging

### O03-429

#### DOES COMBINED ANTEVERSION PREVENT DISLOCATION IN TOTAL HIP REPLACEMENT?

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**Introduction/objectives:** Although the cause of dislocation in total hip replacement (THR) is multifactorial, the correct alignment of the components has been described as critical point to avoid it. Combined anteversion (CA) is the sum of cup and stem anteversion. Has been suggest, that the safe zone is between  $37^\circ \pm 10^\circ$

**Methods:** Historic cohort study of patients operated on primary THR between 2009 and 2015. The inclusion criteria were: Patients with primary degenerative coxarthrosis and ages between 55 and 88. Patients with hip dysplasia or neuromuscular diseases were excluded. Clinical and radiological variables of patients with dislocation were analyzed. The acetabular, femoral and combined anteversion were analyzed radiologically. The CA of  $37^\circ \pm 10^\circ$  was considered as the "safe zone". Radiographic data were measured by computerized axial tomography

**Results:** 1289 primary THR met the inclusion criteria. There were 34 dislocation (2.63%). Average age 71.08 years. Mean follow-up was 32 months. Most dislocated THR (73.5%) had a correct acetabular anteversion. The mean acetabular anteversion was  $15.1^\circ \pm 9.4^\circ$ . In addition, 38.2% of the dislocated THR had a correct femoral anteversion. The mean femoral anteversion was  $8.4^\circ \pm 17.2$ . Eventually 35.3% (12 of 34) of the dislocated THR had a correct combined anteversion. The mean combined anteversion was  $21.1^\circ \pm 16.5$

**Conclusion:** One in three (35.3%) of dislocated hip replacements had a correct combined anteversion. The dislocation in the THR is multifactorial and although a correct combined anteversion is necessary to avoid the femoro-acetabular impingement, it cannot be considered as a true safe zone

## O03 Imaging

### O03-85

#### ALIGNMENT VIEW BEFORE TOTAL HIP ARTHROPLASTY IN DYSPLASTIC HIP CAN FIND SOME CASES FOR DISTAL OSTEOTOMY WITH OUT SHORTENING BY NEW MECHANICAL AXIS AFTER INSERTING CUP AND STEM, AN IMPORTANT TECHNICAL POINT

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**Introduction/objectives:** Total hip arthroplasty is done for destructive joint disorder sequela of dysplastic hips. There may be some cases which has valgus knee. So, we take alignment view before total hip arthroplasty in DDH cases. There were more valgus knees specially in crowe type 3 and 4 for maintaining mechanical axis balanced before operation. If it is not corrected during process of THA, after inserting cup and stem and omission of proximal femur, valgus alignment may become prominent. So it is advised that if there is high riding hip which need shortening, it is done in distal part of femur to both correct mechanical axis and also do shortening. In crowe type 1 and 2 which may do not need shortening, if there is valgus knee, distal osteotomy without shortening should be done

**Methods:** Between 2005 and 2015, there were 154 dysplastic hips which need THA. Alignment view were done for all of them.

**Results:** There were 6 cases of crowe type 1 and 2 that need distal osteotomy to correct knee alignment without any need of shortening.

**Conclusion:** In pre-operative planning, it is necessary to draw new mechanical axis of limb with new position of cup and stem to calculate position and size of osteotomy of distal femur. If osteotomy done without attention to new mechanical axis after inserting cup and stem, there may be over or under correction of alignment.



## O03 Imaging

### O03-160

#### TRACTION MR ARTHROGRAPHY OF THE HIP FOR CHARACTERIZATION OF AVASCULAR NECROSIS AND FEMORAL CARTILAGE DAMAGE

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**Introduction/objectives:** In young patients with femoral head necrosis (AVN) surgical hip dislocation or hip arthroscopy offer the possibility of bone grafting, cartilage repair and correction of associated femoroacetabular impingement. Currently necrosis-, cartilage damage pattern and overall joint morphology are unknown in AVN. Traction MR arthrography (MRA) can improve visualization of cartilage lesions. Thus we assessed (1) location of necrosis, (2) cartilage damage pattern, (3) accuracy of traction MRA to detect cartilage lesions (4) and prevalence of osseous deformities.

**Methods:** IRB-approved retrospective study. Database (2016-2018; 360 hips) was reviewed for patients with AVN and complete radiographs and traction MRA. 30 patients were included (mean age 31 years). 14 hips underwent joint preserving surgery (9 open, 4 arthroscopy). Traction technique included weight-adapted traction (15-23 kg), a supporting plate to avoid pelvic tilt and radial images for assessment of cam deformities, necrosis, cartilage damage. We assessed (1) necrosis location, (2) femoral cartilage damage pattern on radial MR images; (3) accuracy of traction MRA to detect femoral cartilage lesions compared to surgery; (4) prevalence of cam-/pincer-/dysplastic hip deformities.

**Results:** (1) Necrosis was located most frequently antero-superiorly (93%).  
(2) Most frequently femoral cartilage delamination was found antero-superiorly (87%).  
(3) Sensitivity-specificity was 100% of traction MRA to detect femoral cartilage lesions.  
(4) 90%; 43%; 23% of hips had a cam-, pincer-, dysplastic deformity.

**Conclusion:** AVN predominantly affects the antero-superior quadrant and leads to corresponding femoral cartilage delamination which can be detected accurately using traction MRA. Prevalence of osseous deformities is high in AVN.

## O03 Imaging

### O03-53

#### THE MANAGEMENT OF ISOLATED GREATER TROCHANTER FRACTURES: IS CROSS-SECTIONAL IMAGING NECESSARY?

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**Introduction/objectives:** Isolated fracture of the greater trochanter is an uncommon presentation of hip fracture. Historically, these injuries were managed non-operatively, but modern imaging techniques have made it possible to detect occult intertrochanteric extension in up to 90% of cases. We aimed to review the investigation and management of greater trochanter fractures in our institution.

**Methods:** A retrospective review was completed of patients admitted with greater trochanter fractures. These were case-matched with 2-part extracapsular fractures. Initial management and clinical outcome was established using electronic notes and radiographs. Mortality and length of stay was calculated for both groups.

**Results:** 85 isolated greater trochanter fractures in 84 patients identified from 2006-2017. 81/85 patients were treated non-operatively. 78 were mobilised full weight bearing. None required readmission or operation due to fracture displacement. 58 patients had cross-sectional imaging with MRI or CT and 15 of those scanned had intertrochanteric extension. In the same time period, 998 2-part extracapsular fractures were treated using a sliding hip screw. Length of stay was shorter in patients with greater trochanter fractures than 2-part extracapsular fractures (median 7 days vs 14 days,  $p < 0.0001$ ). 30-day mortality was 11.9%, with no significant difference to patients with 2-part extracapsular fractures.

**Conclusion:** Cross sectional imaging rarely changed treatment protocol for greater trochanter fractures. The outcome following non-operative treatment is good even in the presence of occult fractures. We advocate early mobilisation and repeat plain radiographs if patients fail to progress. This will reduce unnecessary morbidity from fixation of stable occult fractures.



## O03 Imaging

### O03-395

#### SPORT SPECIFIC DYNAMIC EVALUATION OF THE IMPINGING HIP IN ATHLETES

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**Introduction/objectives:** After effect of Femoro acetabular impingement are nowadays recognized as a major cause of hip pain in the athletic population. In this population an accurate evaluation of the hip morphology and of its R.O.M. are of crucial importance to understand the specific impingement. Athletes have motion request that aren't usual for the non-athletic population. Usual diagnostic tools have the limitation that can give only a static bi-dimensional evaluation of the hip. The use of a collision model can improve the comprehension of the sport specific impingement.

**Methods:** From Jan 2014 to Jul 2016 we treated 15 professional sports players. Clinical evaluation including all impingement tests was performed. Complete radiographic protocol evaluation was performed. MRI was performed in all patients and arthro MRI in 8 patients. A CT scan was performed and then obtained a collision model.

**Results:** In these cases the collision model software provides several crucial information including quantification of total acetabular coverage therefore suggesting to limit our trimming only to the femoral side. Of crucial importance is the possibility to analyse the alpha angle in relation to the acetabulum and to simulate pre operatively the specific sport impinging spots.

**Conclusion:** A collision model software can give several crucial information regarding static hip morphology. In addition to other static pre-operative exams, a collision model can simulate the hip ROM and reproduce the specific impingement. In conclusion our experience with dynamic software assisted visualization of FAI has been extremely helpful. Software assisted FAI evaluation is an effective tool to improve our understanding of sports specific impingement and can improve the outcome of our treatments.

## O04 Trauma

### O04-215

#### INFLUENCE OF COGNITIVE IMPAIRMENT ON MORTALITY, COMPLICATIONS AND FUNCTIONAL OUTCOME AFTER HIP FRACTURE: DEMENTIA AS A RISK FACTOR FOR SEPSIS AND URINARY INFECTION

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**Introduction/objectives:** To analyze the influence of cognitive impairment on mortality, complications and functional outcomes in patients older than 65 with a hip fracture.

**Methods:** Observational study of a single-center prospective consecutive cohort: 955 patients of 86±7.2 (65-104) years, 725 (75.9%) female, from 2013 to 2015, extracapsular in 538 cases (56.3%) and intracapsular in 417 (43.7%). Patients were controlled clinically and radiographically in out-patient clinic after up to 12 months. Statistical analysis: Bivariate analysis (Pearson, Fisher, Mann-Whitney, Wilcoxon) was applied to study statistically significant relations, and contingency coefficients (CC) were calculated.

**Results:** Patients with cognitive impairment showed higher mortality, total (p=0,000; CC=0,197) and out-of-hospital (p=0,000; CC=0,198), a higher rate of respiratory infections (p=0,029; CC=0,093), urinary tract infections (p=0,008; CC=0,108) and sepsis (p=0,011; CC=0,105). We found no correlations between mental status and surgical complications, even for dislocation (p=0,136). Patients with dementia started from poorer functional situations (p=0,000; CC=0,367) and ended follow-up with lower walking ability (p=0,000; CC=0,4,3), but cognitive impairment did not relate statistically with a worse functional recovery (p=0,304); the proportion of patients who maintained their previous ability to walk was similar in both groups (altered mental status and not).

**Conclusion:** 1. Cognitive impairment is a risk factor for mortality in hip fracture patients.  
2. Cognitive impairment is a risk factor for respiratory, urinary tract infection and sepsis (These two late are not published previously).  
3. Functional recovery is not conditioned by cognitive impairment.

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## O04 Trauma

### O04-426

#### PERIOPERATIVE OUTCOMES OF ACUTE FIXATION AND HIP REPLACEMENT FOR ACETABULAR FRACTURES IN PATIENTS OVER 60 YEARS OF AGE

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**Introduction/objectives:** The incidence of fragility fractures of the acetabulum in older patients is increasing. Management may be non-operative, acute fixation or fixation with hip replacement. Review of the literature suggests a trend towards better outcomes in patients who are allowed early mobilisation and full weight bearing thus avoiding sarcopenia, deconditioning and dependence/ disability. This paper describes our experience of 'fix and replace' in an older cohort of patients.

**Methods:** This is a retrospective study. Medical records and imaging for 45 patients over 60 years of age treated with acute column fixation and THR over 3 years were reviewed. Co-morbidities, ASA grade, injury mechanism, fracture type and perioperative complications are recorded. Pathological fractures were excluded.

**Results:** Thirty-six patients were included. Average age was 74.7 years, median ASA 3. Eighty-four percent of these injuries occurred as a result of low-energy simple fall. Seventy-eight percent of the acetabular fractures involved both columns with fragmentation and dome impaction. A dual-approach was used in 74.3% for fixation of both columns followed by hip arthroplasty. Mean blood loss 850ml. Patients were allowed to weight bear immediately. Mean length of stay was 27.9 days. Complications included 2 dislocations, 1 failed fixation, 2 deep infections. Two patients died within 28 days.

**Conclusion:** Achieving stable fixation of both columns and quadrilateral plate support is a pre-requisite for acute hip arthroplasty. Combined acetabular fixation and hip arthroplasty is safe and allows early mobilisation of patients with potential to reduce morbidity and mortality in this frail patient group.

## O04 Trauma

### O04-542

#### FEMORAL HEAD FRACTURES MANAGEMENT THROUGH SURGICAL HIP DISLOCATION, SAFE BUT DEMANDING TECHNIQUE

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**Introduction/objectives:** -Introduction: Femoral head fractures are complex and rare injuries; surgery is indicated when incongruity and instability are present. Many surgical approaches have been described for treatment, with the disadvantage of limited exposure. 360-degree view of the head can be achieved through Surgical hip dislocation which facilitate reduction in selected head fractures.  
-Objective: We report on the (1) quality of fracture reduction, (2) clinical function at a minimum of 1 year (3) frequency of complications especially avascular necrosis in a case series with treated with this approach.

**Methods:** we retrospectively reviewed 31 cases of fracture head femur treated through surgical hip dislocation in the period from 2011 to 2017 with a minimum follow up of 12 months (range 12:60)  
4 cases were lost during follow up leaving 27 patients for study, the average age was 34 years (SD,8.3). 6 cases pipkin 1, 13 cases pipkin 2 and 8 cases pipkin 4. Radiographic evaluation of reduction was done using the Matta's criteria, Harris hip score and modified Merle d'Aubigne hip score for clinical assessment.

**Results:** Anatomic Fracture reduction in 21 hips and satisfactory in 6. Mean HHS was 88 points (range 80:100), mean modified Merle d'Aubigne hip score was 15 (SD,1). 2 patients developed symptomatic hip arthritis. No femoral head AVN was reported. 2 patients had asymptomatic Brooker type 1 heterotopic bone formation.

**Conclusion:** Management of femoral head fractures through surgical hip dislocation is a surgically demanding but safe procedure with clinical results comparable to previous reports with nearly similar rate of complications.

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## O04 Trauma

### O04-556

NOF FRACTURE: KEY COMPONENTS CONTRIBUTING TO COST OF IN-PATIENT TREATMENT

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**Introduction/objectives:** Several authors have reported on time to surgery (TTS), length of stay (LOS) and total cost. Anecdotal evidence from our service suggests that all hip fractures are not created equal. We decided to investigate this suspicion within our trauma service in a regional hospital. If 'money is to follow the patient' this work has important implications for patient management.

**Methods:** We captured data on a retrospective cohort of 400 neck of femur (NOF) fractures which had a surgical procedure performed at Mayo University Hospital. After capturing case-level data from patient charts and theatre logbooks, we analysed this fracture population and show how patient demographics and operative features may directly impact LOS and cost of treatment.

**Results:** Eight patients required major optimisation before hip surgery while only 16 (or 4%) went to surgery more than 2 days after admission. Mean TTS was 28 hours with 229 (89%) patients reaching theatre within 24 hours of admission. 55% underwent hemiarthroplasty while 45% received fixation. Hemiarthroplasty took 1:19 while fixation took 0:05 longer. LOS did not correlate to age or to operation performed. LOS was significantly shorter for patients discharged Home (12 days, same hemiarthroplasty / fixation ratio). Mean total cost is 22,155 with implant, theatre and ward costs 1,045, 2,555 and 18,555 respectively.

**Conclusion:** LOS is significantly less for patients discharged Home ( $p < 0.001$ ): they are 5-years younger than the 1/3 discharged to Rehabilitation. Total cost of DHS (21,758) is 23% less than that of an IM Nail (28,385); PCPCP is 1/2 the cost of DHS or IM Nail ( $p < 0.05$ ). The charge for an orthopaedic bed (750/day) is still the most critical cost factor; 18,555, or 84% of 22,155.

## O04 Trauma

### O04-492

"SAFE SURGICAL ANGULAR RANGE" FOR SACRO-ILIAC (SI) SCREW AT S1 LEVEL

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**Introduction/objectives:** The misplacement of percutaneous SI-screws represents a critical complication which occurs in about 10% to 15% of all cases. This study was designed to analyse the radiographic anatomy of surgical S1 corridor and compare with the position of sacroiliac screws (S1) in a pelvic trauma population.

**Methods:** Retrospective study with patients submitted to surgical treatment of pelvic fractures with SI screws. Imaging evaluation with postoperative computerized tomography. Axial and coronal surgical angular range determined by selecting the ideal entry point on the ilium. A perpendicular line was drawn to the midpoint of the widest axial/coronal surgical canal view and extended out through the ilium. The intersection of this line with the ilium was used as the apex for angle calculation. Sagittal assessment of the entry point. Clinical complications or malposition screws were recorded.

**Results:** Total of 20 patients (14 men/6 women) and 27 (S1) screws. Average of 41.3 years old. Average safe axial surgical angular range of 20.7°, and 22.1° of coronal surgical angular range. All the screws were in a correct sagittal position. Almost 70% of the screws were outside the "safe axial surgical angular range" and only 11.1% was outside the "safe coronal surgical angular range". Three patients with post op neurological deficits. Complications most common in the group of screws out of "safe surgical angular range" ( $p$  less than 0,05).

**Conclusion:** These findings emphasize a high prevalence of misplaced screws in the axial plane when using this "safe angular range". Preoperative planning for (S1) percutaneous SI-screws for unstable pelvic and sacral fractures must include a detailed CT scan analysis to determine the safety and angular orientation of surgical corridors.

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## O04 Trauma

### O04-225

IS PARKINSON'S DISEASE ASSOCIATED WITH WORSE OUTCOMES FOLLOWING HIP REPLACEMENT AFTER HIP FRACTURE?

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**Introduction/objectives:** The prevalence of Parkinson's disease (PD) is increasing. This condition imparts a significantly increased risk of hip fracture. A retrospective cohort analysis was performed to establish whether patients with PD had worse outcomes following hip replacement surgery (HR) for treatment of acute fractures. Outcomes following hemi or total arthroplasty were evaluated by comparison of revision rates recorded for matched patient groups and mortality rates observed.

**Methods:** Patients who underwent HR surgery following acute hip fracture between 2005 - 2012 with PD were identified using datasets available through the Swedish Hip Arthroplasty Register. A control group was generated, with 1:3 matching for sex and age. Risks of revision and mortality were compared at points over the 7-year study period, using Kaplan-Meier and Log-rank testing; p-values <0.05 were considered statistically significant.

**Results:** Risk of mortality did differ at 30 days ( $p=0.034$ ), at 1 year ( $p=0.002$ ) and at 7 years ( $p<0.001$ ) with increased mortality for PD patients ( $p<0.001$ ). Risk of revision did not differ at 30 days ( $p=0.16$ ). At 1 and 7 years, revision was higher for PD patients ( $p=0.007$ ). Overall, indications for revision observed in the PD group were predominantly for dislocation/instability.

**Conclusion:** Patients with PD had worse outcomes following total or hemiarthroplasty following hip fracture, with increased risks of revision and long-term mortality. In order to improve outcomes in this patient population further investigations are needed to analyse the reason for increased revision. With a predicted increase in prevalence of Parkinson patients with hip fractures a true multidisciplinary approach has to be considered to improve outcomes.

## O04 Trauma

### O04-411

DISLOCATION RATE WITH HEMIARTHROPLASTY FOR FRACTURE OF THE FEMORAL NECK USING THE POSTERIOR APPROACH. RESULTS FROM A LARGE CASE SERIES.

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**Introduction/objectives:** Literature suggests an up to 8-fold increased dislocation risk if fracture of the femoral neck (FFN) is treated with hemiarthroplasty using a posterior surgical approach compared to a lateral approach, resulting in dislocation rates of 5.1- 16.0%. Other outcomes (post-op bleeding, gait) are reportedly better with posterior approach. We aimed to analyse the risk of dislocation in a consecutive cohort of FFN patients treated with posterior surgical approach hemiarthroplasty.

**Methods:** A review of prospectively collected data on 435 consecutive hemiarthroplasty procedures for FFN between January 2009-December 2017 including patient demographics and dislocation risk factors. 30 day and 1 year mortality rates were calculated. Hospital charts were retrospectively reviewed for any dislocation. Posterior approach with tissue repair was used in all cases.

**Results:** Mean age was 82.9 years (standard deviation +/-8.5), 70.8% female, mean length of stay 11.1 days, 30 day mortality rate 6.2%, 1 year mortality rate 20.5%. There were 10 first dislocations (2.3%), mean time to dislocation was 18 days (min-max: 2-54). 6/10 had recurrent dislocations but no patients were revised for dislocation.

**Conclusion:** Posterior approach hemiarthroplasty for treatment of fracture of the femoral neck can result in a relatively low dislocation rate (2.3%), comparable to reported dislocation rates (0-4%) with a lateral approach. Combined with a lower risk of post op bleeding and better gait outcome, posterior approach hemiarthroplasty can be a good solution for FFN.

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## O05 Complex primary THA 1

### O05-410

THE OPTIMAL METHOD OF TOTAL HIP REPLACEMENT IN PATIENTS WITH CONSEQUENCES OF SEVERE ACETABULAR FRACTURES AND PELVIC DISCONTINUITY.

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**Introduction/objectives:** The aim of this study was to create an algorithm of choosing the optimal method of total hip replacement in patients with consequences of severe acetabular fractures and pelvic discontinuity.

**Methods:** 150 patients with consequences of severe acetabular fractures and pelvic discontinuity were divided into four groups according to the technique used for total hip arthroplasty from 2004 to 2016. Each patient was clinically and radiologically evaluated (including CT scans) post-operatively. Functional outcomes were evaluated using standard questionnaires. 71% of patients were male, 29% were female. 72% of patients were below 50 years of age and 28% were 51-78 years old

**Results:** Posterior approach (Kocher-Langenbeck) for hip replacement provides very good visualization and allows surgeon to perform numerous manipulations, this reduces duration of surgery and blood loss if compared with anterolateral or combined approach. Mathematical models showed that combination of Burch-Schneider Cage with acetabular component (Cup-cage) is the most effective option for creation of primary stability of acetabular component in patients with consequences of severe acetabular fractures and pelvic discontinuity. This was also shown by better functional outcomes in this group of patients.

**Conclusion:** Combining Burch-Schneider Reinforcement Cage with the acetabular component (Cup-cage) in total hip arthroplasty in patients with such pathology is preferable to create primary stability. Algorithms were created to minimize the cost of pre-operative planning and to increase the functional outcomes of total hip replacement in patients with consequences of severe acetabular fractures and pelvic discontinuity.

## O05 Complex primary THA 1

### O05-363

ACETABULAR RECONSTRUCTION USING A ROOF REINFORCEMENT RING WITH HOOK FOR TOTAL HIP ARTHROPLASTY IN DEVELOPMENTAL DYSPLASIA OF THE HIP-OSTEOARTHRITIS - MINIMUM 22-YEAR FOLLOW-UP RESULTS

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**Introduction/objectives:** In patients with development dysplasia of the hip (DDH) the acetabular reconstruction in the total hip arthroplasties (THA) continues to be challenging. In the long-term patients with DDH have increased risk of aseptic loosening and migration of the acetabular component. The acetabular roof reinforcement ring with hook (ARRH) is designed for use in acetabular reconstruction with bone stock deficiencies and bone grafting can be done behind the ring.

We report here the long-term results of acetabular reconstruction using ARRH with a minimum follow-up of 22 years in DDH.

**Methods:** This study consists of 33 consecutive cases of THA for DDH. The average age at surgery was 53 years (range, 35-77 years). Ten hips were classified as Charnley group A and 23 as Charnley group B. Patients were clinically and radiographically assessed at follow-up. A Kaplan-Meier survivorship analysis was calculated and a cox regression analysis was performed with the endpoint of THA revision.

**Results:** The average follow-up was 24.8 years (range, 22-27.7years) with a minimum follow-up of 22 years. The mean Merle D'Aubigné score increased from 7 preoperative to 15 points at follow-up. The survivorship of the hips at 22-years was 75% (95% confidence interval, 58-88%). Six hips underwent revision for aseptic loosening and one hip underwent revision for recurrent hip dislocations. Structural bone grafting was identified as risk factor for failure (hazard ratio with 95% confidence interval, 6.6 [5.0-8.2], p-value 0.023).

**Conclusion:** As a versatile tool for acetabular reconstruction in bone stock deficiencies the acetabular reinforcement ring with hook shows favourable long-term outcomes. If structural bone grafting is needed for reconstruction failure rate is substantially higher.

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## O05 Complex primary THA 1

### O05-516

RESULTS OF PERTROCHANTERIC FIXATION WITH PROXIMAL HUMERUS PLATE IN PATIENTS WITH TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** A number of techniques are used for fixation of pertrochanteric fractures in patients with total hip arthroplasty. The etiologic factors include intraoperative fractures, femoral osteotomy, pertrochanteric fracture of hips with coxarthrosis and periprosthetic fractures. Fixation of these fractures are often challenging because of a intramedullary femoral stem.

**Methods:** 28 hips of 27 patients' X-rays were evaluated retrospectively whom underwent fixation of pertrochanteric fractures in patients with total hip arthroplasty with Proximal Humerus plate between 2014-2017 by 2 different orthopedic surgeons. 18 of 28 hips were Crowe type 4 hips which were operated with femoral shortening osteotomy, 4 were pertrochanteric fracture with coxarthrosis or avascular necrosis of femoral head, 2 were intraoperative fracture during total hip replacement surgery, 2 were periprosthetic fracture, 1 was nonunion after femoral shortening osteotomy fixed with plate and screw and 1 was coxa vara. Rate of fracture healing, number of fixed cortices and complication rate were measured. Fleiss' kappa statistical analysis was used to measure the level of agreement among 2 different orthopedic surgeons in evaluating the x-rays for fracture healing.

**Results:** 28 hips of 27 patients' were analyzed. Mean follow-up time was 19 months( range from 3-46 months) , mean number of fixed proximal cortices were 6.46 (range from 4-9), mean number of fixed distal cortices were 4.7 ( range from 3-9), average of union time was 93 days (range from 45-217). We observed only one nonunion with follow-up of 104 days.

**Conclusion:** Fixation of pertrochanteric fractures in patients with total hip arthroplasty with proximal humerus plate is a simple, safe and effective technique.

## O05 Complex primary THA 1

### O05-245

DIFFICULTIES AND ANATOMICAL RECONSTRUCTION AFTER CERAMIC-ON-CERAMIC TOTAL HIP ARTHROPLASTY FOR CONGENITAL HIP DISEASE

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**Introduction/objectives:** Implantation of a total hip arthroplasty (THA) presents remains a concern in patients with congenital hip disease (CHD) because bone deformities and previous surgeries. We compare surgical difficulties and outcome in patients who underwent THA due to arthritis secondary to severe CHD with those in control patients with moderate CHD

**Methods:** We assess 131 hips in patients with moderate CHD (group 1) and 56 with severe CHD (Group 2) who undergone an alumina-on-alumina THA between 1999 and 2012. The mean follow-up was 11.3 years (range, 5 to 18). Mean age was 51.4 years in group 1 and 42.2 in group 2. Two-way ANOVA with repeated measures were used to analyse clinical and radiological changes.

**Results:** We implanted a small cup in the true acetabulum and bone autograft was only used as segmental reinforcement in 10 cases in group 2. Twenty hips in group 2 had had previous surgery (p<0.001). Six cups were revised for aseptic loosening, three in each group. Survivorship analysis for cup aseptic loosening at 15 years showed 97.3% (95% Confidence Interval (CI) 94.4-100) for group 1 and 93.0% (95% CI 85.2-100) for group 2 (p=0.186). Despite a worse preoperative status in group 2, the clinical outcome improved in both groups. Acetabular component placement within Lewinnek's safe zone was similar in both groups and all revised cups were outside this zone. No osteolysis or complications from ceramics were found.

**Conclusion:** Using a small cup placed in the true acetabulum, the ceramic-on-ceramic THA provides good clinical results in both groups. Placing a cup in the true acetabulum inside the Lewinnek safe zone can be challenging in severe dysplasia.

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## O05 Complex primary THA 1

O05-105

### OUTCOMES OF TOTAL HIP ARTHROPLASTY AFTER PRIOR ACETABULAR FRACTURES

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**Introduction/objectives:** Total Hip Arthroplasty (THA) after an acetabular fracture (AF) is a technically demanding procedure. Thus, we aimed to evaluate our THA cases performed for post-traumatic sequelae following an AF, with a minimum 4-year follow-up.

**Methods:** Between 2011-2014, we performed 49 post-traumatic THAs (30 male and 19 female). All cases had priorly undergone surgery due to a closed AF. Patients' average age was 47.3 years (range, 25-73). Average time from AF's initial treatment to THA was 11 months (range, 9-18). Complete removal of previous hardware was necessary in 7 cases (14.2%), partial removal in 19 (38.7%), whereas in the remaining cases the prior osteosynthesis was left in-situ. A cemented cup was used in 13 patients (26.5%) and an uncemented one in 36 patients (73.5%). Morselized bone graft was used in 15 cases (30.6%) to fill different degrees of acetabular defects. An acetabular cage was indicated in 6 patients (12.2%). Mean follow-up 4.6 years (range, 4-6). Patients were evaluated at 3 weeks, 6 months and once every year to last follow-up.

**Results:** Mean preoperative Harris Hip Score (HHS) score was 42 points (range, 25-58), reaching 91 points at final follow-up (range, 82-96). Revision surgery was required for aseptic loosening of the acetabular component in 3 cases (6.1%). Seven acetabular cups presented with radiolucent lines without component migration in otherwise asymptomatic patients. Two patients had a surgical site infection and were treated with irrigation and debridement, whereas 2 other cases had a unique dislocation each, treated with closed reduction. Overall complication rate was 16.3%

**Conclusion:** THA following AFs showed acceptable results, being slightly inferior to those reported for degenerative hip disease.

## O05 Complex primary THA 1

O05-494

### CORRECTIVE OSTEOTOMIES IN CHILDHOOD ARE A RISK FACTOR FOR COMPLICATIONS DURING THA IN HIP DYSPLASIA

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**Introduction/objectives:** The aim of this work is to report results of uncemented trabecular titan acetabular component during THA (total hip arthroplasty) in treatment of hip dysplasia patients as well as to show complications that occurred.

**Methods:** Retrospective analysis of 181 THA in 159 patients (mean 49.2 years of age, range 19-80, F:143, M:16) from 2009 to 2016 was conducted. Minimal follow up was 2 years. One hundred THA were done on a priorly operated hips in childhood. There were 8 Chiari pelvic osteotomies, 55 periacetabular osteotomies, 88 femoral osteotomies, 16 greater trochanter distalizations and 3 soft tissue operations. Eighty six hip were not operated in childhood.

**Results:** All THA were performed using uncemented femoral and acetabular components. All acetabular components were made of trabecular titan. Among 16 non-satisfactory results there were 4 dislocations, 6 aseptic loosening of the femoral component, one femoral periprosthetic fracture, 1 deep periprosthetic infection, one aseptic loosening of the acetabular component, 1 peroneal palsy and 2 early polyethylene exchanges due to the increased wear. All of the complications occurred in the patients that were operated before in the childhood. All 6 aseptic loosening of the femoral component were seen in the patients that had femoral osteotomy done in the childhood. Acetabular component loosening occurred because of the initial malposition.

**Conclusion:** Uncemented acetabular components made of trabecular titan showed excellent short term survival. Corrective osteotomies in childhood are a risk factor for complications during THA.

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## O05 Complex primary THA 1

O05-586

### EXTENSIVE SOFT TISSUE RELEASE IN PRIMARY TOTAL HIP ARTHROPLASTY IN PATIENT WITH HIGH RIDING (>4 CM) PROXIMAL FEMUR

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**Case Study:** Hip arthroplasty in patients with high riding proximal femur is one of the most challenging issues in joint surgery setting. Patients with old missed proximal femur fracture or high level type 4 of dysplastic hip are complicated cases for hip replacement surgery and usually you don't know how much of discrepancy could be managed during surgery.

Soft tissue release around the hip or proximal femur shortening are two strategy for approach the patient and getting the anatomical site of acetabulum in true position.

But we have limitations in both way and we must balance between soft tissue and bone procedure to get best results with less complications and most patient satisfaction.

We studied around 15 patients with more than 4 cm limb shortening with different causes of hip problems needing joint replacement. We managed all these patients with extensive soft tissue release step by step to insert acetabulum component in correct position and gain maximal limb length near to other normal limb. We didn't do proximal femur shortening in any of cases and our surgeries have done in a regular grading way and special postoperative care.

The four processes utilized for high riding of proximal femur were as follows:

Firstly, the adductor and parts of the iliotibial tract Secondly, the iliopsoas muscle's attachment and rectus femoris and sartorius muscles release.

Thirdly, gracilis and biceps femoris, to the ischial tuberosity.

We collected all difficulties and postoperative complications to find best approach to these patients.

## O06 The paediatric hip

O06-220

### LONG-TERM RESULTS OF SINGLE-STAGE OPEN REDUCTION, SALTER INNOMINATE OSTEOTOMY, AND PROXIMAL FEMORAL OSTEOTOMY IN CHILDREN WITH DEVELOPMENTAL DYSPLASIA OF THE HIP

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**Introduction/objectives:** Hip open reduction, innominate osteotomy and proximal femoral osteotomy in cases of late diagnosed developmental dislocation of the hip (DDH) are widely used now. Assessment of long-term results of one-stage surgical treatment of patients with late diagnosed DDH and detection of main risk factors for adverse outcomes of treatment.

**Methods:** We retrospectively reviewed the cases of 65 patients who had 87 single-stage open reductions, Salter innominate osteotomies, and proximal femoral osteotomies between 1978 and 2006. To evaluate the radiographic results, the acetabular index and the Wiberg center-edge angle were measured, and the Severin and Kalamchi-MacEwen classifications were used.

**Results:** At the time of the operation, the mean age of the patients was 3.9y(range 1.0-10.1y). The average time of follow-up was 16.2 y(range: 10-38y).

A total of 70.4% of good or excellent outcomes were obtained for clinical functional evaluation according to the McKay classification. For radiographic outcomes, 67 hips (75.9%) were classified as good or excellent according to the Severin classification. A total of 29.3% of all hips had a poor outcome according to the Kalamchi and MacEwen classification for AVN.

The poorest outcomes were observed for clinical, radiographic and AVN results in children with: teratologic dislocation of the hip, previously performed long conservative treatment, multiple attempts of closed reduction with the development of AVN, age over 8 y.o. at the time of surgery (p < 0.05).

**Conclusion:** One-stage treatment is a good selection for late-diagnosed DDH. Best results can be obtained in children in the age group of 1.5-5 y.o. with typical DDH non-associated with other congenital malformations and without signs of AVN at the time of surgery.

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## O06 The paediatric hip

O06-9

DEGENERATIVE CHANGES OF THE HIP FOLLOWING SLIPPED CAPITAL FEMORAL EPIPHYSIS: A MINIMUM 18-YEAR FOLLOW-UP STUDY

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**Introduction/objectives:** In-situ screw fixation is still currently the 'gold standard' treatment for SCFE and has shown acceptable results at mid-term follow-up. This study aims to evaluate functional and radiographic long-term outcomes after this procedure.

**Methods:** Sixty-five SCFE patients were treated between 1983 and 1998, 38 underwent clinical and radiographic examination with a mean follow-up of 23 years (range 18-33). 7 patients were contacted but could not attend clinic. 12 patients were lost to follow-up.

**Results:** Initial radiographs demonstrated a mild slip in 53.3%, moderate in 31.1% and severe in 15.6% based on the Southwick angle. 82.9% were stable and 17.1% unstable according to Loder's definition. Ten hips (15.6%) were converted to a total hip replacement (THR) at a mean of 16 years after surgery. There were no cases of AVN. Mean Harris Hip score of the remaining 38 patients was 78.1/91, UCLA score 33.1/40, Tegner Activity score 3.8/10, Vas Function 1.7/10 and Vas Pain 1.9/10. Twenty-one percent of patients were found to have a positive FADIR and a limited internal-rotation in 90° flexion of 19.7° vs. 35.6° at normal hip. Radiographic analysis demonstrated osteoarthritic changes in 68.2% (Tönnis 1: 40.9%, 2: 18.2%, 3: 9%). Slip severity was associated with significantly higher Tönnis grading.

**Conclusion:** This long-term follow-up study of in-situ pinning for SCFE shows that although complication rates in terms of avascular necrosis remain low, a high number of patients become symptomatic and have a limited function. Degenerative changes are not uncommon with 22.2% of the patients developing end stage arthritis. It is important that patients and parents are informed of these risks.

## O06 The paediatric hip

O06-49

ILIZAROV APPARATUS FOR MANAGING SEVERE TYPES OF PERTHES'S DISEASE

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**Case Study:** Introduction: A great number of authors doubt in the expediency of external fixation for treating Perthes's disease. Purpose: We present the results of applying apparatus techniques for managing severe types of Perthes's disease. Materials and methods: We analyzed the results of treatment of 39 patients aged 5 to 10 years with Perthes's disease in the fragmentation stage. Distribution of joints according to Catterall, class III - 23, class IV - 16; according to Herring, group B/C 24 cases, group C - 15. In all cases the applied hip decompression by external fixator, perforation of joint components with wires and injections of cell-tissue suspension into femoral head. The method was applied in an isolated form in 16 cases (group I). In 10 observations made additionally varus osteotomy (group II), in 13 cases - the innominate osteotomy (group III). Indications to perform additional interventions have established based on the age, the magnitude of NSA, extent of the violation of the articular relationships. Results: Complete restoration of the epiphysis structure after apparatus removal was: in group I - 19±0.8 m., in group II 12±0.5 m., in group III 12.8±0.6 m. Distribution of joints according to Stulberg: group I: class I - 6, class II - 7, class III - 2, class IV - 1; group II: class I - 3, class II - 5, class III - 2; group III: class I - 3, class II - 7, class III - 2, class IV - 1. Conclusions: Middle - term follow-ups showed that the adequate joint unloading, local blood supply stimulation, differentiated use of reconstructive procedures provided the conditions for restoration of the epiphysis structure and shape.

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## O06 The paediatric hip

O06-223

PELVIC AND FEMORAL OSTEOTOMY FOR THE TREATMENT OF LEGG-CALVÉ-PERTHES DISEASE

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**Introduction/objectives:** Pelvic and femoral osteotomy are both effective for achieving a spherical femoral head in patients with Legg-Calvé-Perthes disease (LCPD). The aim of this study was to evaluate other outcomes.

**Methods:** We retrospectively reviewed 34 hips in 34 patients with LCPD who underwent either pelvic osteotomy or proximal femoral varus osteotomy during the initial stage between 6 and 8 years old. Twelve hips underwent pelvic osteotomy and 22 hips underwent femoral osteotomy. We evaluated Stulberg's classification, acetabular coverage (AC), height of the greater trochanter, and leg shortening at the final follow-up, and the period between the operation and completion of repair. For the comparison between the two groups, Student's t-test and Fisher's exact test were used. Level of Evidence - Level IV.

**Results:** At the final follow-up, the mean age of the patients was 13.6 years and Stulberg's classification was categorized as I / II in 31 hips (91%). The mean AC was 89% in the acetabular group and was 83% in the femoral group (P=0.17). The height of the greater trochanter was categorized as zone 4 in 4 hips (33%) of the pelvic group and 10 hips (45%) of the femoral group (P=0.72). The mean leg shortening was 5.9 mm and 6.2 mm in the pelvic and the femoral group respectively (P=0.92). The period between the operation and completion of repair was shorter in the femoral group (mean: 40 months) than in the pelvic group (mean: 57 months) (P<0.05).

**Conclusion:** Femoral osteotomy was beneficial for rapid repair in patients between 6 and 8 years old if the operation was performed at the initial stage.

## O06 The paediatric hip

O06-279

PARAMETERS OF SAGITTAL SPINOPELVIC BALANCE IN CHILDREN WITH DYSPLASTIC HIP SUBLUXATION

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**Introduction/objectives:** To date the sagittal profile in patients with various spinal pathologies has been studied in detail and there are no characteristics regarding the spinopelvic balance in children with dysplastic subluxation of the hip. Objective: to conduct analysis of the sagittal spinopelvic balance in adolescents with dysplastic subluxation of the hip.

**Methods:** The analysis of the examination results in 40 (100%) adolescents aged 12 to 17 years. The changes in femoral neck shaft angle and angle of antetorsion of the proximal hip, global lumbar lordosis and features of spinal-pelvic ratios (PI, SS, PT, SVA) were made. The X-ray data evaluation was performed with the use of 'Surgimap2.2.12.1'

**Results:** The average points of the neck-shaft angle and the angle of antetorsion comprised 139.4 ± 7.8 ° and 37.8 ± 8.98 ° respectively. The average index of lumbar lordosis comprised 63.4 ± 8.54 °. In all patients the mean SS indicator comprised 43.24 ± 5.25 °, and PT - 3.5 ± 10.9 ° which indicates excessive pelvic anteversion. In all patients, SVA was projected posteriorly from the sacrum averaged at 15.63 mm. A pronounced positive relationship between angle of antetorsion and SS (r = 0.86, P < 0.05) and respectively GLL has been established.

**Conclusion:** 1.The disturbance in the stability of hip joints inevitably influences the condition of the vertebral- motor segments in the lumbar spine  
2.Excessive angular values of antetorsion of proximal femur lead to the excessive pelvic anterior rotation which in its turn changes the sagittal profile of the lumbar spine towards hyperlordosis.

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## O06 The paediatric hip

O06-389

### OSTEOTOMY OF THE FEMUR IN THE TREATMENT OF TYPE II AN

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**Introduction/objectives:** Surgical treatment of type II avascular necrosis (AN) of the femoral head in children is difficult.

**Methods:** We performed 86 femoral osteotomies in 62 patients aged 2 to 16 years. Of these, 39 were femoral varus derotation osteotomy (VDRO) and 27 posterior rotational osteotomy (PRO) of the femur. VDRO was performed if joint stability was restored in the position of the abduction and internal rotation of the hip. PRO was performed if congruence was improved and centering of the femoral head in the frog-lateral leg position was restored, as well as in the "aggressive" type of deformation. The level of evidence of this retrospective study is III.

**Results:** The II type of AN is revealed on average in the age of 9 years in 75.8% of cases. In 24.2% of cases deformation develops up to the age of 5 years ("aggressive" type). The beginning of displacement of the epiphysis usually occurs in the 6-7 years of the child's life. Clear symptoms of deformity are usually determined after 8-9 years. Decentration of the femoral head was in 98.5% of cases, incongruence of articular surfaces in 30.3% of cases, multiplanar deformation of the proximal femur in 65.2%. Long-term results were traced to the end of bone growth (on average, 7 years, 8 months). At the age of the patient at the time of intervention up to 8 years, VDRO gives 2 times more bad results (Severin 3 and 4) than good (Severin 1 and 2). PRO is reliable ( $p < 0.05$ ) better than VDRO eliminates the incongruence of the articular surfaces and gives better results in the "aggressive" type of deformation.

**Conclusion:** a differentiated approach is required in the choice of osteotomy of the femur in type II AN.

## O06 The paediatric hip

O06-42

### AVASCULAR NECROSIS OF THE FEMORAL HEAD IN CHILDREN WITH CONGENITAL HIP DISLOCATION

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**Introduction/objectives:** Objective is to analyze the causes and consequences of AVN in children with CHD.

**Methods:** Anamnesis, clinical and X-ray data of 38 children (42 hips) with AVN were studied. All patients were previously treated in other medical institutions. They were divided into 4 groups according to the age. The algorithm considering child's age, orthopedic status and X-ray data of the hip was used to choose the surgery.

**Results:** The main causes of AVN were determined and divided into 3 groups: 1) traumatic primary interventions; 2) severity of hip dysplasia; 3) failed rehabilitation. The severity of AVN was assessed according to the Tönnis classification. The severest vascular disorders were detected in children from the group 1 (aged under 3 years) with the elements of proximal femur dislocation and were combined with subtotal lysis of the femoral head. Depending on the child's age, the X-ray and clinical examination results, the following types of surgery were performed: different types of corrective intertrochanteric hip osteotomy in combination with or without acetabular correction by Salter (or triple pelvic osteotomy). Postoperative rehabilitation included the correction of vascular and trophic disorders, hydrodynamic cuff therapy. Long-term outcomes were evaluated by Harris functional scale. When analyzing long-term outcomes for 5 years we noted the conditions to restore damaged hip in all cases.

**Conclusion:** The majority of severe cases of AVN is associated with traumatic treatment in young children, or failed rehabilitation principles. Any vascular disorders in the femoral head during the child's growth and hip joint development lead to the secondary deformities of the proximal femur, residual acetabular dysplasia.

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## O07 Patient management 1

O07-162

### COMPARISON BETWEEN A FIXED AND WEIGHTED DOSE OF TRANEXAMIC ACID IN PRIMARY TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** Tranexamic acid (TXA) reduces post-operative bleeding and the need for transfusion. There remains a lack of consensus regarding the optimal regimen and dosage of TXA. The goal of this study was to investigate the effect of two different TXA regimens on blood loss and transfusion rate.

**Methods:** This was an analysis of prospectively collected data on 600 primary THAs. In 300 THAs, the patient received a fixed dose of 1 g of TXA at the beginning of the operation. In the other 300 THAs, the patient received a weighted dose of 30 mg/kg of TXA. Patients with a contraindication for TXA were excluded. A standardized transfusion trigger was used.

**Results:** The differential hemoglobin level was 2.2 g/dL SD 0.9 for the 1 g TXA cohort compared with 2.0 g/dL SD 0.7 for the 30 mg/kg TXA cohort which was statistically significant ( $p < 0.05$ ). There was also a greater variance in differential hemoglobin level in the 1 g TXA cohort compared with the 30 mg/kg TXA cohort (95%CI 2.12-2.32 versus 1.99-2.16) ( $p = 0.0006$ ). There were 9 patients in the 1 g TXA cohort that had an allogeneic transfusion (3.0%) compared with 4 patients in the 30 mg/kg TXA cohort (1.3%). Although this was not statistically different ( $p = 0.16$ ), this can be clinically relevant and represents a relative risk of 1.4 (95%CI 0.96-2.02) and an odds ratio of 2.3 (95%CI 0.70-7.52).

**Conclusion:** This study confirms that the use of TXA in patients undergoing primary THA can result in a very a low transfusion rate. A weighted dose of 30 mg/kg TXA resulted in less hemoglobin drop and resulted in a lower transfusion rate compared with a fixed dose of 1 g TXA. These results suggest that a single weighted dose of TXA is more effective in reducing blood loss after primary THA compared with a single fixed dose.

## O07 Patient management 1

O07-75

### TOPICAL, INTRAVENOUS AND COMBINED TRANEXAMIC ACID ADMINISTRATION FOLLOWING PRIMARY TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** Tranexamic acid (TXA) is used to reduce blood loss and the need for transfusion after primary total hip arthroplasty (THA). The purpose of this study is to determine if topical, intravenous or both routes combined are equivalent in reducing blood loss compared with no administration.

**Methods:** In this prospective study 266 patients (285 hips) who underwent THA were divided into four groups. Group A (65 hips) received 2.5 g of topical TXA. Group B (76 hips)-control, no TXA, Group C (88 hips)-1g intravenous TXA and Group D (56 hips)-topical and intravenous TXA. The primary outcome was the total haemoglobin count and blood loss. We also assessed the need for transfusion, reduction in haemoglobin, length of hospital stay and complications. Blood loss was calculated according to Nadler formula. Chi-square, ANOVA and Bonferroni methods were used to compare the data.

**Results:** Patient demographic characteristics were similar between groups. Two patients (3.1%) in Group A, 4 (5.3%) in Group B, 3 (3.4%) in Group C and 1 (1.8%) in Group D were transfused ( $p = 0.75$ ). Haemoglobin loss was significantly higher in Group B ( $p < 0.001$ ). The mean reduction in haemoglobin at 48 hours was lower in the topical group ( $p < 0.05$ ). Patients that did not receive TXA (Group B) had a significantly higher total blood loss ( $p < 0.001$ ) and longer length of stay ( $p < 0.001$ ). Only one patient in the topical group had a pulmonary embolism at 72 hours after surgery which resolved without complications.

**Conclusion:** Topical, intravenous or combined TXA administration provides equivalent reductions in haemoglobin and blood loss after primary THA. Considering these results, it must be the surgeon's decision as to which form of TXA is more convenient taking into account the patient's risk factors.

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## O07 Patient management 1

### O07-416

THREE AND A HALF YEARS OF EXPERIENCE WITH OUTPATIENT TOTAL HIP ARTHROPLASTY  
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**Introduction/objectives:** In the last few years there has been a continued interest in reducing length of hospital stay (LOS) after primary total hip arthroplasty (THA). In April 2014 we started with THA in an outpatient setting for selected patients. The objective of this study was to report our experience with the three and a half years of THAs in an outpatient setting.

**Methods:** In this prospective cohort study we included all patients who were planned to receive primary THA in an outpatient setting between April 2014 and October 2017. Patients with cardiovascular history and diabetes were excluded. Moreover, patients had to be motivated and had to have a caretaker at home. Postoperative follow up was 6 weeks, 3 and 12 months. The short form of the Hip disability and Osteoarthritis Outcome Score (HOOS-PS), Oxford Hip Score (OHS), EQ-5D; and the Numeric Rating Scale (NRS) for pain in rest and during activity were taken preoperatively and at 6 weeks, 3 and 12 months postoperatively. Furthermore, anchor questions on patients functioning in daily living were scored at 6 weeks and 3 and 12 months postoperatively. All complications were registered.

**Results:** A total of 257 patients met the inclusion criteria. There were 40 patients who stayed in the hospital mainly because of postoperative nausea or dizziness. All other 217 patients went home the day of surgery. Of these 217 patients, mean age was 63 years (41 - 79), mean BMI was 26.8 kg/m<sup>2</sup> (18.3 - 36.9). Mean HOOS-PS, OHS, EQ-5D and NRS for pain all improved significantly. There were three readmissions and two reoperations.

**Conclusion:** This study confirms that outpatient THA can be performed successfully in a selected group of patients, with satisfying results up to 1 year postoperatively, and without troublesome side effects.

## O07 Patient management 1

### O07-352

DOES PREOPERATIVE PAIN CATASTROPHISATION PREDICT PATIENT-PERCEIVED OUTCOME AFTER PRIMARY HIP ARTHROPLASTY?  
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<sup>(1)</sup> The Centre for Hip Surgery, Wrightington Hospital, Wigan, United Kingdom

**Introduction/objectives:** To examine the relationship between preoperative pain catastrophisation and patient-reported outcome in patients undergoing primary total hip replacement (THR).

**Methods:** We performed a retrospective study using data from our hospital arthroplasty database. We identified 103 patients who underwent primary THR and had completed a preoperative Pain Catastrophising Scale (PCS) questionnaire and preoperative/12-month postoperative Oxford Hip Scores (OHS). Patient demographics and clinical variables such as BMI, ASA, duration of surgery and length of stay were recorded. The correlation between PCS and postoperative change in OHS was assessed, including a regression analysis to assess the effect of PCS and other clinical variables on OHS change.

**Results:** Preoperative PCS had a weak negative correlation with postoperative change in the OHS ( $r=-0.248$ ;  $P=0.0114$ ). Univariate analyses found BMI, number of comorbidities, length of stay, ASA grade and PCS to be negatively correlated with change in OHS postoperatively. Multiple linear regression revealed that the only statistically significant predictor of postoperative OHS was the PCS ( $P=0.0207$ ).

**Conclusion:** Preoperative PCS has a negative correlation with the change in OHS following THR, demonstrating that in this cohort, higher preoperative catastrophisation tends to correspond with poorer improvements in OHS pre- to postoperatively. Use of the PCS in the preoperative assessment may help identify patients who could benefit from clinical psychological support and assist in setting realistic expectations of THR by informing patients of possible outcomes. Further work is needed to determine if cognitive behavioural interventions can improve postoperative outcomes in patients with high pain catastrophising tendencies.

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## O07 Patient management 1

### O07-365

RECOVERY TRAJECTORIES AFTER TOTAL HIP ARTHROPLASTY (THA): FAST STARTERS, SLOW STARTERS AND LATE DIPPERS  
Hesseling, B.\*<sup>(1)</sup>; Mathijssen, N.<sup>(1)</sup>; Van Steenberghe, L.<sup>(2)</sup>; Melles, M.<sup>(3)</sup>; Vehmeijer, S.<sup>(1)</sup>; Porsius, J.<sup>(3)</sup>  
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**Introduction/objectives:** To explore whether subgroups of patients with different functional recovery trajectories after THA can be discerned, as well as their predictors, using data from the Dutch Arthroplasty Register (LROI).

**Methods:** We retrospectively reviewed prospectively collected Oxford Hip Scores (OHS) up to one year postoperatively of 6030 primary THA patients. Latent growth curve modelling (LGCM) was used to classify groups of patients according to their trajectory of functional recovery. We used multivariable multinomial logistic regression analysis to explore predictors of class membership.

**Results:** LGCM identified Fast Starters (fast initial improvement and high 12 month scores, 87.7%), Slow Starters (no initial change and subsequent improvement, 4.6%) and Late Dippers (initial improvement and subsequent deterioration, 7.7%). Predictors (OR, 95% CI) for Slow Starters were female sex (1.63, 1.14-2.33), smoking (1.95, 1.26-3.03) and anterior approach (0.47, 0.29-0.78). Predictors (OR, 95% CI) for Late Dippers were age > 75 years (1.62, 1.22-2.15), smoking (1.68, 1.17-2.42), ASA equal to or greater than 3 (1.41, 1.05-1.91), obesity (1.96, 1.43-2.69), EQ-5D Self-Care (1.41, 1.10-1.82 (some problems)) and 2.90, 1.39-6.03 (unable)), EQ-5D Anxiety/Depression (1.31, 1.00-1.71 (moderately) and 1.98, 1.06-3.24 (extremely)), EQ-5D VAS (0.91, 0.86-0.97 per 10 points), direct lateral approach (2.18, 1.58-3.02) and hybrid fixation (1.79, 1.00-3.21).

**Conclusion:** We discerned Fast Starters, Slow Starters and Late Dippers after THA regarding functional recovery trajectories. Sex, age, BMI, ASA scores and EQ-5D scores predicted an unfavourable response to THA, as well as approach and fixation.

## O07 Patient management 1

### O07-286

DOES PREOPERATIVE PHYSIOTHERAPY AND PATIENT EDUCATION INFLUENCE PATIENT-REPORTED OUTCOMES AFTER TOTAL HIP REPLACEMENT?  
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**Introduction/objectives:** Physiotherapy and patient education are the fundamentals of the treatment for osteoarthritis (OA) of the hip. Still, it remains unclear whether physiotherapy or patient education before total hip replacement (THR), is beneficial for the patients postoperatively. Utilizing Swedish Hip Arthroplasty Register (SHAR), the objective is to retrospectively study the influence of preoperative physiotherapy and/or patient education on patient reported outcome measures (PROMs) one year after THR.

**Methods:** Data covering all THRs performed in Sweden for osteoarthritis, between the years 2012 and 2015, was obtained from SHAR. There were 37,329 patients with complete data. Multiple linear regression modelling was performed with 1-year postoperative PROMs (hip pain on a visual analogue scale [VAS], the quality of life measures EQ-5D index and EQ VAS, and surgery satisfaction VAS) as dependent variables. Physiotherapy and patient education were used as independent variables and were based on patient reported data.

**Results:** Patient reported preoperative physiotherapy and/or patient education had no or small influence on 1-year postoperative PROMs. Patient education, was associated with slightly better EQ-5D index (0.0065, 95% CI 0.0012, 0.012) and EQ VAS (0.50, 95% CI 0.054, 0.948). Physiotherapy was associated with slightly better EQ VAS (0.84, CI 0.43, 1.25).

**Conclusion:** Even though we found some statistically significant differences, the magnitude of those were too small and inconsistent to conclude a positive influence. Further research is needed with more specific and demarcated interventions.

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## O07 Patient management 1

### O07-290

EFFECTIVENESS OF A HOME-BASED REHABILITATION PROGRAM DRIVEN BY A TABLET APPLICATION COMPARED TO USUAL CARE IN THE NETHERLANDS FOR PATIENTS AFTER A TOTAL HIP ARTHROPLASTY  
Wijnen, A.\*<sup>(1)</sup>; Hoogland, J.<sup>(1)</sup>; Munsterman, T.<sup>(2)</sup>; Gerritsma, C.<sup>(3)</sup>; Dijkstra, B.<sup>(4)</sup>; Zijlstra, W.<sup>(4)</sup>; Annegarn, J.<sup>(5)</sup>; Ibarra, F.<sup>(6)</sup>; Zijlstra, W.<sup>(7)</sup>; Stevens, M.<sup>(1)</sup>  
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**Introduction/objectives:** Total Hip Arthroplasty (THA) is considered one of the most successful surgical treatments available. At present postoperative physiotherapy is not always covered by the basic health insurance in the Netherlands. Recent developments in technology are promising for providing home-based exercise programs. The aim of the study was to compare the effectiveness of a home exercise program with usual care after a THA in the Netherlands.

**Methods:** A comparative study. Patients aged 18-65 who received a THA as a treatment for primary or secondary osteoarthritis were included. Patients followed a 12-week exercise program with video instructions on a tablet PC. Patients were asked to do strengthening and walking exercises at least five days a week. This patient group was compared with a patient group that received usual care after a THA. Effectiveness was measured at four different time moments (preoperative, 4 weeks, 12 weeks and 6 months postoperative), by means of patient self-reported questionnaires (HOOS, SF-36, EQ-5D) and functional tests (Timed Up & Go (TUG), Five Times Sit-to-Stand Test (FTSST)). Descriptive statistics were used to describe patient characteristics. The Mann-Whitney U test was used to test between group differences.

**Results:** 16 patients completed the program and 23 patients received usual care. Six months postoperatively, the patients of the home exercise program scored significantly better on the TUG and the FTSST, as well as on the ADL and quality of life subscale of the HOOS, the (role) physical functioning of the SF-36 and the index score of the EQ-5D.

**Conclusion:** A home-based rehabilitation program driven by a tablet application seems to be effective for THA patients and could be an alternative to regular physical therapy.

## O08 Fundamental research

### O08-233

DYNAMIC TRIAL FITTING OF THE CUP, DOES PRE-EXPANSION CAUSES LOSS OF PRIMARY STABILITY (A BIOMECHANICAL STUDY)  
Hoorenberg, D.\*<sup>(1)</sup>; de Waard, S.<sup>(1)</sup>; Siersevelt, I.<sup>(1)</sup>; Haverkamp, D.<sup>(1)</sup>  
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**Introduction/objectives:** Trial fitting of the acetabular component is traditionally done by trial cups who do not resemble the real press-fit obtained by the definitive cup. The X-pander<sup>®</sup> was developed to mimic the real press-fit obtained by the definitive cup. However, there is concern on losing the elasticity of the cancellous bone by using the X-pander. The purpose of this study was to assess if there is a difference in primary stability when using the X-pander in comparison to the traditional trial cups.

**Methods:** A biomechanical study was performed with bovine calf acetabula, randomized for placement of the cup with X-pander or traditional trial cups. Two types of cups were used (Anexys, Mathys and Trident, Stryker). Lever out force was compared as a measurement of primary stability with a Mecmesin<sup>®</sup> AFG 2500 N, a digital force gauge and Mecmesin<sup>®</sup> MultiTest 2.5-dV, a Force Measurement Testing Device For Compression Tests and Traction Testing with VectorPro MT Materials Testing Software.

**Results:** For testing, 58 cups were inserted in bovine calf acetabula (20 Anexys, 38 Trident) and randomized for trial fitting between a standard trial cup and X-pander. Cup size varied between 52mm and 60mm. Overall mean lever out was 45,1 Nm (SD 14,6) for the X-pander group and 45,0 Nm (SD 14,5) for the control group. After adjustment for potential confounders (Cup size and type) mixed model analysis did not reveal a significant difference in lever out between the use of a trial cup and the X-pander (mean 1,0 Nm, 95%CI (-5,9; 8,0), p=0,77).

**Conclusion:** Initial press fit of the implanted cup is not lost by pre-expansion as done with dynamic trial fitting with an X-pander device. Therefore, the X-pander can be safely used in clinical practice.

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## O08 Fundamental research

### O08-356

IS THERE A RELATIONSHIP BETWEEN HIP WITH PROXIMAL AND DISTAL SEGMENTS KINEMATICS DURING SINGLE LEG SQUAT IN FEMALE SUBJECTS WITH FEMOROACETABULAR IMPINGEMENT SYNDROME ASSOCIATED WITH GREATER TROCHANTERIC PAIN SYNDROME?  
Schroder, R. G.<sup>(1)</sup>; Locks, R.\*<sup>(2)</sup>; Contreras, M. E. K.<sup>(2)</sup>; Araujo, L. C. T.<sup>(2)</sup>; Paz, A.<sup>(1)</sup>  
<sup>(1)</sup> Aktonpaz, Florianopolis, Brazil; <sup>(2)</sup> Hospital Regional Sao Jose, Hospital SOS Cardio, Sao Jose, Brazil; <sup>(3)</sup> Hospital Governador Celso Ramos, Florianopolis, Brazil

**Introduction/objectives:** To evaluate the correlation between hip kinematic ROM with proximal and distal segments in symptomatic females subjects with femoroacetabular impingement (FAI) associated with greater trochanteric pain syndrome (GTPS) during single leg squat.

**Methods:** Twenty-six female participants with unilateral anterior and lateral hip pain were recruited after physical examination, X-Ray and MRI investigation confirming combined (cam plus pincer) FAI and GTPS. After familiarization with the testing protocol, participants were asked to perform three sets of 5 single leg squat. Trunk, pelvis, hip, knee and ankle kinematic data were recorded. The relationship between hip and trunk, pelvis, knee and ankle kinematics were investigated.

**Results:** After statistical analysis was found a strong and significant correlation between sagittal hip (flexion) ROM with trunk transversal (lateral inclination) (r=0.722, p=0.000), pelvis sagittal (anterior pelvic inclination) (r=0.865, p=0.000) and knee sagittal (flexion) (r=0.735, p=0.000). Transversal (adduction) hip ROM with trunk transversal (lateral inclination) (r=0.722, p=0.000) and pelvis sagittal (anterior pelvic inclination) (r=0.724, p=0.000). Hip longitudinal (internal rotation) ROM and ankle longitudinal (external rotation) ROM (r=0.7604, p=0.000).

**Conclusion:** The results of the present study demonstrated the positive, significant and strong relationship between hip, pelvis and trunk range of motion during single leg squat in female patients presenting FAI and GTPS. Rehab protocols may focus on balance between hip trunk and pelvis stability during functional activities in this specific group of patients.

## O08 Fundamental research

### O08-327

REPORTED METHODOLOGICAL QUALITY OF RANDOMIZED CONTROLLED TRIALS OF TOTAL HIP ARTHROPLASTY REHABILITATION  
Saiman, F.\*<sup>(1)</sup>; Unver, B.<sup>(2)</sup>; Unver, F.<sup>(3)</sup>; Karatosun, V.<sup>(4)</sup>  
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**Introduction/objectives:** The purpose of this study is to evaluate the methodological quality of randomized controlled trials published in the field of total hip arthroplasty rehabilitation using the PEDro scale.

**Methods:** A literature search of multiple databases (such as MEDLINE, PEDro) was used to total hip arthroplasty rehabilitation randomized controlled trials from 1998 through 2017. For each article, the 11-item Physiotherapy Evidence Database (PEDro) scale was examined and a total PEDro score was generated. The relationship between the total PEDro score and time (year of publication) was evaluated with linear models. A study that scores 7 (i.e. scores positive in seven out of ten criteria) is considered to have a high methodological quality, a score of 5-6 a moderate methodological quality and a score between 0 and 4 is regarded as poor quality.

**Results:** 60 randomized controlled trials were retrieved and subjected on quality scoring to both the PEDro scale. Mean scores (with standard deviation) for the PEDro scale were 5.90 (1.41). The total PEDro score increasing by an average of - 0.25 points between 1998 and 2017. Studies have been shown to have a high methodological quality of 41.6%, moderate methodological quality of 40% and poor methodological quality of 18.3%.

**Conclusion:** The reported methodological quality of randomized controlled trials of total hip arthroplasty rehabilitation improved over time. However, higher quality of the study is needed to determine optimal strategies for total hip arthroplasty rehabilitation.

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## O08 Fundamental research

### O08-72

FINGERPRINT PATTERN OF BONE MINERALIZATION ON CEMENTED AND UNCEMENTED FEMORAL STEMS ANALYSED BY [18F]-FLUORIDE-PET. A RANDOMISED CLINICAL STUDY.

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**Introduction/objectives:** We present a randomized clinical study using 18F-Fluoride Positron Emission Tomography/Computerised Tomography (F-PET/CT) to analyze the osteoblastic part of bone metabolism (new bone mineralization) in periprosthetic bone adjacent to femoral stems following THA surgery. We randomly compared cemented and uncemented stems, analyzed with F-PET/CT.

**Methods:** In 26 patients (26 cases) having hip osteoarthritis, a THA was performed. The patients received either an uncemented HA coated femoral stem or a cemented stem. The contra lateral healthy femur was used as reference for normal metabolism. The patients were analyzed with clinical score, radiography and F-PET/CT preoperatively, at 6 weeks and 6 months after surgery. At 2 years clinical score and radiography was analysed. We used the Polar Map system for presenting the PET results in 13 regions of interest adjacent to the whole stem.

**Results:** The clinical and radiographic results were good in all patients. At PET analyses after 6 weeks, the bone mineralizing activity was significant higher around the uncemented stems, both compared to the cemented group and to the contralateral healthy reference femur group. The cemented group also had an elevated activity but only almost significant.

**Conclusion:** Mineralizing activity analyzed with F-PET/CT was significant higher for the uncemented group. The activity did also decrease at a slower rate for this group. F-PET/CT is a new useful tool to analyze secondary stabilization of femoral stems at THA.

F-PET/CT is a novel method to analyze bone metabolic response to hip prostheses. The method can give new knowledge to secondary stabilisation of different models of hip prostheses, which is important to the longevity of the prosthesis.

## O08 Fundamental research

### O08-525

THE EFFECT OF MANUFACTURING TOLERANCES AND ASSEMBLY FORCE ON VOLUMETRIC WEAR IN THA

Bitter, T.\*<sup>1</sup>; Khan, I.<sup>2</sup>; Marriot, T.<sup>2</sup>; Lovelady, E.<sup>2</sup>; Verdonschot, N.<sup>3</sup>; Janssen, D.<sup>1</sup>  
<sup>1</sup> Radboudumc, Nijmegen, Netherlands; <sup>2</sup> Zimmer Biomet, Dorcan, Swindon, United Kingdom; <sup>3</sup> Department of Orthopaedics, Radboud University Medical Centre, Nijmegen, Netherlands

**Introduction/objectives:** Fretting corrosion at the taper-head interface in total hip arthroplasty has been reported as a possible cause of early failure. The extent of fretting corrosion is affected by surgical technique (e.g. impaction force during assembly), design features (e.g. manufacturing tolerances), and patient factors (e.g. Body weight). Finite Element (FE) simulations can assist in the investigation of the effect of these parameters on taper wear.

**Methods:** An FE model was developed of a Zimmer Biomet type-1 taper junction (Ti-Ti). The simulation was developed based on experiments in which implants were loaded for 10 mln cycles. Based on general manufacturing tolerances (ISO 2768-1), tip-fit (proximal contact), base-fit (distal contact), and perfect-fit (full contact) taper couples were modelled, at assembly forces of 2, 4, and 15 kN. After assembly, the models were cyclically loaded to 4 kN (ISO 7206-6).

**Results:** The perfect fit resulted in the least amount of wear when assembled with 2 or 4 kN. The tip fit produced the most amount of wear in all cases (+119% @ 4 kN assembly). At an assembly force of 15 kN the base-fit model predicted the least amount of wear (-%40). Increased assembly force resulted in a reduction of wear in all cases.

**Conclusion:** The results presented here stress the importance of using sufficient assembly force during surgery to minimize wear at the taper junction. Manufacturing tolerances should preferably lead to either a perfect-fit or a base-fit, as this reduces the wear at the taper junction for Ti6Al4V components.

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## O08 Fundamental research

### O08-173

TRABECULAR TITANIUM: OVERVIEW OF THE BIOMEDICAL APPLICATIONS OF AN ADVANCED CELLULAR SOLID BIOMATERIAL.

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**Introduction/objectives:** Trabecular Titanium is a biomaterial imitating trabecular bone morphology. In vitro studies reported promising outcomes in terms of its osteoinductive and osteoconductive properties (Gastaldi 2010, Sollazzo 2011). In vivo histological and histomorphometric analysis indicated bone in-growth in cancellous (+68%) and cortical bone (+87%) (Devine 2012). A multicentre prospective study was performed to evaluate mid-term results of cups in Trabecular Titanium after primary Total Hip Arthroplasty.

**Methods:** 89 patients (91 hips) were included (52% men), with median (IQR) age and BMI of 67 (57-70) years and 26 (24-29) kg/m<sup>2</sup>. Evaluations were performed preoperatively and at 1 week, 3, 6, 12, 24 and 60 months (mo.). Bone Mineral Density (BMD) was determined by DEXA according to DeLee & Chamley 3 Regions of Interest (ROI).

**Results:** Median (IQR) Harris Hip Score and SF-36 improved significantly from 48 (39-61) and 49 (37-62) preoperatively to 99 (96-100) and 76 (60-85) at 60 mo. (p###0.0001, Wilcoxon test). All cups resulted radiographically stable, with presence of superolateral and inferomedial bone buttress, radial trabeculae in ROI I/II and no radiolucent lines. BMD initially declined from baseline at 7 days; then, it increased or stabilized in all ROIs up to 24 mo., while showing evidence of partial decline over time with increasing patients' age at 60 mo., although without any clinical significance in terms of patients' health status or implant stability. No revision or implant failure was reported.

**Conclusion:** Mid-term assessments reported significant improvements in quality of life and functional recovery as well as good implant stability, in accordance with literature (Petricani 2015; Bistolfi 2014).

## O08 Fundamental research

### O08-465

EXPERIMENTAL STUDY TO INVESTIGATE A POTENTIAL MODEL FOR IMPROVED OSSEOINTEGRATION IN SICKLE CELL BONE DISEASE PATIENTS WITH AVASCULAR NECROSIS

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**Introduction/objectives:** It is well documented that implant loosening rate in sickle cell disease patients is higher than seen in patients with THR from other indications. The Hypoxic inducible factor(HIF) - is activated in the microcellular hypoxic environment and this through a cascade of other enzymatic reactions promotes the activity of other factors and further help enhance angiogenesis and osteogenesis. The aim of this study was to investigate and propose a potential model for investigating osseointegration in a hypoxic microcellular environment using osteoblasts(MG63).

**Methods:** Human MG63 osteoblastic cells were cultured under normoxia and hypoxic conditions (20% and 1% oxygen saturation) for 72 hours under two different condition- with and without cobalt chloride. The samples cultured under normoxic conditions without cobalt chloride acted as control. Using qualitative polymerase chain reaction-(qPCR) - HIF expression was assessed under the above conditions in relation to the control.

**Results:** The results showed there was significant expression of the HIF 1 alpha protein under hypoxic condition with cobalt chloride in comparison with the control samples- all at 72hours incubation. Mann-Whitney U test was used to deduce level of significance of fold change.(p=0.002; <0.05). This was deemed as there being a significant difference in the level of expression of HIF compared to the control.

**Conclusion:** The results show that the hypoxic inducible factor can be expressed using the above tested experimental invitro-model with significant results which can be a foundation for further research into improving hip implant prosthesis design to help enhance osseointegration in sickle cell disease patient with AVN.

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## O09 Revision THA 1

O09-149

### POSTOPERATIVE RESTORATION AND MIGRATION OF THE HIP CENTRE WITH THE USE OF IMPACTION BONE GRAFTING IN REVISION AND COMPLEX PRIMARY HIP ARTHROPLASTY

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**Introduction/objectives:** Although Impaction grafting proved efficacy in the reconstruction of acetabular defects in primary and revision hip arthroplasty, its role in large segmental defects is still debatable. Our objective is to measure hip center restoration and last follow up migration after acetabular reconstruction with impaction grafting in different types of acetabular defects

**Methods:** This is a single-center retrospective radiographic study of (107) total hip arthroplasty (42 primary, and 65 revision) in (104) patients using impaction grafting. The available radiographs (preoperative, immediate postoperative, and last follow-up) were examined for normal, preoperative, immediate postoperative, and last follow-up vertical (V) and horizontal (H) hip center. Maximum Acetabular Defect Distance (MADD), presence and size of the mesh were recorded.

**Results:** In type 1 and 2 AAOS defects, the postoperative hip center was not significantly different from the normal hip center measured on the contralateral healthy side or by Ranawat method. In Type 3 Defects there was a significant variation between the normal hip center and the postoperative hip center (P-value: 0.034 and 0.001 for V and H respectively). At 44 Months follow up of 36 hips; 31 (86%) hips migrated (range 1-42 mm). The mean amount of migration  $\pm$  SD was 5.72  $\pm$  3.7, 2, 4.15  $\pm$  1.2, and 11.26  $\pm$  3.9 mm for types 1, 2, and 3 respectively (P-value 0.211). Hips with MADD > 15 mm, with mesh, especially large mesh sizes migrate significantly more (p-value = 0.042, 0.037, and 0.039 respectively).

**Conclusion:** Hip center restoration was better and migration was less for type 1 and 2 AAOS rather than for type 3. Other options for reconstruction of these challenging defects should be considered.

## O09 Revision THA 1

O09-354

### IMPACTION BONE GRAFTING OR UNCEMENTED MODULAR STEMS FOR THE TREATMENT OF TYPE B3 VANCOUVER PERIPROSTHETIC FRACTURES? A COMPLICATION RATE ANALYSIS

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**Introduction/objectives:** Since the gold standard for treatment of type B3 Vancouver periprosthetic femoral fractures (PPF) is yet to be defined, we sought to analyse the complication rate between impaction bone grafting (IBG) technique with a cemented stem and reconstruction with a uncemented distally-fixed modular stem (DFMS).

**Methods:** We retrospectively studied 55 B3 PPFs operated between 2000-2016, comparing the complication rate of 34 patients treated with IBG technique (group A) with 21 patients treated with a DFMS (group B). Median follow-up of groups A and B were 74.7 (IQR, 74.4) and 55.2 months (IQR, 42.4), respectively (p=0.008). Median age of groups A and B were 82 (IQR, 15) and 83 (IQR, 12) years, respectively (p=0.27). Median number of prior surgeries was 1 (IQR, 1) for both groups (p=0.31). Median grade of Endo-Klinik femoral bone defect was similar between both groups (3 [IQR, 0] vs. 3 [IQR, 0], p=0.11). We performed a multiple regression analysis to determine risk factors for complications including the following variables: age, initial diagnosis and surgical technique.

**Results:** As for infection outcomes, two-stage revision surgery was more frequent in-group A than in-group B (4 vs. 0, p=0.003). Although not significant, group A presented more implant failures than group B (5 vs. 1, p=0.195). We found 4 dislocations in-group B and 2 in-group A (p=0.192). Multiple regression analysis showed a significant correlation between surgical technique and complication rate (p=0.01). IBG technique presented an odds risk for complications of 0.21 (p=0.016; IQR 0.058-0.75).

**Conclusion:** Femoral reconstruction with IBG technique evidenced an ostensibly higher complication rate than that of DFMS for the treatment of B3 PPF.

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## O09 Revision THA 1

O09-554

### CONVERSION OF MOM TO DUAL MOBILITY WITH CUP RETENTION

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**Introduction/objectives:** High complication rates have been reported when monoblock metal on metal (MoM) total hip arthroplasties and hip resurfacings are revised. Aseptic loosening of the revision cup, intraoperative acetabular fracture and dissociation as well as instability and infection have been reported. Conversion to a dual mobility polyethylene bearing without cup extraction could be a simple strategy to prevent these complications.

**Methods:** Review of THA MoM revisions, performed in three institutions, identified 20 patients who underwent conversion to dual mobility constructs. The original acetabular components consisted of 8 Conserve Plus (Wright Medical), 6 Birmingham Hip Resurfacing (Smith & Nephew) and 6 Redapt (Biomet). The dual mobility liner used was Trident MDM liner (Stryker) in 14 hips and Avantage dual mobility liner (Zimmer Biomet) in 6 cases. Inclusion criteria were perfect cup positioning and absence of acetabular loosening on CT scan. Patients with severe ARMD on ultrasound or MRI scan were excluded and underwent complete revision.

**Results:** Of the 20 patients who underwent dual mobility revision, there was 1 complication. One patient had additional posterior capsular repair. There were no re-revisions for aseptic loosening, infection or instability.

**Conclusion:** The high complication rate observed when revising MoM THA urged us to explore a less invasive revision technique. Retention of a well fixed monoblock acetabular component and fitting a dual mobility bearing to it appears to be a reliable alternative with short term results showing a low morbidity.

## O09 Revision THA 1

O09-409

### THE RELATIONSHIP OF MODULAR STEM FRACTURE WITH LENGTH OF PROXIMAL COMPONENT IN FEMORAL REVISION ARTHROPLASTY

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**Introduction/objectives:** Fracture of modular hip revision stems is not uncommon. In Switzerland 32 fracture cases have been reported for the Revitan® stem (Zimmer Biomet) to the manufacturer since 2002. We have analysed these fracture cases. Its goal was to assess whether there is an association between implant fracture and patient-specific factors and implant-related factors.

**Methods:** Anonymized data of these 32 component fracture cases were analysed to age, gender, BMI, time in vivo to failure, type of the distal and proximal part, length of the proximal and distal part, total length and diameter. Location of the implant fracture and the relation to the trochanter minor was determined by radiographs. The data were compared with the implant configuration in the overall population of patients in Switzerland and with the sales distribution.

**Results:** 32 cases experienced stem fracture (0.7%). 29 male (90.6%), 3 female (9.4%) with 63.2 years mean age at implantation and 5.5 years mean time to failure. Mean BMI was 29.7. 24 fractures (77.4%) with a proximal stem size of 55/65 mm, 7 fractures (12.6%) with 75/85 mm and no fractures with 95/105 mm. The distribution of stem sizes differed significantly from the size and sale distribution in the overall population (p<0.001). No significant differences at other implant-related factors. Of 27 evaluable radiographs 21 showed implant fractures located proximal to the distal border of the trochanter minor.

**Conclusion:** The present study suggests that small proximal stem components seem to increase the risk of stem fracture. Additional factors seem to be high BMI, gender and bad proximal bone support. Modular revision components with sufficient proximal length should be selected or addicted to patient-specific factors to consider non-modular Systems.

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## O09 Revision THA 1

### O09-197

#### MINIMUM 10-YEAR FOLLOW-UP RESULTS OF ACETABULAR RECONSTRUCTION WITH THE BURCH-SCHNEIDER CAGE AND MASSIVE ALLOGRAFTS

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**Case Study:** Objectives. In hip revision surgery, reconstruction of pelvic osteolysis is a critical concern. The present study evaluates retrospectively the clinical and radiographic outcome of acetabular revision with massive bone allografts and the Burch-Schneider antiprotusio cage at a minimum follow-up of 10 years.

**Methods:** Between January 1992 and August 2005, 106 hips with acetabular bone loss underwent revision surgery with use of bulk allografts and the Burch-Schneider® cage. Forty-four patients (47 hips) deceased without additional surgery. The remaining 59 hips in 59 patients were available for clinical and radiographic assessment at a mean follow-up of 15.1 years (range, 10.0-21.9). They were 17 males and 42 females, with an average age at surgery of 59 years (range, 29-83). Paprosky IIIA and IIIB acetabular bone defects were detected in 25 and 34 cases, respectively.

**Results:** Ten hips underwent re-revision because of aseptic loosening (6), infection (3), and flange breakage (1). Furthermore, 4 cages showed radiographic signs of instability with severe bone resorption. The cumulative survival rates at 21.9 years with removal for any reason or x-ray migration of the Burch-Schneider cage and aseptic or radiographic failure as the end points were 76.3% and 81.4%, respectively. Mean Harris hip score improved from 33.2 points preoperatively to 75.7 points at the time of follow-up ( $p < 0.001$ ).

**Conclusions:** The management of severe acetabular bone loss is a challenging problem in hip revision surgery. The use of the Burch-Schneider antiprotusio cage and massive allografts proved out to be an effective technique in the reconstructive treatment of extended deficiency of pelvic bone stock with high long-term survivorship.

## O09 Revision THA 1

### O09-150

#### LONG-TERM RESULTS OF REVISION TOTAL HIP ARTHROPLASTY WITH A CEMENTED FEMORAL COMPONENT

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**Introduction/objectives:** In revision total hip arthroplasty (THA), the cancellous bone is normally completely removed out of the femoral canal during stem extraction. This situation is comparable to primary THA following the shape closed concept, with some authors advocating to remove the metaphyseal cancellous bone to enhance press-fit stability ("French paradox").

The aim of this study was to investigate the long-term outcome, regarding survival and radiological results, of a cemented straight stem when used for revision THA and to compare these results to the results of the same stem in primary THA.

**Methods:** 178 stem revisions performed between 01/1994 and 08/2008 using the Virtec straight stem were included. The cumulative incidence for re-revision was calculated using a competing risk model. Risk factors for re-revision of the stem were analyzed using an absolute risk regression model. Radiographs analyzed for osteolysis, debonding and subsidence had a minimum follow-up of 10 years.

**Results:** The cumulative incidence for re-revision due to aseptic loosening of the stem was 5.5% (95% CI, 2.9-10.2%) at 10 years. Aseptic loosening was associated with younger age, larger defect size and larger stem size. After a minimum 10 years follow-up, osteolysis was seen in 39 of 80 revision THA. Compared to the results in primary THA, the survival in revision THA with the same implant was inferior.

**Conclusion:** Cemented straight stems used for revision THA showed excellent long-term results regarding survivorship and radiological outcome. This stem therefore offers a valuable and cost-effective option in revision THA.

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## O09 Revision THA 1

### O09-323

#### STRUCTURAL ALLOGRAFT FOR RECONSTRUCTION OF ACETABULAR DEFECTS IN HIP REVISION SURGERY

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**Introduction/objectives:** Total hip revision requires a meticulous planning, with definition of bone defects and appropriate strategies for reconstruction. The purpose of our study was to determine clinical and radiographic outcomes of acetabular revision with use of structural bone graft

**Methods:** We performed a retrospective study including patients with acetabular defects, Paprosky 3A, submitted to revision surgery with a superior figure 7 distal femur structural allograft with hemispherical cementless cup, at a minimum follow-up of 5 years. The patients were assessed clinically with Visual Analogic Scale and Harris Hip Score and radiographically for graft integration

**Results:** Our study included 18 hips with a follow-up of 91 months(60-144).The age of the patients was 65 years(47-84).Considering revision or loosening as endpoints, the survival rate of the structural graft with hemispherical cup was 100% at 5 years,90% at 7 and 75% at 8.Two patients were revised for aseptic loosening with a cementless cup without grafting. One patient showed reabsorption of the graft but remains asymptomatic, without evidence of loosening. HHS improved from 37 preop to 72(44-85).15 patients refer occasional pain(VAS-1)and two have constant pain(3 and 5 respectively).One patient died due to prosthetic joint infection after the surgery and two died of unrelated causes and were not included in this study

**Conclusion:** Structural allografts are generally used for segmental bone deficiencies involving the superolateral acetabulum or posterior wall and column. The main advantage is the potential to restore bone stock. If loosening occurs, cementless cup without grafting can be performed, which happened in two of our patients. Acetabular reconstruction with structural allograft is a reliable option for type 3A defects

## O10 Complex primary THA 2

### O10-375

#### SEX DIFFERENCES IN FEMORAL MORPHOLOGY IN PATIENTS WITH DEVELOPMENTAL DYSPLASIA OF THE HIP UNDERGOING ARTHROPLASTY

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**Introduction/objectives:** In this computed tomography (CT) based morphological study we aimed to assess whether there were any differences in femoral morphology between male and female patients with developmental dysplasia undergoing total hip arthroplasty (THA).

**Methods:** This was a retrospective study of the pre-operative CT scans of all male patients with DDH who underwent THA at two hospitals in Japan between 2006-2017. Propensity score matching was used to match these patients with female patients in our database who had undergone THA during the same period, resulting in 49 male and 49 female patients being matched on age and Crowe classification. The femoral length, anteversion, neck-shaft angle, offset, canal-calcus ratio, canal flare index, lateral centre-edge angle, alpha angle and pelvic incidence were measured for each patient on their pre-operative CT scans.

**Results:** Significant differences were found in femoral anteversion with a mean male anteversion of 22 degrees ( $\pm 14.2$ ), compared to 30 degrees ( $\pm 15.5$ ), in females ( $p=0.02$ , Confidence Interval (C.I.) 1.6 to 14.9), offset, with a mean male offset of 31 mm ( $\pm 6.2$ ), compared to 29 mm ( $\pm 6.1$ ) in females, ( $p=0.04$ , C.I.: 0.2 to 4.8), and femoral length with a mean femoral length of 434 mm in males ( $\pm 22.2$ ), compared to 407 mm in females ( $\pm 23.9$ ), ( $p<0.001$ , C.I.: 19.2 to 34.3). No significant differences between male and female patients were found for the other measurements.

**Conclusion:** This was the first study of this size assessing femoral morphology in male patients with DDH undergoing THA. Significant differences were found between male and female patients in femoral anteversion, length and offset and this should be taken into account when planning and performing THA in these patients.

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## O10 Complex primary THA 2

O10-414

HIGH DISLOCATION DEVELOPMENTAL DYSPLASIA: TOTAL HIP ARTHROPLASTY WITH SHORTENING SUBTROCHANTERIC OSTEOTOMY  
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**Introduction/objectives:** Total hip arthroplasty (THA) in high dislocated hip presents great difficulties in restoration of the biomechanical of the hip, and in the election of osteotomy type and the proper implants. The stability of the osteotomy is an important issue. We present our experience in high dislocation developmental dysplasia with shortening subtrochanteric osteotomy, small hemispheric cup, and Wagner conical stem.

**Methods:** A cases series study of 17 hips in 13 patients, who were diagnosed as high dislocation dysplasia between 2008 and 2015. Clinical evaluation included Harris hip score, Oxford text, complications and Leg length discrepancy. The radiological evaluation included positions of the cup, leg lengthening, osteotomy consolidation time, biomechanical restoration of the center of rotation, subsidence of the stem and the presence of radiolucent lines.

**Results:** Follow-up was 55 months. The average Harris Hip score and oxford test improved postoperatively. The average length of the osteotomy was 3.4 cm. The average lowering of the center of rotation was 5.8 cm. The average lengthening of the femur was 2.5 cm. The average time for bone union was 5.5 months.

**Conclusion:** The lowering of the center of rotation requires extensive soft tissue release and sometimes shortening of the femoral diaphysis. The use of small hemispheric cups and use of reconstruction techniques of acetabular coverage is necessary. Shortening osteotomy is often recommended. Deformities of the femur such as excessive anteversion and the narrowed femoral canal advise the use of diaphyseal anchoring stems. Conical Stems provided an excellent primary stability in the distal and the proximal fragment of the femur, avoiding the used of plates or cables to achieve stability at the site of the osteotomy.

## O10 Complex primary THA 2

O10-272

LOCAL USE OF AUTOLOGOUS BONE GRAFT WITH 1,25-DIHYDROXY-VITAMIN D3 FOR THE REPLACEMENT OF BONE DEFECTS IN PRIMARY TOTAL HIP ARTHROPLASTY IN PATIENTS WITH END STAGE RENAL DISEASE.  
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**Introduction/objectives:** The purpose of this study is to evaluate effectiveness of local 1,25-dihydroxy-vitamin D3 for remodelling of auto bone graft in total hip arthroplasty (THA) in patients with end stage renal disease (ESRD).

**Methods:** 43 patients with ESRD with type I - II acetabular defects according to Paprosky were included in this study. Patients were randomly separated in two groups. In group A, auto bone grafts without any additives were used, in group B (Control) - sterile 1,25-dihydroxy-vitamin D3 was used as additive. Clinical (Harris Hip Score), radiological (X-ray), evaluation of serum 1,25-dihydroxy-vitamin D3 and dexa scanning were performed in 1, 3, 6 and 12 months. The obtained data was then analyzed using Kaplan-Mayer curve (The value of p < 0,05 was considered statistically significant).

**Results:** Statistically significant differences between 2 groups (p<0.05) were established in about 3 and 6 months based on Harris Hip Score and DEXA. Patient in Group B showed higher scores. While at 12 months, there were no statistically differences were noted. Serum 1,25-dihydroxy-vitamin D3 was statistically higher in Group B up to 6 months.

**Conclusion:** All patients with ESRD have comorbidities of different types of renal osteodystrophy including the result of low levels of vitamin D3. Additional local usage of active Vitamin D 3 reduces the risk involving aseptic loosening of endoprosthesis and provides increased remodelling of bone autografts, as a result leading to improved Harris Hip Score during the early post-operative period.

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## O10 Complex primary THA 2

O10-482

SURVIVAL AND COMPLICATIONS AFTER COMPLEX HIP ARTHROPLASTY WITH A MODULAR FEMORAL STEM  
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**Introduction/objectives:** This study aims to evaluate the survival and complications after complex hip arthroplasty, in which a modular femoral stem was needed for reconstruction.

**Methods:** A retrospective cohort study was performed including 134 consecutive patients from January 2007 to May 2014 receiving a Restoration modular femoral stem. Thirteen patients received a modular stem in a primary procedure, because of failed osteosynthesis. In the remaining 121 patients a revision procedure was performed, including 64 patients with a Vancouver B2/B3 periprosthetic fracture, 48 patients with aseptic loosening and a deficient femoral canal, 6 patients as a 2nd stage revision procedure because of a low-grade infection and 3 with miscellaneous reasons. Baseline characteristics, follow-up until death, revision or end of follow-up and complications were determined. Survival of the prosthesis was analysed taking competing risks (death) into account.

**Results:** Median age was 76 years (48-97). After a median follow-up of 4.5 years the cumulative survival of the prosthesis was 95.6% (95% CI: 93.9 - 97.4). Complications included 16 dislocations and 4 deep infections for which re-operation was needed. Overall mortality rate was 22%.

**Conclusion:** Mid-term survival rate of complex hip arthroplasty with a modular femoral stem was 95.6%. Dislocation was the main reason for complications.

## O10 Complex primary THA 2

O10-398

BONE GRAFTING OF ACETABULAR DEFECTS AT THA IN PATIENTS WITH DYSPLASTIC OSTEOARTHRITIS OF THE HIP  
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**Case Study:** Background. The achievement of a stable cup fixation in case of dysplastic osteoarthritis of the hip with the restoration of hip rotation center is an actual problem in THA  
Aim. to evaluate the results of using bone grafting of acetabular defects in patients with dysplastic osteoarthritis of the hip.

**Materials and methods.** 53 patients with dysplastic osteoarthritis of the hip stage IV had underwent THA with bone grafting of acetabular defects. The average age was 41.6 (25-53) years, 8 males and 45 females. 18 patients had Crowe's type II and 35 had Crowe's type III dysplastic osteoarthritis of the hip. Structural autograft with screw fixation was applied for the reconstruction of segmental defects of superior and anterior acetabular walls (38 patients) and cancellous autograft for the reconstruction of cavity defects (15 patients). Press-fit cup fixation was used in all cases.

**Results:** The average duration of follow up was 5.1 (3.5-7.3) years. Harris Hip Score improved up 35 to 88 points. Survivorship for aseptic acetabular loosening was 98 %. Bone autograft incorporation was observed in all cases. In 45 cases (85 %) hip rotation center was restored. In 3 cases was noted a partial resorption of bone grafts around the fixing screw with lamentation of pain in the grafted area. In one case periprosthetic infection occurred.

**Conclusion:** THA with bone grafting of acetabular defects in patients with dysplastic osteoarthritis of the hip is an effective procedure which gives the possibility of a biological restoration of acetabular walls and hip rotation center.

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## O10 Complex primary THA 2

O10-332

MODULAR NECK FRACTURE IN THE PRACTICE OF TOTAL HIP ARTHROPLASTY.

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**Introduction/objectives:** The use of modular neck femoral components in total hip replacement has recently increased. Main advantage of it using is easiness of femoral offset optimization. However, sporadic messages about the modular neck fracture appeared in the literature last time. The aim of the study is a clinical analysis of modular neck fracture in patients with total hip arthroplasty.

**Methods:** We conducted a retrospective study included analysis of the 9 case histories with modular neck fractures carried out from January 1, 2014 to December 31, 2016. The statistical analysis was performed by Microsoft Excel AtteStat 12.0.5.

**Results:** The average age of the patients was  $51.2 \pm 11.61$  years. The average weight -  $96.8 \pm 2.95$  kg. The average height -  $180.6 \pm 3.65$  cm. The mean BMI are  $29.7 \pm 2.03$ . Distribution of coxarthrosis etiology in primary THR: posttraumatic coxarthrosis - 4 patients (44%), degenerative coxarthrosis - 5 patients (66%). Wright Long Straight modular necks were implanted in 7 patients (78%), in 2 patients (22%) - Wright Long Var/Val modular neck. The average time from primary arthroplasty to revision surgery was  $3.6 \pm 0.89$  years. It should be noted that all patients had active lifestyle before primary THR. The average UCLA score before revision surgery were  $5.8 \pm 1.3$  points (moderate level of physical activity). Analysis of appearance fracture conditions showed usual activity of all patients: walking on the stairs, leaving the car, getting up from the chair, walking. In revision surgery the modular necks fractures were identified at the basis of neck.

**Conclusion:** The modular necks fractures occurred in patients with excessive body weight and moderate level of physical activity who have an active lifestyle prior primary THR.

## O10 Complex primary THA 2

O10-321

SCIATIC NEURAPRAXIA AFTER HIP ARTHROPLASTY IN DYSPLASTIC HIP. IT'S REALLY 4 CMS A SAFE ZONE?

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**Introduction/objectives:** Total Hip arthroplasty in chronic high dislocated hips are increasing; nevertheless, this technique has more problems, being one of the worst sciatic neuropaxia. Literature presumes that lengthening more than 3 or 4 centimeters or more than 10% of the total femoral length has more incidence of neuropaxia, but some other considerations have not been well established

**Methods:** This retrospective study, revised 240 Total Hip arthroplasties performed in high dislocated hips (Hartofilakidis Grade III High Dislocation) by one only surgeon with the same approach, trying to figure out how can affect total body length, body mass index, length discrepancy, descending length, osteotomy or not, and amount of femoral resection during the osteotomy, in the appearance and severity of sciatic neuropaxia

**Results:** We revised 240 Total hip arthroplasties performed since January 2005 to December 2015, descending hips from 27 to 82 millimeters, finding 15 sciatic neuropaxias ( incidence 6,25% ), four in 99 Crowe 3 dislocation hips (4,04%) and eleven (7,8%) in 141 Crowe 4 non treated hip dislocations. We evaluated how many of our patients who suffer sciatic neuropaxia, have a resection femoral osteotomy (6) against those who do not require it (9), and evaluate the above variables listed in our methodology;

**Conclusion:** Total hip arthroplasty in chronic high dislocated hip poses real challenges for a hip surgeon because its technical difficulties and possible complications, the most feared, sciatic neuropaxia. It is important to evaluate the need of an adequate resection osteotomy, as well as different variables to decrease the incidence of sciatic neuropaxia.

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## O11 THA in young patients

O11-558

LONG-TERM FOLLOW-UP RESULTS OF CEMENTED TOTAL HIP ARTHROPLASTY IN PATIENTS YOUNGER THAN 30 YEARS AND OUTCOMES OF THEIR SUBSEQUENT REVISIONS.

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**Introduction/objectives:** Total hip arthroplasty (THA) is increasingly performed in young patients. Their age at the time of primary THA probably requires one or more revisions, so a durable and preferably biological reconstruction is needed. The purpose of this study was to examine long-term results up to 30 years after primary cemented THA in patients under 30 years and the outcome of subsequent revisions.

**Methods:** A historical prospective study of 48 patients (69 hips) younger than 30 years was done, all received primary cemented THAs between April 1988 and May 2004, using acetabular bone impaction grafting if necessary. At review, 2 patients (4 hips) were lost to follow-up. All revisions were performed with cemented THA in combination with bone impaction grafting. Kaplan-Meier curves were used to determine survivorships.

**Results:** The mean age at primary surgery was 25.2 years (range 16.7-29.9y). The mean follow-up of the primary hips was 17.8 years (range 1.3-29.2y). The 15- and 20-year survival for the primary THAs with endpoint revision of any component for aseptic loosening were 85.2% and 80.4%. The 15- and 20-year survival for the primary cup components with endpoint revision for aseptic loosening were 85.2% and 80.5%. The 10-year survival with endpoint re-revision for aseptic loosening of the stem was 100%. Only 4 out of 19 revised hips were re-revised, due to septic loosening (3 hips) and progressive osteolysis (1 hip).

**Conclusion:** Cemented THAs in patients aged <30 years have satisfying long-term outcomes at 20 years after primary surgery. None of the subsequent revised components were re-revised within 10 years of follow-up. These revisions, using cemented components and bone impaction grafting, have promising results at 10 years of follow-up.

## O11 THA in young patients

O11-183

POST-OPERATIVE RADIOLOGICAL ANALYSIS OF TOTAL HIP REPLACEMENTS AT THE CHILDREN'S SURGICAL CENTRE, CAMBODIA

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**Introduction/objectives:** To evaluate postoperative radiographs at the Children's Surgical Centre (CSC) following primary total hip replacement (THR) between 2007 and 2017 by visiting foreign surgeons and local surgeons supervised by foreign surgeons. Additionally looking at THRs conducted by local surgeons unsupervised pre and post 2015 to assess progression over time.

**Methods:** Data from digitised AP pelvic radiographs was extracted using ImageJ software for leg length discrepancy, vertical centre of rotation, horizontal centre of rotation discrepancy (HCOR), acetabular inclination, femoral stem positioning and cement mantle thickness. There were four strata: foreign led (FL), early supervised, early unsupervised (EU) and late unsupervised (LU). Analysis of means was conducted using univariate ANOVA and Sheffe's test. Studies have shown optimal HCOR to be < 5 mm.

**Results:** 51 radiographs were analysed. The EU group had a significantly greater HCOR compared to the FL group (2.20 mm (95% CI: 0.48 - 3.92 %) vs 5.67 mm (95% CI: 4.29 - 7.05 %) (p = 0.027)). There was a significantly improved HCOR in the LU group compared to the EU group (5.67 vs 2.95 mm (95% CI: 1.74 - 4.17%) (p < 0.05)). There was no difference between the groups in the other parameters.

**Conclusion:** CSC has successfully established a self-sustainable THR service in Cambodia. Optimal positioning of implanted components is essential to providing successful patient outcomes and there is strong evidence of local surgeons improving their performance with time and training from visiting foreign surgeons. In the majority of parameters, local surgeons were performing to a similar standard as visiting surgeons. As such CSC serves as an example of what is possible for hospitals in other low and middle income countries.

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## O11 THA in young patients

### O11-524

#### EFFECT OF SURGICAL APPROACH IN YOUNG PATIENTS ON SHORT-TERM RISK OF REVISION AFTER TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** Total hip arthroplasty (THA) is used increasingly in younger patients. There is no consensus about the best surgical approach for THA, especially in this young patient group. Furthermore, trends in surgical approach are changing, with an increasing use of the anterior approach in the last decade. Therefore, we evaluated the short-term survival rates for different surgical approaches using data from the Dutch Arthroplasty Registry (LROI).

**Methods:** All patients younger than 55 years with a primary THA implanted in the Netherlands between 2007 and 2016 were selected. All patients who received a THA with a posterolateral, direct lateral, anterolateral or anterior approach were included (n = 17,015). We determined 1 year survivorship and used multivariable Cox regression ratios for comparison between surgical approaches while adjusting for potential confounders.

**Results:** Our preliminary results showed no difference between the posterolateral (HR = 1.74, CI = 0.99 - 3.07) and direct lateral approach (HR = 1.50, CI = 0.81 - 2.78) compared to the anterior approach in risk of revision after 1 year follow-up. The anterolateral approach resulted in a significantly higher risk of revision after 1 year (HR = 2.45, CI = 1.24 - 4.84) compared to the anterior approach.

**Conclusion:** We found an increased risk of revision in THA using the anterolateral approach in young patients. However, there was no difference in risk of revision between the anterior, posterolateral and direct lateral approach 1 year after THA.

## O11 THA in young patients

### O11-549

#### TOTAL HIP REPLACEMENT VERSUS HIP ARTHROSCOPY, WHICH ONE OFFERS MORE PREDICTABLE CLINICAL RESULTS?

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**Introduction/objectives:** Surgical management young adult with hip pain range from Preserving Surgery to Total Hip Arthroplasty (THA). Traditional clinical hip scores does not discriminate good from excellent results in this population. Aim of our study was to assess the clinical results of hip surgery using a specific hip score (iHOT33) for young active patients

**Methods:** We developed a retrospective descriptive study of a cohort of 80 patients younger than 55 years. The patients were divided into two groups: hip arthroplasty or arthroscopic hip surgery. Demographic and surgical technique data were collected. For the clinical assessment, we used the iHOT33 scale preoperatively and one year after the hip surgery. For the descriptive analysis, it was used Chi square test and non-parametric tests, supported by SPSS Statistics (significance p <0.05).

**Results:** Of the cohort of 80 patients, 43 underwent THA and 37 underwent hip arthroscopy. In the THA group (43 patients), 28 were male (65.1%) and the mean age was 44.4 years. The average iHOT33 score preoperatively was 18.9, while the postoperative at one year was 72.25. Therefore, an increase of 53.4 points was obtained with THA. The mean age at the arthroscopy group (37 patients, men 64.8%) was 36.9 years. The mean preoperative iHOT33 score was 32.97 and the postoperative 65.23 at one year. The increase in this group was 31.19 points. The comparison of the iHOT33 improvement between both groups showed statistically significant differences (p <0.05)

**Conclusion:** In our series of young patients, the clinical improvement one-year postoperatively is greater in THA surgery versus preserving surgery (p <0.05). Both options improve the quality of life of our young patients but more predictable results were obtained with total THA.

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## O11 THA in young patients

### O11-391

#### 15 TO 27 FU OF 94 POLISHED TAPERED CEMENTED STEMS IN PATIENTS UNDER 35.

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**Introduction/objectives:** The survival of cemented polished tapered stems was reviewed in two cohorts of patients with a high risk profile for aseptic loosening with a follow-up between 15-27 years after surgery.

**Methods:** The original cohort counted 63 patients. Two patients died within less than three years following surgery, one in a RTA and one of a leukemia relapse. The group followed therefore consisted of 61 patients with 94 THR for either inflammatory arthritis or avascular necrosis for various reasons. Forty percent of these patients were on steroids at the index operation and 85 % on NSAIDs. The fate of every implant is known and F-U is 100 % because all patients were treated and followed at the university hospital.

**Results:** Three stems needed revision. One because of a deep infection and one for a periprosthetic fracture. Only one stem needed revision for stem fracture due to aseptic loosening at 18-y-FU. The reason was eccentric PE wear of the cup (conventional PE) with PE particle shedding.

**Conclusion:** With a long term follow up (15-27 y.) cemented polished stems have an excellent survival in young patients with a high risk profile for aseptic loosening. At the present time this result has not been surpassed by modern cementless stem designs.

## O11 THA in young patients

### O11-434

#### SPIRON SCREW PROSTHESIS - AN OPTION FOR YOUNGER PATIENTS

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**Introduction/objectives:** Short stem prosthesis are supposed to conserve as much bone stock as possible for future revision surgery and to allow a more natural load transmission in the femur.

**Methods:** From March 2012 to July 2014 37 patients with 38 hips underwent hip arthroplasty with the Spiron prosthesis. Clinical and radiological examinations took place preoperatively, 3 months and yearly postoperatively. Harris Hip Score (HHS), Oxford Hip Score (OHS), intensity of pain (visual analogue scale (VAS)) and postoperative patient satisfaction were detected.

Radiological were assessed: CCD-angle, leg length, medialization/ lateralization of femur shaft axis, cup inclination, implant failure (radiolucent lines, varus dislocation).

**Results:** 34 hips were available for follow-up examination. Average HHS improved from 59.6 points preoperative to 88.7 points 3 month postoperative, to 95.1 points 1 year and 96.3 points 2 years postoperative. OHS results as follows: 38.2 points (preop.), 21.9 (3 months postop.), 16.2 (1 year postop.) and 15.1 (2 years postop.). The median intensity of pain (VAS) decreased from 63.1 points preoperative to 13.2 points at 3 month follow-up, to 6.4 at 1 year and 3.1 at 2 year follow-up. Patient satisfaction advanced from 3.1 points at 3 month to 2.8 points at 1 year and 2.5 at 2 years follow-up. Mean postoperative CCD-angle increased by 5.7° (p<0.01), mean leg length increased by 2.5 mm (p=0.09). Cup inclination was 43.7°. The femur shaft axis was medialized on an average of 3.2 mm.

**Conclusion:** The Spiron prosthesis provides encouraging functional short term results. The Spiron prosthesis is a good option for young patients, however they have to be informed regarding prosthesis specific complications and missing long term results.

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## O11 THA in young patients

### O11-59

TOTAL HIP ARTHROPLASTY IN YOUNG PATIENTS IN THE NETHERLANDS: TREND ANALYSIS OF >19.000 PRIMARY HIP REPLACEMENTS IN THE DUTCH ARTHROPLASTY REGISTER

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**Introduction/objectives:** Total hip arthroplasty (THA) is one of the most successful interventions in medical care. Outcome of THA in younger patients (<55 years) is still inferior when compared to older patients. Because of shifting trends in THA, and failure rates being higher in younger patients, we aimed to assess trends in implant characteristics in the last ten years in patients younger than 55 years old in the Netherlands using the Dutch Arthroplasty Register (LROI).

**Methods:** Data were divided in subgroups for year of surgery and age. Chi-square trend test was used to analyze differences between year of surgery and age groups.

**Results:** Between 2007 and 2017 a total number of 19,915 primary THA were performed in patients <55 years. Osteoarthritis was the most prevalent diagnosis (66.1%). The total number of THA performed increased with 25% between 2012 and 2017. Uncemented fixation was used in 79.5% of all performed THAs. A trend towards a head diameter of 32 mm was present, where ceramic-on-polyethylene is becoming the most frequent used bearing type. Posterolateral surgical approach was used the most in young patients, but an anterior approach is used increasingly. Ceramic-on-polyethylene, 32 mm head diameter and an anterior approach were used significantly more in older patient groups.

**Conclusion:** There was a clear preference for uncemented fixation in young patients. In head diameter, bearing type and surgical approach clear trends were visible. Characteristics of THA in young patients were subject to changing perspectives, and differed with age.

## O12 Hip arthroscopy 1

### O12-227

CAPSULAR CLOSURE VERSUS UNREPAIRED CAPSULOTOMY IN HIP ARTHROSCOPY, PRELIMINARY RESULTS OF A RANDOMIZED CONTROLLED TRIAL

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**Introduction/objectives:** To enter the hip joint in hip arthroscopy a capsulotomy is necessary. It is thought that unrepaired capsulotomy may result in increased early postoperative pain. Classically no capsular repair at the end of the procedure is performed but no consensus exists what the best treatment option is. The CLOSE trial is a prospective patient-blinded rct and investigates the effect of capsular closure versus unrepaired capsulotomy on early postoperative pain.

**Methods:** This abstract presents the preliminary results of the first 55 patients. After computer randomization 27 patients were allocated to the repair group and 28 to the unrepaired capsulotomy group. Primary outcome was the Numerical Rating Scale (NRS) at 12 weeks postoperatively. Change from baseline (CFB) was calculated and compared between the treatment groups. Comparison between the two groups was performed by use of univariate Students t-tests. Mixed model analysis was performed to assess differences between the groups.

**Results:** Patient characteristics of both groups were comparable. Mean pre-operative NRS pain score in the repair group was 4.3 (2.2) and in the unrepaired group 4.4 (SD 2.9) (p=0.89). Significant decrease in NRS was observed in both groups (p<0.01). Mean decrease of NRS pain 12 weeks after surgery was 3.1 (SD 1.9) and 2.8 (SD 2.9) in the repair and unrepaired group, respectively (p=0.71). Mixed model analysis revealed a mean difference of 0.3 (95%CI: -0.5; 1.1) between the groups in favour of the unrepaired group during the first 12 weeks, which was not statistically significant (p=0.52)

**Conclusion:** Preliminary results of this rct suggest that there is no difference in early postoperative pain comparing capsular closure versus unrepaired capsulotomy in hip arthroscopy.

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## O12 Hip arthroscopy 1

### O12-519

THE IMPACT OF ROUTINE CAPSULAR REPAIR IN COMPETITIVE SPORTSMEN UNDERGOING ARTHROSCOPIC CORRECTION OF FEMORO-ACETABULAR IMPINGEMENT: CASE-CONTROL STUDY WITH 2 YEAR FOLLOW-UP

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**Introduction/objectives:** To evaluate whether routinely repairing the hip capsule in competitive athletes undergoing arthroscopic correction of symptomatic femoroacetabular impingement yields improved and sustained functional outcomes

**Methods:** Competitive athletes between 2009-2015 were assigned to one of two groups based on whether capsular repair was performed as part of their index hip arthroscopic (HA) procedure. Exclusion criteria was Tonnis Grade 2+, >40 years, previous surgery, labral excision and other underlying hip conditions. Patient-reported outcomes (HHS, UCLA, SF-36 and WOMAC) were completed pre-operatively and minimum 2 years post-operatively. Range of movement was assessed using a hand-held goniometer. Incidence of subsequent revision surgery between groups was analysed

**Results:** 697 consecutive athletic cases were included: 348 in Group A (No Repair), 349 in Group B(Repair). Average age overall 25.8±5.6 years (15.4 - 39.3). There was no significant difference between groups for any patient-reported outcome measure with both groups significantly improving from pre-operative baseline (p=0.000). No cases in either group required conversion to THR: 22 cases(7%) in Group A required a repeat HA compared to 15 cases(4.8%) in Group B within 2 years following index procedure however this was not statistically different (p=0.380). Group A had a greater mean internal rotation (mean 34.6°;SD 7.74°) compared to those with a repaired capsule (mean 27.4°;SD 6.83°) (p=0.00)

**Conclusion:** Repairing the hip capsule does not lead to statistically superior post-operative outcomes nor a significant reduction in revision HA rates, at 2-years post-operation. Capsular repair limits excessive internal rotation, potentially by restoring the iliofemoral ligament, which may improve hip stability

## O12 Hip arthroscopy 1

### O12-308

EFFECT OF CIGARETTE SMOKING ON PATIENT REPORTED OUTCOMES IN HIP ARTHROSCOPY: A MATCHED-PAIR CONTROLLED STUDY WITH MINIMUM 2-YEAR FOLLOW-UP

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**Introduction/objectives:** The rate of hip arthroscopy has increased; however, there is limited literature examining patient reported outcomes (PRO) in smokers.

**Methods:** From February 2008 to July 2015, data were prospectively collected and retrospectively reviewed to identify patients that smoke at the time of primary hip arthroscopy. Patients were matched 1:2 (smoking: non-smoking) based on patient sex, age within 5 years, labral treatment (repair vs. reconstruction vs. debridement), workers compensation status, and body mass index (BMI) within 5 kg/m<sup>2</sup>. All patients were assessed pre- and postoperatively with 4 patient-reported outcome measures: modified Harris Hip Score (mHHS), Non-Arthritic Hip Score (NAHS), Hip Outcome Score-Sport Specific Subscale (HOS-SSS), and International Hip Outcome Tool 12 (iHOT-12). Pain was estimated on the visual analog scale. Satisfaction was measured on a scale from 0-10.

**Results:** 75 hips (72 patients) were included in the smoking group and 150 hips (140 patients) were included in the control group. At preoperative baseline, the smoking group had significantly lower PRO scores when compared with the control group for mHHS, NAHS, and HOS-SSS. Both groups demonstrated significant improvement from preoperative baseline. Minimum two-year follow-up was achieved with an average of 42.5 months for the smoking group and 47.6 months for the control group (p=0.07). At latest follow-up, the smoking group reported inferior results for all scores.

**Conclusion:** Patients who smoke had lower PRO scores preoperatively and at latest follow-up. Both groups demonstrated similarly significant improvement in all PRO scores. While hip arthroscopy may still yield clinical benefit in smokers, patients who smoke may ultimately achieve an inferior functional status.

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## O12 Hip arthroscopy 1

### O12-99

ANTERIOR EXTRA-ARTICULAR SUBSPINE AND INTRAARTICULAR FEMOROACETABULAR IMPINGEMENT DUE TO DECREASED FEMORAL TORSION - A 3D CT IMPINGEMENT SIMULATION STUDY

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**Introduction/objectives:** Location of hip impingement in hips with symptomatic FAI combined with decreased Femoral Torsion (FT) is unknown. Therefore, we evaluated symptomatic hips with decreased FT both with and without cam and pincer FAI, using CT-based virtual 3D impingement simulation and questioned:

- (1) What is the osseous range of motion?
- (2) Where are the osseous femoral and acetabular impingement zones located?
- (3) Is impingement extra- or intra-articular?

**Methods:** We performed a retrospective comparative analysis of 37 hips in 24 symptomatic FAI patients with decreased FT. These hips were compared to 21 hips of 18 symptomatic patients with anterior FAI with normal FT (10-25°) and 26 asymptomatic hips with no FAI and normal FT. This resulted in a total of 84 hips in 68 patients. All FAI patients were symptomatic and presented with anterior hip pain, a positive anterior impingement test and decreased internal rotation during clinical examination. All hips underwent CT scans including the pelvis and the distal femoral condyles. Decreased FT was defined as FT < 5°.

**Results:** (1) Hips with FAI combined with decreased FT have a significantly lower mean flexion (114° vs 125°, p < 0.001) and internal rotation at 90° of flexion (18° vs 32°, p < 0.001) compared to the asymptomatic control group. (2) The maximal acetabular impingement zone for hips with decreased FT was located at the 2 o'clock position. (3) In hips with decreased FT, 95% of the impingement locations were located intra-articular and 32% had a concomitant extra-articular subspine FAI.

**Conclusion:** Hips with FAI and decreased FT have less flexion and internal rotation in 90° of flexion. Hip impingement due to decreased FT is intraarticular combined with subspine FAI. We identified decreased FT as a new cause for anterior FAI.

## O12 Hip arthroscopy 1

### O12-250

ENDOSCOPIC TREATMENT APPROACH FOR PROXIMAL HAMSTRING TENDINOPATHY

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**Introduction/objectives:** Hamstring tendinopathy (HT) can be a very debilitating condition. Pain in the gluteal and ischial region, while running or seating, is the most common symptom. Sometimes a pseudo-sciatic pain is associated. Followed by clinical examination, MRI confirms the diagnosis. Most cases can be dealt with conservative treatment, but in more reluctant cases, open or endoscopic treatment can be the solution. This work presents the results of endoscopic treatment of HT, focusing on key technique points, its surgical approach and clinical anatomy.

**Methods:** We performed a retrospective study in patients with HT treated by an endoscopic approach. The patients were in ventral decubitus and two portals were made to approach the ischium, followed by bursectomy, tenotomy of semimembranosus and its tenorrhaphy to semitendinosus, and sciatic neurolysis. All patients were submitted to VAS, WOMAC and subjective evaluation scales.

**Results:** The study included 3 endoscopies in 2 male patients, with 32 and 47 years old, and a 6m and 4y duration of symptoms, respectively. Follow up of 1 year in both cases. Mean VAS improved from 8.5 (7-10) to 2 (2 - 2), and WOMAC from 46,4 (37,3 - 63,7) to 81,1 (73,6 - 88,7). Subjectively both patients were satisfied with the procedure.

**Conclusion:** In the recent years HT has gained increased recognition. Conservative treatment remains the mainstay approach, but if it fails to resolve the symptoms, surgery is advocated. We believe endoscopic treatment should be considered over the open procedure. It offers the advantage of minimal aggression, low morbidity and equal results, allowing the same surgical gestures: ischial bursectomy, hamstring tenotomy and tenorrhaphy and sciatic neurolysis.

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## O12 Hip arthroscopy 1

### O12-252

DOES ILIOPSOAS LENGTHENING ADVERSELY AFFECT CLINICAL OUTCOMES? A MULTI-CENTER COMPARATIVE STUDY OF HIP ARTHROSCOPY WITH AND WITHOUT ILIOPSOAS FRACTIONAL LENGTHENING

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**Introduction/objectives:** Iliopsoas fractional lengthening (IFL) continues to be a controversial procedure. The purpose was to report the outcomes of patients who underwent arthroscopic IFL, with femoroacetabular impingement (FAI) and a labral tear, and to compare their outcomes to a control group that did not undergo IFL.

**Methods:** Data were retrospectively reviewed between July 2009 and April 2015. Patients were eligible if they had both a hip arthroscopy for FAI and labral tear treatment with IFL (Group A) and without IFL (Group B). Minimum postoperative follow-up was set to two years and the modified Harris Hip Score, International Hip Outcome Tool, Hip Outcome Score - Activity of Daily Living Score, and Hip Outcome Score - Sports Specific Subscale, visual analogue scale for pain, patient satisfaction, minimal clinically important difference (MCID) and patient acceptable symptomatic state (PASS) were calculated.

**Results:** 351 hips (307 patients) met the necessary inclusion criteria in the IFL cohort with a mean follow-up time of 42.5±18.1 months. For the control cohort, 392 hips (354 patients) were included with a mean follow-up time of 43.9±19.6 months. Both groups showed significant postoperative improvement in two year follow-up PROs. The group with iliopsoas lengthening showed comparable results to the control group with respect to PRO improvement, MCID, PASS, rates of revision or THA conversion.

**Conclusion:** Treatment with arthroscopic IFL, in the setting of FAI and a labral tear, is a safe procedure with good short to mid-term follow-up results and associated improvement in PROs. Patients who underwent IFL showed similar outcomes compared to a control group. In appropriately selected patients, arthroscopic IFL did not adversely affect clinical outcomes.

## O12 Hip arthroscopy 1

### O12-593

TRACTION FORCE FOR PERIOPERATIVE HIP DISLOCATION IN HIP ARTHROSCOPY

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**Introduction/objectives:** During hip arthroscopy it is necessary to apply traction force to widen the joint space. Main goal of our study was to measure the amount of force needed to widen the hip joint. Second goal was to analyze if there is a reproducible relation between this force and the amount of joint space widening.

**Methods:** The perioperative traction force was measured in 27 patients (24 female, mean age 41) during hip arthroscopy. Four measurements were performed during arthroscopy: two before the procedure, one after releasing the vacuum seal and one after capsulotomy. The widening of the joint space was measured with fluoroscopy and a steel bullet for calibration. Friedman and Wilcoxon tests were used to measure differences in traction force at the several moments. The Spearman's rho correlation coefficient was used to find a correlation in traction force and obtained joint space widening.

**Results:** The median traction force before arthroscopy was 750N (range 390-1362). The median traction force after vacuum seal release lowered to 496N (range 119-780) (p=0.001) and to 452N (range 63-750) after capsulotomy (p<0.001). Median joint space widening was 8.6mm (5.4-13.7). Correlation between traction force and joint space widening was -0.13.

**Conclusion:** A median traction force of 750N was needed to acquire 8.6mm of joint space widening. This traction force was significantly lowered by almost 250N after release of the vacuum seal of the hip and 300N after additional capsulotomy, without loss of joint space narrowing. No correlation between traction force and joint space widening could be found.

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## O13 Patient management 2

### O13-281

#### FEASIBILITY AND PATIENT EXPERIENCE OF A HOME-BASED REHABILITATION PROGRAM DRIVEN BY A TABLET APPLICATION AND MOBILITY MONITORING FOR PATIENTS AFTER A TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** Recent developments in technology are promising for providing home-based exercise programs. The objective of this study was to evaluate the feasibility and patient experience of a home-based rehabilitation program after Total Hip Arthroplasty (THA) delivered by means of videos on a tablet PC and a necklace-worn motion sensor to continuously monitor mobility-related activities.

**Methods:** Thirty independently living patients aged 18-75 who received a THA as treatment for primary or secondary osteoarthritis (OA) were included. Patients followed a 12-week exercise program with video instructions on a tablet PC and daily physical activity registration through a motion sensor. Patients were asked to do strengthening and walking exercises at least five days a week. There was weekly phone contact with a physiotherapist. Adherence and technical problems were recorded during the intervention. User evaluation was done in week 4 (T1) and at the end of the program (T2). Descriptive statistics were used to describe the data.

**Results:** Twenty-six patients completed the program. Average adherence for exercising five times a week was 92%. Reasons mentioned most often for non-adherence were vacation or a day/weekend off (25%) and work (15%). The total number of technical issues was eight. The average score on the user evaluation questionnaire (range 0-5) was 4.6 at T1 and 4.5 at T2. The highest score was for the subscale "coaching" and the lowest for the subscale "sensor".

**Conclusion:** A home-based rehabilitation program driven by a tablet application and mobility monitoring seems feasible for THA patients. Adherence was good and patient experience was positive. The novel technology was well accepted. A home-based program could be an alternative for formal physiotherapy.

## O13 Patient management 2

### O13-315

#### PREOPERATIVE CHRONIC OPIOID USE AND VALUE-BASED OUTCOMES IN TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** The current study aims to add to the paucity of prior studies that have used a state's opioid registry to report detailed perioperative opioid use patterns and the effects of preoperative chronic opioid use among a consecutive cohort of total hip arthroplasty (THA) patients.

**Methods:** A retrospective analysis on 256 consecutive patients who underwent a THA at our institution between February 2016 and June 2016 was performed. Two cohorts were involved in the study: THA patients who were deemed preoperative chronic opioid users and those who were not. Data on patients' opioid use histories 3 months prior to surgery and 6 months following surgery were collected using the state's prescription monitoring program. Variables that were compared between the two groups included baseline characteristics, as well as quality metrics.

**Results:** Of the 256 patients, 54 (21.1%) patients were identified as chronic opioid users. The chronic users had a significantly higher prevalence of private insurance while the non-chronic users had a higher prevalence of worker's compensation insurance ( $p < 0.001$ ).

Discharge disposition, value-based purchasing (VBP) costs, length of stay (LOS), emergency room visits, and postoperative office visits were similar between the two cohorts. Readmission rates, 30-day ( $p = 0.031$ ), 90-day ( $p = 0.043$ ), and 6-month ( $p = 0.046$ ), were significantly higher in the chronic opioid users cohort.

**Conclusion:** The current study demonstrates that a substantial proportion of preoperative chronic opioid users continue to consume large amounts of opioids up to 6-months following THA surgery. Furthermore, preoperative chronic use is significantly associated with poorer quality outcomes, specifically with respect to readmission rates.

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## O13 Patient management 2

### O13-362

#### THE MEDIAN LOCAL ANESTHETIC DOSE (MLAD) OF INTRATHECAL BUPIVACAINE AND INTRATHECAL PRILOCAINE IN TOTAL HIP ARTHROPLASTY WITH THE ANTERIOR SUPINE INTERMUSCULAR APPROACH

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<sup>(1)</sup> Reinier de Graaf Groep, Delft, Netherlands

**Introduction/objectives:** In order to optimize the direct mobilization after total hip arthroplasty (THA), the dose of bupivacaine used for spinal anesthesia might be reduced. Furthermore, prilocaine might be a suitable alternative. The objective is to determine the median local anesthetic dose (MLAD) of bupivacaine and prilocaine in THA that allows direct post-operative mobilization and sufficient anesthesia during surgery.

**Methods:** Two prospective dose finding studies were conducted in which the MLAD of bupivacaine and the MLAD of prilocaine in THA with ASI approach were studied using the up-and-down sequential allocation model as described by Dixon and Massey. The mean surgery time for THA with ASI approach in 2014 was 68 minutes and the 95th percentile was 104 minutes. To allow bupivacaine and prilocaine to reach a sufficient nerve blockade, we added respectively 15 and 20 minutes to the 95th percentile of the mean surgery time. The dose requirements for the succeeding patient were directed by the outcomes of the preceding patient. An inadequate dose of bupivacaine led to a 0.5 mg dose increase, whereas an adequate dose led to a 0.5 mg dose decrease. In the prilocaine study an inadequate dose led to a 5 mg dose increase, whereas an adequate dose led to a 5 mg dose decrease.

**Results:** The MLAD for bupivacaine was 5.7 mg (95% CI 5.2-6.1). Three patients reported pain at the end of the surgery, varied between a dose of 4.0 and 5.0 mg. The MLAD for prilocaine was 52.9 mg (95% CI 52.9-53.0). Thirteen patients reported pain during surgery, varied between a dose of 40 and 60 mg.

**Conclusion:** The dose of bupivacaine used for spinal anesthesia during THA with ASI approach might be reduced. The use of prilocaine during THA with ASI approach is not recommended.

## O13 Patient management 2

### O13-396

#### ASPIRIN AS DVT PROPHYLAXIS IN TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** VTE is a serious complication following total hip arthroplasty (THA). Traditionally low molecular weight heparin uses as chemoprophylaxis against VTE but there are potential complications with these group of drugs. According last edition of ACCP guideline and recent AAOS guideline Aspirin can be used as a safe and efficient drug for prophylaxis against VTE. In this study we observed efficacy and potential risks of Aspirin regarding this issue.

**Methods:** In a Prospective series of consecutive 1000 THA patients between January 2014 to January 2017 we used Aspirin as the only prophylaxis regimen against VTE. Patients with major risk factors for VTE were excluded. There was no mechanical prophylaxis in our patients, patients immediately started to ankle pumping after completion of anesthesia and were ambulated as tolerated weight in same day of surgery or the day after surgery. Hemoglobin (Hb) concentration preoperatively and post operation day (POD) 1 and 3 were calculated as an indicator of blood loss. All operations were done through minimally invasive direct anterior approach. Routinely we use no suction drain in our patients

**Results:** there are 5 cases (0.5%) of clinically symptomatic VTE. No hematoma formation requiring surgical drainage observed in our patients. There were 18 wound bleeding POD 1 to 3 requiring dressing change. Mean Hb concentration reduction were 2g/L (1-4g/L) and no patient required blood transfusion

**Conclusion:** considering enormous potential of Aspirin in reduction of symptomatic VTE as recommended by AAOS and ACCP guidelines and in light of very low cost of Aspirin we recommend routine Aspirin usage as 1st line chemoprophylaxis against VTE except in patient with major risk factors for example those with history of previous DVT.

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## O13 Patient management 2

### O13-514

YOUNG PATIENTS WITH HIP PATHOLOGY: HOW TO IMPROVE PSYCHO-SOCIAL PROBLEMS IN DAILY LIFE  
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**Introduction/objectives:** Patients under 40 with hip pathology experience different problems in daily life compared to older hip patients. Besides physical problems like pain and stiffness of the joint, these young patients also face limitations on the psycho-social and emotional aspects in daily life. These problems are correlated to the life phase they are in. However, there is limited information about these experienced non-physical problems.

**Methods:** In this prospective study, primarily inductive analysis was performed by daily practice observation. These observations showed that different but specific problems in variable dimensions were experienced. Next, 30 patients answered a survey about experienced psycho-social problems in daily life caused by hip pathology. Deductive analysis was performed by organizing a focus group for member checking. Collected data were evaluated. Topics were discussed more in detail and interventions were determined. These interventions were executed and subsequently evaluated in a second focus group.

**Results:** During outpatient visits, patients want to discuss medical issues but also their psycho-social problems. Some sensitive subjects, like sexuality, are not easily mentioned. Young patients need patient-specific information about their personal situation to manage their expectations. Contact with peers and sharing experiences is seen as valuable, for example on a forum, by telephone, mail, or in real life.

**Conclusion:** Young hip patients have specific needs and expectations on psycho-social aspects. They want to be seen as an unique young person, with specific needs and expectations. This must and can be integrated more specific in daily healthcare practice to provide guidance in experienced daily life problems caused by hip pathology.

## O13 Patient management 2

### O13-444

COMPARISON OF SUTURES VERSUS STAPLES IN SURGICAL WOUND CLOSURE AFTER TOTAL HIP REPLACEMENT  
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**Introduction/objectives:** Both sutures and staples can achieve the basic goals of wound closure widely and endeavour to re-approximate the skin by creating a watertight, tension-free non-inverted position of the edges. There are various studies with conflicting results regarding the efficacy, economics, rate of complications and cosmetic outcomes achieved when comparing these two closure methods for a variety of applications. In this study we evaluated the efficacy of this two methods.

**Methods:** In this RCT 637 patients underwent THA during 2015-2016 were randomly assigned to skin closure with staples (n=297) or skin closure with suture (n=340) groups. Vancouver Scar Score and Holland wound evaluation scar was evaluated for each patient. Data were entered in SPSS software ver 16.0 and analyzed. P value lesser than 0.05 considered as significant.

**Results:** The patients aged 51±13 years. Number of patients with wound complication was 65 patients (10.20%) after six-week follow-up which had no difference between staples and suture skin closure (RR=0.45, CI= 0.34-1.29). The mean of Vancouver Scar Score and Holland wound evaluation scar was not significantly different between two groups (P>0.05). Time to closure in wounds was shorter in staple group (mean= 5.3 min, CI= 2.3-8.4) than the nylon suture group (mean= 14, CI= 6.5-17.5). Pain was more in staple group rather than nylon suture group by VAS score (mean 4.5 versus 3.2).

**Conclusion:** This study suggests that 10.2% of patients report a wound complication with no difference between sutures and staples. It was demonstrated that suturing skin requires more time and staples are more painful to remove. However, there are no significant difference in use.

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## O13 Patient management 2

### O13-234

MINIMAL POST OPERATIVE RESTRICTIONS ARE SAFE AFTER POSTERIOR APPROACH TOTAL HIP ARTHROPLASTY. RESULTS FROM A LARGE COHORT STUDY  
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**Introduction/objectives:** To prevent early post-operative dislocation after total hip arthroplasty (THA) patients have to adhere to precautions. A minimal/no restrictions protocol is usually used with anterior approach, more restrictive protocols usually with posterior approach. We aimed to compare the <90 day dislocation rate between patients managed with minimal versus extensive restrictions in a large cohort of posterior approach THA's.

**Methods:** Prospective cohort of 1049 consecutive elective primary hip replacement surgery procedures (Sept 2014-Jul 2017) with minimal restrictions (cross-legged sitting and combined full flexion, internal rotation and adduction not allowed, no other restrictions). Hospital charts were prospectively reviewed for patient demographics, risk factors and any hip dislocation. Control: 1101 consecutive primary elective THA's (Jan 2011-Aug 2014) with a restrictive protocol (no hip flexion >90°, no internal rotation or adduction, sleeping supine, elevated (toilet) seat, 6 weeks crutch use). The posterior surgical approach was used in all procedures.

**Results:** Minimal restrictions group: 17 dislocations <90 days (1.6%); Restricted group: 28 (2.5%). Chi-square p=0.1. Testing the hypothesis of inferiority by a minimum of 1% increase in <90 days dislocation risk: p=0.14 (test for difference) and p<0.001 (non-inferiority test), allowing us to discard the null hypothesis (absolute increase in risk of >1% with minimal restrictions). Patient demographics were not significantly different but the proportion of surgeries performed with a femoral head >28mm was higher in the minimal restrictions group.

**Conclusion:** It appears safe to manage patients with minimal restrictions after posterior approach THA if combined with more frequent use of larger femoral heads.

## O14 Dual mobility cups

### O14-51

CEMENTLESS DUAL MOBILITY CUPS AND BONE GRAFT FOR RECONSTRUCTION OF ACETABULAR DEFECTS  
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**Introduction/objectives:** Dual Mobility (DM) Total Hip Arthroplasty (THA) is a good alternative in difficult revisions with high rates of postoperative dislocations. This prospective study was designed to record a- the outcome of cementless revision DM cups b- the success rate of cementless cups combined with bone allograft as a construct in massive acetabular defects.

**Methods:** 29 hips with massive acetabular defects were prospectively evaluated. Segmental superior and posterior acetabular defects were reconstructed using bulk fresh frozen allograft, while bone chips were impacted into the cavitary defects. Cementless porous and hydroxyapatite coated DM cups (Novae E or Coptos, SERF, France) with primary interference fit in addition to screw and peg fixation were employed in all patients. The modified Harris Hip Score and radiological evaluations were recorded. Cup position, stability and bone ingrowth at the cup-bone interface were evaluated. Wilcoxon test was used to compare pre to latest follow up results.

**Results:** acetabular defects grade IIC to IIIB (Paproskey's) were reconstructed using bulk and impaction grafts. At an average 34 months follow up (minimum 2 years) all cups had evidence of bone ingrowth at the cup-bone interface. No dislocation was recorded. Incorporation of the impacted graft into cavitary defects was observed in 25/29 (86%). The HHS has improved from a mean of 29 pre to 85 points postoperatively (P=0.001).

**Conclusion:** Massive acetabular defects can successfully be reconstructed using a combination of cementless cups that incorporate with host bone in addition to bulk graft that maximizes the initial stability. DM articulation is a valuable alternative in difficult revision THA. However, longer term follow up are required.

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## O14 Dual mobility cups

### O14-229

#### TOTAL HIP ARTHROPLASTY USING A DUAL MOBILITY CUP FOR DISPLACED FEMORAL NECK FRACTURES IN ELDERLY PATIENTS: A COMPARATIVE STUDY WITH BIPOLAR HEMIARTHROPLASTY USING A PROPENSITY SCORE-MATCHED ANALYSIS

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**Introduction/objectives:** With the advent of dual mobility acetabular cups (DMC) and their claims of lower dislocation rates, total hip arthroplasty (THA) using DMC is seeing resurgence in the treatment of femoral neck fractures (FNF). The present study aimed to compare perioperative parameters and early complications, with a focus on the dislocations and postoperative ambulatory capacity, between THA using DMC and bipolar hemiarthroplasty (BHA) in the treatment of displaced intra capsular FNF.

**Methods:** A total of 264 patients who underwent BHA or THA using DMC for FNF were included. After propensity-score matching for age, gender, BMI, preoperative ASA score, Koval's grade, and Charlson comorbidity index, 71 pairs of THA using DMC and BHA patients with a mean age of 80.6±6.4 years and 79.4 ± 6.6years, respectively, were identified. The mortality rate, perioperative parameters, dislocation rate, surgical or medical complications, and postoperative ambulatory status of both groups were evaluated.

**Results:** There was no significant difference in surgery-related complications including infection or reoperation rate between the two groups. Operation time, estimated blood loss, and amount of transfusion were greater in the THA using DMC group. However, THA using DMC had superior outcomes in terms of postoperative ambulatory capacity and mortality (p<0.0001 and p=0.015, respectively). Dislocation rates in both groups were similar, with four dislocations in the THA using DMC group and five in the BHA group (p=0.739).

**Conclusion:** Our study suggests that the use of dual mobility cups may represent an alternative treatment approach that retains the core advantages of THA in elderly patients with displaced FNF.

## O14 Dual mobility cups

### O14-477

#### DUAL-MOBILITY BEARINGS FOR PATIENTS WITH ABDUCTOR-TROCHANTERIC COMPLEX INSUFFICIENCY

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**Introduction/objectives:** The purpose of this study was to summarize the performance of dual mobility cup systems for revision total hip arthroplasty in patients who had abductor-trochanteric complex deficiency.

**Methods:** We prospectively followed up 17 patients (20 hips) with a mean age of 64.5 years (range: 33-89 years) who underwent acetabular reconstruction with dual-mobility cups for aseptic loosening in 12 hips, infection treatment as second or single stage in 6 hips, and instability in 2 hips. All of the patients had abductor insufficiency. We evaluated the clinical Harris Hip scores (HHS) and radiographs for migration, loosening, and osteolysis. The survival of the components was calculated according to Kaplan-Meier survivorship analysis, and failure was defined as any dislocation and acetabular component and total hip system revision for any reason.

**Results:** The mean duration of follow-up was 38.1 months (range: 24-98 months). There were 2 (12.5%) repeat revisions for cemented cup migration after 11 months and 19 months. There was no dislocation. At the last follow up, the mean HHS increased from 42 points preoperatively to 86 points. The cumulative survival rate of the dual-mobility cup system was 93% (95% confidence interval (CI): 88- 98.7%) at 5 years, with any revision as the endpoint.

**Conclusion:** Dual-mobility cups may provide excellent stability in patients with abductor-trochanteric complex insufficiency.

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## O14 Dual mobility cups

### O14-201

#### DUAL MOBILITY THR FOR THE MANAGEMENT OF FAILED PROXIMAL FEMORAL FIXATION

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**Introduction/objectives:** Proximal femoral fractures are increasingly common in older population where the bones are fragile and comminuted. Complications are not uncommon including nonunion, malunion and screw cut out. Dual mobility total hip replacement is a reasonable option for such problems that can restore patient hip to good range of motion with low risk of dislocation

**Methods:** 20 patients with failed fixation of proximal femur fractures had dual mobility total hip replacement. Patients were evaluated according to the American Society of Anesthesiology (ASA) scoring system and harris hip score (HHS).

All patients received cemented DM cup (Novae stick, SERF, France) and standard or long polished cemented stem. Trochanteric re-attachment was performed using Wroblewski's cross-over double wiring technique.

The modified Harris Hip Score was measured postoperatively and radiological evaluation of patients at 6 and 12 weeks then annually thereafter.

**Results:** average follow up of 16 months (range 12 to 30) were evaluated with no loss to follow up. 17 patients were classified as ASA III and 3 patients as ASA IV. At the latest follow up all patients were independently mobile. 8 patients were community ambulatory and 11 were mobile indoors. No dislocation was recorded and stable greater trochanter was observed in all patients. One patient developed postoperative hematoma that needed alteration of the anticoagulant protocol and 2 weeks of oral antibiotics. Another patient had periprosthetic fracture distal to the tip of the stem 6 months postoperatively.

**Conclusion:** Dual mobility total hip replacement is a good option for the management of complicated fixation of proximal femur fracture. Dislocation is no longer a complication of total hip for the management of such a problem

## O14 Dual mobility cups

### O14-303

#### COST ANALYSIS OF DUAL-MOBILITY VS. LARGE FEMORAL HEAD CONSTRUCTS IN REVISION TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** The purpose of this study was to evaluate costs of dual-mobility (DM) vs. large femoral head (LFH) constructs in revision total hip arthroplasties (THAs) from a healthcare payer perspective.

**Methods:** A Markov model was constructed to analyze costs incurred by payers in the United Kingdom (UK), Germany, Italy and Spain over 3 years in revision THA with DM or LFH implants. Model states and probabilities were derived from prospectively collected registry data in patients who underwent revision THA with a DM (n=126) or 40 mm LFH (n=176) construct and then mapped to corresponding procedural reimbursement codes and tariffs for each country. Costs were weighted-average national payments for post-THA reinterventions. Italian costs were based on volume-weighted reimbursement levels for three major regions. Probabilistic sensitivity analysis examined the effect of combined uncertainty across all model parameters.

**Results:** Over a 3-year period following revision THA, reinterventions were performed in 11 (9%) DM patients and 34 (19%) LFH patients. In the UK, DM constructs had lower associated incremental costs compared to LFH (£428 vs. £1,447). In Germany, DM constructs had lower costs compared to LFH (€ 451 vs. € 1,272). In Italy, DM constructs had lower costs than LFH (€ 540 vs. € 1,425). In Spain, DM constructs had lower costs than LFH (€ 523 vs. € 1,562).

**Conclusion:** At mid-term follow-up, DM constructs utilized in revision THAs were associated with a significantly lower absolute risk of re-intervention (~11% lower) and translated to lower healthcare payer costs compared to LFH constructs in each market modelled.

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## O14 Dual mobility cups

O14-463

THE COST-EFFECTIVENESS OF DUAL-MOBILITY IN A SPINE FUSION POPULATION WITH HIGH-RISK OF DISLOCATION

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**Introduction/objectives:** Routine use of DM may not be a cost-effective measure, but an increasing number of THA candidates have coexisting spinal disorders, substantially increasing their risk for instability. This study seeks to expand our understanding of the cost-effectiveness of dual mobility components as an alternative to standard articulations in this high-risk dislocation population.

**Methods:** A state-transition Markov model with expected-value decision analysis was used to evaluate the cost-effectiveness of DM cups for high-risk patients who would be at high risk for dislocation within one year of their index THA. Direct and indirect costs of dislocation, incremental DM cost (\$1000), quality-adjusted life years (QALY) values and dislocation probabilities were derived from published data.

**Results:** Spine fusion patients were modelled to have a 15% probability of dislocation following primary THA based on published clinical ranges. A hypothetical reduction of 5% in probability of dislocation was deemed clinically plausible with the addition of a DM implant. Under these model parameters, sensitivity analysis was used to identify scenarios for which DM would be cost effective. For example, if the probability of dislocation is 15% with traditional bearings, then the use of DM is cost-effective if it reduces the dislocation risk to 10% and costs less than \$640 (Figure 1). However, at its current average selling price (\$1000), it would only be cost-effective if it reduces the probability of dislocation from 15% to 7% in this population.

**Conclusion:** Dislocation is a significant complication and spine fusion patients have been shown to be at high risk. Our results indicate that under specific conditions DM cups are cost-effective for this high risk spine fusion population.

## O15 Surgical approach 1

O15-493

IS THE HYPE REAL? DIRECT ANTERIOR APPROACH VERSUS STRAIGHT LATERAL APPROACH IN TOTAL HIP REPLACEMENT: EARLY FOLLOW UP.

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**Introduction/objectives:** Recently the anterior approach in hip replacement has gained popularity among patients because of supposed postoperative benefits in functional outcome and pain management. In our clinic, two surgeons each use exclusively one approach in hip replacement and the anterior approach (DAA) was compared to the straight lateral approach (SL) in postoperative outcome.

**Methods:** Patients who underwent a total hip replacement through an direct anterior or a straight lateral approach between 2014 and 2016 at the Bergman Clinics were retrospectively followed. Each approach was exclusively performed by one of the two surgeons. Patient Reported Outcome Measures (PROMs) were conducted preoperative and after 3 and 12 months. Patient were evaluated with Hip Disability and Osteoarthritis Outcome Score (HOOS-PS), de Oxford Hip Score (OHS) and a Numeric Rating Scale (NRS) for pain.

**Results:** Total hip replacement was performed in a total of 1026 patients. At 3 months and 12 months an improvement of the HOOS-PS score was found ( $p = 0.001$  and  $p = 0.017$  respectively) for the DAA compared to SL. Operating time and duration of stay were significantly less in DAA. At specific physical activity questions in the OHS questionnaire the DAA showed better outcome at 3 and 12 months.

**Conclusion:** This study shows better results in Patient Reported Outcome Measurement with the DAA on function, operating time and length of stay. Differences between the approaches on the total score are minimal, therefore it remains to be seen if the better outcome in DAA is clinically relevant in the rehabilitation process.

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## O15 Surgical approach 1

O15-420

THE DIRECT ANTERIOR APPROACH THA: BEYOND THE LEARNING CURVE

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**Introduction/objectives:** Recent publications suggested that the Direct Anterior Approach (DAA) for total hip arthroplasty is associated with more stem revisions compared to other approaches. In addition, lack of adequate data on outcome and complications is emphasized. Many reports are single surgeon series, deal with multiple clinics, use a traction table or included the surgeon's learning curve. Therefore, we report perioperative and short-term revision data of the DAA performed on a regular table in a high-volume training hospital by surgeons who are beyond their learning curve.

**Methods:** Intraoperative parameters and postoperative complications of 2369 THAs performed from 2011 to 2014 were retrospectively analysed. Duration of follow-up was 3-6 years.

**Results:** Mean operation time, blood loss and hospital stay were 68 minutes (SD 18), 387 mL (SD 250) and 3,4 days (SD 1,9) respectively. Revision rate for any reason was 2,4%, for dislocation 0,6%, and for aseptic stem loosening 1,4 % (uncemented stems) and 0,7% (cemented stems). Intraoperative fracture rate was 0,5%. In total 1,6% had a deep infection, prosthesis could be retained in 84% of the patients in this group.

**Conclusion:** The perioperative outcomes and complication rate confirm the DAA as a safe and reliable approach. Dealing with the learning curve may become easier for future surgeons when the DAA is incorporated in resident training programs. Nevertheless, we found the learning never stops, also for experienced surgeons, for both implant system and approach. With the benefits of supine patient position and less tendon or muscle transections we believe the DAA will continue to gain popularity. However, more data is necessary, especially concerning risk factors for aseptic uncemented stem loosening.

## O15 Surgical approach 1

O15-153

THE INFLUENCE OF DIFFERENT PELVIC SUPPORTS ON CUP INCLINATION ANGLE USING A POSTERIOR APPROACH

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**Introduction/objectives:** The orientation of the acetabular component is influenced by the angle of the cup introducer and the orientation of the pelvis. The goal of this study was to examine the effect of two different pelvic supports on cup orientation.

**Methods:** In this prospective study, 200 consecutive patients undergoing primary THA in the lateral decubitus position were included. A single support over the pubic symphysis (PS) or a single support over the ipsilateral anterior superior iliac spine (ASIS) was used. The angle of the cup introducer relative to the floor (apparent operative inclination: Ola) was measured. The radiographic inclination (RI) was measured on anteroposterior pelvic radiographs at 6 weeks postoperatively. The target zone for cup inclination was 35-45°.

**Results:** In both cohorts the cups were implanted close to the target Ola with an absolute difference with the Ola of 0.86° in the PS cohort and 1.03° in the ASIS cohort ( $p=0.18$ ). The difference between the RI and Ola was higher in the PS cohort (12.2° SD 4.1) compared with the ASIS cohort (7.5° SD 3.7;  $p<0.0001$ ) with also a bigger variance ( $p=0.04$ ) in the PS cohort. The mean RI was 38.5° SD 4.4 compared with 39.2° SD 4.1 ( $p=0.26$ ) respectively. There were more cups outside the RI target zone in the PS cohort compared with the ASIS cohort (26 versus 15;  $p<0.05$ ).

**Conclusion:** The mean difference between the RI and Ola (the angle of the cup introducer during surgery) was significantly less when using a support over the ASIS compared with a support over the pubic symphysis. Apparently using a support over the ASIS causes less pelvic motion during surgery compared with a support over the pubic symphysis. This resulted in less variance and inclination outliers when using a tight target zone of 35-45°.

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## O15 Surgical approach 1

### O15-582

THE DIRECT ANTERIOR VERSUS THE DIRECT LATERAL APPROACH: POSTOPERATIVE RESULTS WITH TWO-YEAR FOLLOW-UP

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**Introduction/objectives:** The direct anterior approach (DAA) uses a nerve- and muscle neutral interval which theoretically should yield better postoperative results compared to the transgluteal direct lateral approach (DLA). A prospective, randomized, controlled trial was conducted to compare the results of these approaches

**Methods:** From January 2012 to June 2013 164 patients with end-stage osteoarthritis were randomized to either DAA or DLA. Prior to surgery and at 3, 6, 12 and 24 months a physiotherapist recorded the Harris Hip Score (HHS), 6-minute walk distance (6MWD) and the Trendelenburg test status. The patients completed the Oxford Hip Score (OHS) and the EQ-5D. The groups were similar at baseline when comparing demographic data and had comparable preoperative scores. Both groups received the same pre- and postoperative regime. Assessors and patients were blinded to approach used. 154 patients (94%) completed the two-year follow-up.

**Results:** The DAA group had better HHS at all follow-up time points, but maximum 4.4 points (90.4 vs. 86.0 at 12 months,  $p=0.07$ ). No difference was found for the 6MWD. The OHS was significantly better in the DAA group at 3 months (39 vs 36,  $p=0.02$ ) and the EQ-5D index was significantly better in the DAA group at 12 months (0.83 vs 0.77,  $p=0.04$ ). The number of Trendelenburg positive patients increased from 44% preoperatively to 49% at 3 months in the DLA group but improved from 49% to 17% in the DAA ( $p<0.001$ ). After 24 months 16% percent remained Trendelenburg positive in the DLA group, but only 1.3% in the DAA ( $p=0.001$ ).

**Conclusion:** Both the DAA and the DLA are safe and give good postoperative results, but the number of Trendelenburg positive patients can be greatly reduced by use of the DAA.

## O15 Surgical approach 1

### O15-14

SIMILAR SUPERIOR PATIENT REPORTED OUTCOME MEASURES FOR ANTERIOR AND POSTEROLATERAL APPROACH AFTER TOTAL HIP ARTHROPLASTY IN THE NETHERLANDS.

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**Introduction/objectives:** To determine the effect of surgical approach on Patient Reported Outcome Measures (PROMs) after primary THA in the Netherlands.

**Methods:** We selected all primary THAs performed in 2015-2016, registered in the Dutch Arthroplasty Register. Based on surgical approach, 4 groups were discerned: anterior, anterolateral, direct lateral and posterolateral approach. The Hip disability and Osteoarthritis Outcome Score Physical function Short form (HOOS-PS), Oxford Hip Score (OHS), EQ-5D index score and EQ-5D thermometer, Numeric Rating Scale (NRS) measuring pain, both active and in rest, were recorded. The difference between pre- and post-operative scores (3 months) was calculated (delta-PROM). Multivariable linear regression analysis was performed. Cohen's d was calculated as a standard measure of effect size.

**Results:** All 4 approaches resulted in a significant increase of PROMs after THA in the Netherlands ( $n=12,274$ ). The anterior and posterolateral approach were associated with significantly more improvement in HOOS-PS scores compared to the anterolateral and direct lateral approach. Furthermore, the posterolateral approach was associated with greater improvement on NRS pain scores, both in rest or during activities, compared to the anterolateral approach. No relevant differences in delta-PROM were seen between the anterior and posterolateral approach.

**Conclusion:** Anterior and posterolateral approaches showed more improvement in self-reported physical functioning (HOOS-PS) compared to anterolateral and direct lateral approaches in patients receiving a primary THA in the Netherlands.

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## O15 Surgical approach 1

### O15-590

POSTEROLATERAL OR DIRECT LATERAL APPROACH OF HEMARTHROPLASTY AFTER FEMORAL NECK FRACTURES: A SYSTEMATIC REVIEW

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**Introduction/objectives:** In the Netherlands the posterolateral approach (PLA) and direct lateral approach (DLA) are the most commonly used approaches when inserting a hemiarthroplasty after femoral neck fractures. Currently there is no consensus which approach is better for the patient outcome and therefore there is a high variance in practice. The aim of this study was to provide a clear overview of the available evidence of the differences in patient outcomes between patients suffering a femoral neck fracture treated with a hemiarthroplasty using the PLA versus the DLA.

**Methods:** A literature search was conducted in the MEDLINE and EMBASE databases and Cochrane Library. Studies comparing different approaches than PLA and DLA, published before 2000 and reviews were excluded. Language restrictions were set to English and Dutch.

**Results:** 258 records were identified of which 10 were included. Two studies reported significantly more dislocations in the PLA group, 4 studies found no differences. Infection rate did not differ between the groups. DLA patients were more likely to develop a Trendelenburg and limping. The PLA patients tend to have better quality of life, less pain and more satisfaction compared to the DLA patients. The overall methodological quality of the studies was low. The GRADE scores of the outcomes were very low.

**Conclusion:** The PLA tends to have more dislocations, but a higher quality of life and less pain. In contrast DLA have less dislocations, but a higher tendency to abductor insufficiency. These results are based on low quality studies. A well conducted clinical trial is needed.

## O15 Surgical approach 1

### O15-83

DIRECT LATERAL APPROACH WITH TROCHANTERIC OSTEOTOMY USING ULTRA-HIGH MOLECULAR WEIGHT POLYETHYLENE TAPE CAN PROVIDE LOWER DISLOCATION RATE FOLLOWING CEMENTED TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** In THA through a direct lateral approach with trochanteric osteotomy (Dall approach), UHMWPE tape has been recently applied to tighten the greater trochanter, however there are still unclear details of outcomes. To clarify the usefulness of this method which can be to prevent postoperative dislocation, we aimed to investigate the frequency of displacements in the trochanter, the cup installation and the dislocation rate.

**Methods:** We retrospectively enrolled 332 consecutive primary cemented THAs with Dall approach at a mean follow up duration of 4.3 (range, 0.5 to 7.0) years, excluding infection and death. The circumferential cerclage of the greater trochanter fragments were using UHMWPE tapes. The mean age of the patients was 64 (52 to 88) years at the time of surgery. We radiographically calculated the ratio of the pelvic vertical height to the distance from the center of the cup to the tear drop, and investigated the dislocation rate. The hips were dichotomized into groups on their radiographs in 6 months after THA: group U with union or displacement in the greater trochanter of 2 mm or less, and group D with displacement of > 2 mm or non-union.

**Results:** The ratio of the radiographic measurement was 0.11 in group U (275 hips, 83%) and 0.17 in group D (57 hips) ( $p = 0.03$ ). In the case where the ratio was 0.15 or more, 83 hips (30%) were seen in group U and 41 (72%) in group D ( $p < 0.01$ ). Dislocation was in 4 hips (1.2%) while all were in group D with 0.18 of the ratio.

**Conclusion:** Although the dislocation rate of cemented THA by this reinforcement is similar to previous literatures, it was suggested that anatomical consideration of the cup placement and union of the greater trochanter were essential for prevention of dislocation.

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## O16 New technologies

### O16-343

#### AN ANATOMIC CERAMIC CEMENTLESS HIP RESURFACING ARTHROPLASTY

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**Introduction/objectives:** We aimed to demonstrate the clinical safety of a novel anatomic cementless ceramic hip resurfacing device. Concerns around the safety of metal on metal arthroplasty have made resurfacing less attractive, while long term function continues to make the concept appealing. Biolox Delta ceramic is now used in more than 50% of all hip arthroplasties, suggesting that its safety profile is acceptable. We wondered if a combination of these concepts might work?

**Methods:** An anatomic hip resurfacing device was developed by our group. Biolox delta components were coated with plasma sprayed titanium and hydroxyapatite. After extensive preclinical testing, a twenty patient safety study was designed. Patients had to be between the ages of 18 and 70. The initial size range was restricted to femoral heads between 46 and 54, representing the common sizes of hip resurfacing. The primary outcomes were clinical safety, PROMs and radiological control. Secondary outcomes include CTRSA and metal ion levels.

**Results:** 20 patients were recruited, aged 30-69. 7 were women and 13 were men. There were no operative adverse events in their operations undertaken between September 2017 and February 2018. One patient had a short episode of atrial fibrillation on the second postoperative day, and no other complications. At three months the median oxford hip score had risen from 27 (range 14-38) to 46 (31-48). Cobalt and chromium levels were almost undetectable at 3 months. Fixation appeared satisfactory in all patients, with no migration detected in either component. CTRSA is in process.

**Conclusion:** This small study appears to confirm the initial safety of a novel cementless ceramic resurfacing device. The more extensive efficacy study will continue in other European centres.

## O16 New technologies

### O16-139

#### ACCURACY OF ACCELEROMETER-BASED PORTABLE COMPUTER NAVIGATION FOR ACETABULAR COMPONENT ALIGNMENT IN TOTAL HIP ARTHROPLASTY USING ANTEROLATERAL SUPINE APPROACH

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**Introduction/objectives:** The purpose of this study was to examine the accuracy of acetabular component alignment in total hip arthroplasty (THA) in supine position using an accelerometer-based portable computer navigation system.

**Methods:** Thirty hips were received THA in supine position using the Direct Anterior Approach HipAlign® navigation system (OrthAlign, Inc., Aliso Viejo, CA). Three-dimensional templating software (ZedHip, LEXI, Tokyo, Japan) was used for measurement of postoperative cup alignment. The intraoperative navigation and postoperative CT evaluations were compared for the accuracy of cup alignment.

**Results:** The mean cup alignment were  $38.8^{\circ} \pm 3.1^{\circ}$  ( $33.2$  to  $47.0^{\circ}$ ) for the inclination and  $12.3^{\circ} \pm 4.1^{\circ}$  ( $3.2$  to  $22.3^{\circ}$ ) for anteversion. Twenty eight of 30 cups (93.3%) were placed within the Lewinnek safe zone. The absolute difference between the portable navigation and CT measurements was  $2.2^{\circ} \pm 2.0^{\circ}$  for inclination and  $3.3^{\circ} \pm 3.5^{\circ}$  for anteversion.

**Conclusion:** The accelerometer-based device is a portable navigation system for THA in supine position that does not require the use of a large computer console. The navigation system could be highly accurate for placement of acetabular component, and decrease outliers in THA.

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## O16 New technologies

### O16-70

#### SMARTPHONE-ASSISTED TECHNIQUE IN TOTAL HIP ARTHROPLASTY CAN IMPROVE ACCURACY OF ACETABULAR CUP PLACEMENT: A RANDOMIZED-CONTROLLED TRIAL

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**Introduction/objectives:** To determine the percentage of acetabular cups positioned in Lewinnek's safe zone, comparing between the conventional technique (using a mechanical alignment guide) and a smartphone technique (using a level indicator application in the smartphone to evaluate the intraoperative pelvic motion and the operative inclination of the mechanical alignment guide)

**Methods:** A prospective randomized-controlled trial was conducted among 64 patients who underwent primary cementless or hybrid THAs using a posterolateral approach from January 2015 to February 2017. Acetabular components were implanted either by conventional technique (n=32) or using smartphone technique (n=32). Inclination and anteversion angles were measured and calculated in standardized postoperative pelvic radiographs. The data were compared between groups by using the exact probability test, t-test and logistic regression analysis.

**Results:** The inclination angle in the smartphone group was not significantly different from the conventional group [ $41.2^{\circ}$  (SD 3.9) vs  $40.3^{\circ}$  (SD 7.9),  $p=0.567$ ]. The anteversion angle was also similar [ $19.3^{\circ}$  (SD 3.8) vs  $19.1^{\circ}$  (SD 5.9),  $p=0.856$ ]. The smartphone group had higher probability (OR=9.0, 95%CI 1.4-59.2,  $p=0.023$ ) and more cups positioned in Lewinnek's safe zone (90.6% vs 59.4%,  $p=0.008$ ). The operative time, blood loss and complications were not significantly different.

**Conclusion:** An invented instrument that uses the level indicator application of a smartphone together with a mechanical alignment guide could improve the precision of cup placement.

## O16 New technologies

### O16-527

#### ANTERIOR APPROACH LINKED TO MAKO PROCEDURE: TIPS AND TRICKS

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**Introduction/objectives:** We performed from December 2016 to March 2018 116 THR combined save sparing tissue with mako

**Methods:** We use a reproducible procedure. The net and the chech of femur are positioned in lateral side of great trochanter, the net of pelvis are positioned in iliac crest of opposite side.

Anterior approach and mako in an easy a reproducible procedure to avoid mistake and to prevent mal-position of component to avoid wearing a damage of load. We noted the tortion of rasp noted by surgeons was different from the correct position. With mako we can measure the tortion of rasp linked with the good holding and the good position in the femur.

**Results:** The tortion of rasp (we finded femur tortion from  $28^{\circ}$  to  $-18^{\circ}$ ) influence the version (shel version  $12^{\circ}$ - $25^{\circ}$ ) and the inclination ( $40^{\circ}$ - $42^{\circ}$ ) of the shell in the pelvis. In these condition we can misure the combine version between rasp of femur and shel (range  $16^{\circ}$ - $32^{\circ}$ ), that give a good stability and reduce the wearing and load.

With mako we can estimate the good tension of gluteus and of the tensor fascia lata calculating the vector between lengthening (range minus 2 to plus 22 mm) and offset (minus 4mm to plus 3 mm) of the hip. In this way we give a good stability of hip. Mako gives the opportunity of good position of femur and shell giving the good tension of muscle. Usually we have implanted normal head (96 % 0 head). These items combine with anterior approach preserve the muscle so there is no alteration of balance of muscle.

**Conclusion:** This procedure takes a long learning curve to read the value acquired. It takes 20 minutes more the anterior approach only. It combines the tissue sparing with accuracy of Mako.

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## O16 New technologies

### O16-211

TOTAL HIP ARTHROPLASTY USING ROBOTIC-ASSISTED TECHNOLOGY RELIABLY AND ACCURATELY REPRODUCES PLANNED ACETABULAR CUP PLACEMENT, FEMORAL STEM VERSION, COMBINED VERSION, HIP OFFSET AND HIP LENGTH  
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**Introduction/objectives:** Robotic technology may help the surgeon with accurate total hip arthroplasty (THA) reconstructions.

**Methods:** 20 patients underwent a THA that were planned using preoperative CT scans and the robotic arm-assisted software. Pelvic and femoral bone models were constructed by segmenting both preoperative and postoperative CT scan images. The preoperative anatomic landmarks using the system were matched to the postoperative 3D reconstructions of the pelvis. The postoperative bone model was registered to the preoperative bone model using an iterative closest point algorithm.

**Results:** Overall hip reconstruction from the intraoperative numbers obtained from the robotic arm-assisted system were accurate with the deviation from the executed overall hip length and offset being  $1.6\pm 2.9$ mm and  $0.5\pm 3.0$ mm respectively. Combined anteversion was similar and correlated between intraop measurements and postop CT measurements ( $32.5\pm 5.9$  degrees vs  $32.2\pm 6.4$  respectively;  $R^2=0.65, p<0.0001$ ). There was a significant correlation between intraop cup inclination and version with postoperatively measured cup inclination ( $R^2=0.62, p<0.0001$ ) and version ( $R^2=0.76, p<0.0001$ ). Pre and postoperative stem anteversion were significantly correlated ( $R^2=0.64, p<0.0001$ ). Placement of hip center of rotation had a mean medial-lateral error ( $1.0\pm 0.79$ mm), anterior-posterior error ( $1.2\pm 0.8$ mm), and superior-inferior error ( $1.6\pm 0.8$ mm) in planned cup placement versus postoperatively CT measured values within 2mm.

**Conclusion:** This is the first study to look at overall hip reconstruction using robotic arm-assisted system. The overall hip reconstruction obtained in the operating room using robotic assistance accurately correlated with the postoperative independent CT measurements using three-dimensional modelling.

## O16 New technologies

### O16-479

A NOVEL METHOD OF IDENTIFYING NERVE INJURY DURING TOTAL HIP ARTHROPLASTY  
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<sup>(1)</sup> Acibadem University, Acibadem Maslak Hospital, Istanbul, Turkey; <sup>(2)</sup> Acibadem University, Department of Neurology, Acibadem Maslak Hospital, Istanbul, Turkey

**Introduction/objectives:** Anterior Root Muscle Response (ARMR) is a new and noninvasive intraoperative neuromonitoring technique. The aim was to analyze ARMR of sciatic and femoral nerves of patients who had undergone total hip arthroplasty (THA).

**Methods:** A total of 20 adults (11 males, 4 females;  $64.6\pm 13.87$ ; 11 right and 4 left sided) have been monitored using bilateral ARMAR and free-run electromyography of the sciatic and femoral nerves during four stages of THA was applied with posterior approach (exposure, preparation of the femoral side, preparation of the acetabular side, closure). All the patients received sedation and spinal anesthesia. Latency and amplitude values of ARMAR and free-run EMG were recorded from both sides (operated and non-operated) and from five muscles as follows: rectus femoris, vastus lateralis, biceps femoris long-head, tibialis anterior and gastrocnemius.

**Results:** Permanent ( $n=1, 5.2\%$ ) and temporary ( $n=4, 21\%$ ) disappearance of ARMARs was not accompanied with neurotonic discharge of the related muscle on operated side. All temporary disappearance of ARMARs appeared during removing of preparation of femoral side (3 femoral plus sciatic nerves and 1 sciatic nerve innervated muscles). One permanent disappearance of ARMARs was during closure (femoral and sciatic nerves related muscles). In all patients, free-run recordings did not show any persistent neurotonic discharges and there was no post-operative neurological deficit. The mean stimulus intensity was on the operated side  $520\pm 175$  V. Sensitivity was not calculated because of lack of true positive cases. Specificity was calculated as 94.4%.

**Conclusion:** ARMAR may have a role in identifying and preventing neurological complication, thus preventing permanent postoperative neurological deficits.

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## O16 New technologies

### O16-448

OPEN LABRAL RECONSTRUCTION IMPROVES OUTCOMES IN FEMOROACETABULAR IMPINGEMENT AFTER FAILED HIP PRESERVING SURGERY  
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**Introduction/objectives:** Although hip arthroscopy (HA), has gained popularity in the treatment of femoroacetabular impingement (FAI), clinical failures requiring reoperation still occur. The purpose of this study is to report clinical and radiographic outcomes in patients undergoing open labral reconstruction via Surgical Hip Dislocation (OLR-SHD) after failed HA.

**Methods:** In a retrospective review of all hip surgeries in single center from January 1st, 2013 to September 30th, 2017 we identified 18 OLR-SHD procedures. History of HA and demographic data including age, gender, race, body mass index (BMI), American Anesthesiology Society (ASA) score, and side of procedure were collected. Pre- and post-operative Harris Hip Scores (HHS), modified Merle d'Aubigne (MMD) scores, and Tönnis osteoarthritis grade were collected. Simple linear regression analysis was performed for all individual demographics and history of HA for pre- and post-operative HHS, and MMD scores. Sub-analysis was performed using a multivariable logistic regression while controlling for individual variables.

**Results:** Patients with a history of HA had significantly lower pre-operative HHS ( $p=0.044$ ), and significantly greater overall improvement of HHS ( $p=0.026$ ) and MMD ( $p=0.017$ ) scores, from baseline, after undergoing OLR-SHD. There was no difference in pre-operative MMD, nor post-operative HHS and MMD scores.

**Conclusion:** Failure of HA leads to significantly lower clinical outcomes. OLR-SHD after failed HA allows greater surgical exposure to resolve underlying bone deformities and provide equivalent post-operative clinical outcomes compared to those without failed prior HA.

## O17 Primary THA 2

### O17-371

PREDICTING OFFSET RESTORATION IN SHORT AND CONVENTIONAL STEMS BY USE OF DIGITAL TEMPLATING  
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**Introduction/objectives:** Loss of offset >5mm is associated with altered gait and decreased functional outcome. Some short stems follow the medial calcar, also allowing excellent offset restoration. Conventional stems can have difficulty restoring offset due to diaphyseal anchoring. The aim of this study was to assess whether predicting offset restoration preoperatively differs between a short and conventional stem by use of digital templating. Possible predictors and reliability of measurements were also assessed.

**Methods:** Hundred standardised hip X-rays for digital templating were used from two ongoing cohorts with a short and conventional stem. Restoration of offset was dichotomized into "restored" (< 5mm) or "not restored" (>5mm) and analyzed by use of McNemar tests. Multi-level analysis was performed for association between CCD-angle and baseline offset with offset restoration. Bootstrapping was performed to determine the optimal cut-off point of the baseline offset for restoration in a ROC-analysis. Two observers were for the intra-observer reliability and three observers participated for inter-observer reliability.

**Results:** The mean baseline offset was 79.7mm (range 62.5-113mm) with a mean CCD-angle of 128.6° (range 114.5-145°). The conventional stem could only restore the offset in 72%, whereas the short stem restored the offset in 100%. Only the baseline offset was a predictor. A cut-off point of 81.25mm (95% CI of 80.75-84.75mm) in baseline offset was found where the conventional stem was unable to restore offset. Intra-observer reliability was 0.99 and inter-observer reliability was >0.9 between the three observers for preoperative offset.

**Conclusion:** Short stems seem superior to conventional stems in predicting restoration of offset with a baseline offset of >80.0mm.

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## O17 Primary THA 2

O17-329

### THE ASSOCIATION BETWEEN RADIOGRAPHIC AND FUNCTIONAL OUTCOMES AFTER THA

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**Introduction/objectives:** Restoring native hip anatomy and biomechanics are important to create a well-functioning total hip arthroplasty (THA). Hip offset and leg length are regarded as the most important biomechanical characteristics. This study investigated their association with clinical outcomes including patient reported outcome measures (PROMs) and functional tests.

**Methods:** This prospective cohort study was conducted in 77 patients undergoing primary THA (age=65±11 years). Hip offset and leg length were measured on anteroposterior radiographs of the hip pre- and postoperatively. Participants completed the Western Ontario & McMaster Universities Osteoarthritis Index (WOMAC) and performed functional tests (i.e. gait, single leg stance, sit-to-stand, block step-up) preoperatively, and 3 and 12 months postoperatively. A wearable motion sensor was used to derive biomechanical parameters. Associations between radiographic and functional outcomes were investigated with the Spearman's rho correlation coefficient. Subgroup comparisons were conducted for patients with more than 15% decreased or increased femoral offset after THA.

**Results:** Differences in postoperative offset and leg length had little impact on clinical outcomes. Femoral offset subgroups demonstrated no significantly different WOMAC function scores. In functional tests, patients with >15% decreased femoral offset after THA demonstrated more sagittal plane motion during block step-up (14.43° versus 10.66°; p=0.04) while patients with >15% increased femoral offset after THA demonstrated more asymmetry of frontal plane motion during block step-up (34.05% versus 14.18%; p=0.03).

**Conclusion:** To create a well-functioning THA, there seems to be a reasonable safe zone regarding the reconstruction of offset and leg length.

## O17 Primary THA 2

O17-355

### PROSPECTIVE COMPARATIVE STUDY OF SMOOTH-SURFACED TITANIUM STEM AND POLISH-SURFACED STAINLESS STEEL STEM FIXED WITH INTERFACE BIOACTIVE BONE CEMENT TECHNIQUE

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**Introduction/objectives:** Excellent results have been reported with cemented total hip arthroplasty (THA) using both smooth-surface and polished-surface stem. However, the superiority of polished-surface over smooth-surface in cemented THA, or vice versa, is still debated.

**Methods:** Forty six smooth-surfaced triple-tapered Titanium-alloy stem (C) and 46 Exeter stem (T) have been fixed with interface bioactive bone cement (IBBC) technique consecutively in the different period at our institute and prospectively evaluated clinically and radiologically. An area and location of the cortical hypertrophy (CH) were measured in the serial radiograph and compared. All statistical analyses were conducted using IBM SPSS version 21.0.

**Results:** Mean postoperative follow up period was 12.4 years for C and 10.8 years for T. Pre- and postoperative evaluation using Merle d'Aubigne score were 8.3 and 16.0 points for group C and, 8.0 and 16.3 points for group T, respectively (NS). Loosening, radiolucent line, focal osteolysis, cement fracture was not observed in both groups. CH was observed in 8 hips of C and in 7 hips of T (NS). CH was observed firstly at 4.7 years postoperatively in group C and at 3.1 years postoperatively in group T. Area of CH has been enlarged in both groups and reached to maximum at 8.7 years postoperatively in group C and at 8.9 years postoperatively in group T. Maximum area of CH was 129.2mm square in group C and 199.1mm square in group T (p=0.017). Area of CH decreased until final follow up in both groups. Location of the peak of CH was 101.0% in group C and 85.6% in group T (p=0.017).

**Conclusion:** Medium-term (minimum follow up; 10 years) result of both stems fixed with IBBC technique was excellent. CH was observed more prominently and proximally in T compared with C.

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## O17 Primary THA 2

O17-10

### A COPY IS NOT THE SAME AS THE ORIGINAL - ALARMINGLY HIGH RATES OF IMPLANT FRACTURE OF A POLISHED TAPERED FEMORAL STEM

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**Introduction/objectives:** Cemented polished tapered stems have demonstrated excellent long-term outcomes. Based on this concept many companies have entered different varieties of polished tapered stems into the market. The aim of this study was to evaluate implant-related complication of one specific stem design.

**Methods:** Between 2010 and 2017, 315 total hip replacements were performed using a Fortress stem (Biotechni, La Ciotat, France). Patient records and radiology were retrospectively reviewed for implant-related complications.

**Results:** Five (1.6%) patients sustained a fracture of the neck of the implant after a mean of 55 months. All fractures were traumatic, originating at the introducer inlet of the stem. All fractured occurred in obese patients (BMI >33) with a small sized prosthesis. Of these there were three 135° and two 125° stems. Fracture risk was 16.7% (5/30) for patients with a small sized stem and a BMI > 30. All cases were revised using a cement-in-cement technique or a cementless modular revision stem.

**Conclusion:** An alarmingly high rate of early implant fractures was seen using this specific type of cemented stem, in particular when using smaller implant sizes in obese patients. Although based on a proven design, a specific modification (sharp edges of the introducer inlet) led to a stress riser in the neck area, which resulted in a high incidence of implant failure. Due to this finding, the use of this stem can no longer be recommended and it has been abandoned at our institution. This series underlines the importance of a stepwise introduction into the market of new orthopedic devices even when based on established concepts.

## O17 Primary THA 2

O17-552

### EARLY TO MID-TERM RESULTS OF AN UNCEMENTED MODULAR TAPERED FEMORAL STEM IN TOTAL HIP ARTHROPLASTY (THA)

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**Introduction/objectives:** Aim: To assess the clinical and radiological outcome of an uncemented modular tapered femoral stem in revision and complex primary total hip arthroplasty.

**Methods:** This retrospective study included 85 patients who underwent Total hip replacement using the implant of interest. 62 were revision THA and 23 were complex primary THA. Out of the 62 revision surgeries, 55 were performed at one stage and 7 were two-stage surgeries (all infected). Indications for revision were: 25 patients had Periprosthetic fractures, 22 had aseptic loosening, 5 had Adverse Reaction to Metal Debris, 2-recurrent instability and 7-periprosthetic joint infections. Patients were assessed clinically and radiologically at 3 months; 12months and then yearly follow up for osteolysis and subsidence of the stem. Bone loss was classified as per paprosky classification.

**Results:** The mean follow up was 3 years (1.0 year- 6 years), 5 patients had a revision of at least one component. One patient had a fracture of the stem, one had a change of proximal body to correct limb length discrepancy, one ended up with excision arthroplasty for deep infection, 2 patients had periprosthetic fracture eventually needing total femur replacement. There were no intraoperative periprosthetic fractures. Post-operative subsidence rate was 15.38%. There were no revisions for aseptic loosening or Osteolysis.

**Conclusion:** Our results show good to excellent survival and satisfactory clinical and radiological outcome of an uncemented modular tapered stem for revision and complex primary Total Hip Arthroplasty.

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## O17 Primary THA 2

O17-384

### BILATERAL TOTAL HIP ARTHROPLASTY: ONE-STAGE VERSUS TWO-STAGE PROCEDURE

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**Introduction/objectives:** Despite several studies, controversies prevailed about the rate of complications following one-stage and two-stage bilateral total hip arthroplasty (THA). In the current study, we compared the complications and functional outcomes of one-stage and two-stage procedures.

**Methods:** 180 patients (ASA class I or II) with bilateral hip osteoarthritis were assigned randomly to 2 equal groups. The 2 groups were matched in terms of age and sex. All of the surgeries were performed through the Harding approach using uncemented implants. In 2-stage procedures, surgeries were performed with 6 month to 1 year interval. All patients were evaluated 1 year postoperatively.

**Results:** The Harris hip score (HHS) averaged 84.1 and 82.6 in one-stage and 2-stage groups, respectively ( $p=0.528$ ). The hospital stay was significantly longer in the 2-stage group (9.8 days versus 4.9 days). The cumulative hemoglobin drop and the number of transfused blood units were the same. 1 patient in each group developed symptomatic deep venous thrombosis but managed it successfully. There was no patient with perioperative death, pulmonary embolism, infection, dislocation, periprosthetic fracture or heterotrophic ossification. No patient required reoperation. 2 patients in 1-stage group developed unilateral temporary peroneal nerve palsy, which was resolved after 3 to 4 months.

**Conclusion:** 1-stage bilateral THA can be used successfully for patients with bilateral hip disease without increasing the rate of complications. The functional and clinical outcomes are comparable and hospital stay is significantly shorter.

## O17 Primary THA 2

O17-276

### A STUDY OF CEMENTLESS STEM STABILITY AFTER HIP ARTHROPLASTY IN PATIENTS WITH HAEMODIALYSIS

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**Introduction/objectives:** The aim of this study is to evaluate radiographically stabilization of the cementless stems and clinical results after FHP or THR using several types cementless prosthesis in patients with hemodialysis.

**Methods:** This study included 22 patients (27 hips) on hemodialysis who underwent FHP or THR using several types cementless prosthesis. There were 12 women with an average age of 48.3 years. The average follow-up was 8.6 years. The average hemodialysis term was 9 years. Several types of hip prosthesis (7 stems were CLS, 7 were IMC, 7 were Duetto S-I, 2 were Bi-Metric XR and AI HIP SYSTEM, 1 was Modulux and SL-PLUS MIA) have been used for the treatment. Radiographically, we assessed at least 3° of varus-valgus deviation or at least 3 mm of subsidence as aseptic loosening of stems. In addition, we assessed radiolucent line and stress shielding of the stems. As for clinical results, we measured postoperative infection and revision rate.

**Results:** Aseptic loosening of stems was identified in 14.8%. Radiolucent lines were identified in 7.4%-18.5% of hips categorized by Gruen's classification zone I-VII, although their zones differed according to the stem model. Stress shielding was identified in 25 hips (92.6%), half of which was level 1, according to the criteria described by Engh et al. Infection rate was 3.7% and it was a 22 years hemodialysis patient. Revision rate was 11.1%.

**Conclusion:** We experienced early loosening of the stems in this series and considered prevention of amyloid deposition very important in improving the prognosis of the arthroplasty. We should follow carefully hemodialysis patients after surgery because their nutrition level is low and their bodies are compromised due to steroids use and their postoperative infection rate is high.

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## O18 Surgical approach 2

O18-134

### PRIMARY HIP AND KNEE ARTHROPLASTY IN GERMANY AND THE NETHERLANDS. IS THERE A DOWNSIDE EFFECT TO FAST-TRACK SURGERY REGARDING PATIENT SATISFACTION AND FUNCTIONAL OUTCOME?

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**Introduction/objectives:** Hip (THA) and knee (TKA) arthroplasty protocols differ between Germany and the Netherlands. The Dutch system promotes fast-track surgery whereas in Germany conventional care is provided with a longer length of hospital admission including in- and outpatient rehabilitation. The effect of fast-track surgery compared to conventional care on patient reported outcome measurements (PROMs) and satisfaction was monitored in a prospective study.

**Methods:** Patients allocated for primary THA or TKA in three German and one Dutch hospital in the border region were included. PROMs were measured pre- and postoperatively at 6 and 12 months including the Oxford Hip Score, Oxford Knee Score, SF12 survey, Visual analogue scale for Satisfaction and Pain. Length of hospitalization, type and length of postoperative rehabilitation were recorded.

**Results:** 663 Consecutive patients were included; 162 THA and 141 TKA in Germany compared to 185 THA and 175 TKA in the Netherlands. Mean length of hospitalization was 11.5 days (range 6 - 23) in Germany, compared to 4.7 days (range 3 - 25) in the Netherlands ( $p<0.05$ ). In Germany 90% of the patients is discharged with an in- (68%) or outpatient (21%) rehabilitation program for an average of 3 weeks (SD 0.8), compared to 17% in the Netherlands of 2.4 weeks (SD 1.4) ( $p<0.05$ ). No significant differences were measured regarding the PROMs and satisfaction rate with surgery between both countries.

**Conclusion:** Despite length of hospitalization is significantly longer in Germany including the rehabilitation program, no significant difference was recorded regarding the PROMs nor patient satisfaction compared to fast-track surgery performed in The Netherlands. In conclusion, no downside effect of fast-track surgery was recorded in this study.

## O18 Surgical approach 2

O18-300

### CLINICO RADIOLOGICAL COMPARATIVE STUDY ANTERIOR VERSUS POSTEROLATERAL APPROACH

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**Introduction:** Since 1999 the use of Anterior approach (A) is increased, proposed reasons: shorter stay, lower dislocation rate, better limb length control, better functional results.  
**Objective:** Compare clinicoradiographic results A vs PL

**Methods:** Prospective study, multicenter. Serie 80 patients, age range 25-70 years, average 56.5 years; Non consecutive procedures. Data collected: Incision Length, Operation time, Days of stay Harris Hip Score preop and postop. Radiographic evaluation Cup: Orientation (anteversion-declination) Stem: Migration, Pedestal, Alignment. Controls 3 weeks, 2-6 months, 1 year postop Implants uncemented (Element, Exactech, USA).

**Results:** Demographics: no stadistical differences A: Age range 31-70 years, Average 56.1 years, Male 23(57%) PL: Age range 25-70 years, Average 57.2 years, Male 25(62%). Incision Length A 14 cm(12-16 cm), PL 15 cm(12-16 cm) Operation Time A 92 min(80-100 min) PL 73 min 65-94 min) Days of stay A 3.1 days(2.6-4 days) PL 4 days(3.4-5 days) Limb lenght discrepancy A 2 mm(0-6 mm) PL 4 mm(1-6 mm) P: 0.222 RX Cup Declination angle A 42°(38°-47°) PL 45°(38°-51°) Anteversion A 12°(3°-21°) PL 18°(7°-25°) Stem Migration 5 cases 2,3 mm(1-4 mm), 4 A, 1 PL Pedestal 2 cases A Alignment 71 cases neutral, varus 7 cases A, valgus 2 cases A Complications 3 calcar fx's (1 PL, 2 A) 1 wound dehiscence A 1 paresthesia A. Harris Hip Score: A Preop 53(45-61) 3 weeks 86.5(77-92) 2 months 91(84-98) 6 months 94(90-98) 1 year 95(90-99) PL Preop 51(43-60) 3 weeks 81(76-85) 2 months 89(82-97) 6 months 92(89-97) 1 year 93,7(90-99) No patient lost from follow up,dvts, dislocations No revision for any reason.

**Conclusion:** We found initial better results on the Harris hips score with Anterior approach and final similar results. The decrease of the length of stay, should be explore. A higher complication rate in Anterior approach.

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## O18 Surgical approach 2

### O18-104

#### THE EXTERNAL OBTURATOR FOOTPRINT AS A LANDMARK IN TOTAL HIP ARTHROPLASTY THROUGH A DIRECT ANTERIOR APPROACH: A CT-BASED ANALYSIS

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**Introduction/objectives:** Anatomical landmarks for templating of total hip arthroplasty (THA) that are visible both during surgery and on radiographs are rare. If surgery is performed through a direct anterior approach the external obturator tendon (EO) is consistently visible. To use this point as a reference the exact position and dimensions of the footprint need to be known.

**Aim:** To determine the location and dimension of the EO footprint on pelvic radiographs by correlating the EO anatomy in CT scans with conventional radiographs.

**Methods:** CT scans and radiographs of 200 patients were analyzed. The EO tendon was identified on CT scans; the height of its footprint, and its distance to the tip of the greater trochanter and to the anatomical axis of the femur was measured. The accuracy and inter-rater reliability in the identification of the EO footprint was determined.

**Results:** The EO tendon was visible on all CT scans and its footprint was identifiable on all corresponding radiographs. Its crano-caudal dimension was 6.4±1.4mm. Its distance to the tip of the greater trochanter was 16.0±3.1mm. The EO footprint was located 5.2±3.7mm lateral to the femoral anatomical axis. There was no significant difference regarding the accuracy of EO footprint localization on radiographs among the two readers.

**Conclusion:** The EO footprint on the greater trochanter is consistently visible on CT scans and radiographs. As the variability of the footprint dimension is small, this structure may serve as a useful landmark in THA, particularly when performed through a direct anterior approach

## O18 Surgical approach 2

### O18-166

#### SCIATIC NERVE PALSY FOLLOWING PRIMARY MINI-POSTERIOR TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** Sciatic nerve palsy (SNP) after total hip arthroplasty (THA) can be a severe complication, and there are various risk factors for SNP following THA. We conducted a retrospective study to determine the incidence and risk factors for SNP after mini-posterior (MP)-THA.

**Methods:** Primary MP-THAs were performed on 5,230 hips in our clinic and in related hospitals from 2008 to 2017. All implants were cementless. SNP after MP-THA was studied with respect to various factors, and logistic regression was performed to identify the risk factors. Patients with SNP were matched in a 1:1 ratio with patients without palsy (control group) on the basis of the year of surgery and gender.

**Results:** SNP after MP-THA was observed in 31 hips (0.59%), and only female patients were affected. There was no significant difference between women and men with respect to SNP ( $p=0.069$ ). The mean values of the data of the patients with SNP compared to those of the patients without SNP were as follows: age, 58.7 vs. 58.7 years, body weight; 53.4 vs. 57.0 kg ( $p=0.072$ ); height, 151.8 vs. 156.9 cm ( $p<0.001$ ); body mass index, 23.2 vs. 23.1 kg/m<sup>2</sup> ( $p=0.945$ ); developmental dysplasia of the hip, 27 vs. 30 hips ( $p=0.354$ ); diabetes mellitus, 2 vs. 2 hips; previous hip surgery, 4 vs. 2 hips ( $p=0.671$ ); leg lengthening, 13.3 vs. 15.2 mm ( $p=0.359$ ); operative time, 58.0 vs. 50.7 minutes ( $p<0.001$ ); and blood loss, 451.3 vs. 296.5 mL ( $p=0.014$ ). We found an association between the rate of SNP and height or operative time using logistic regression.

**Conclusion:** In this study, we found that MP-THA had a similar risk of SNP in patients compared with historical controls. This study suggests that a longer operative time may mean more damage to the sciatic nerve.

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## O18 Surgical approach 2

### O18-555

#### THE SHORT EXTERNAL ROTATORS AFTER RELEASE IN THE DIRECT ANTERIOR APPROACH TO THE HIP: A PROSPECTIVE STUDY OF MRI FINDINGS AND EXTERNAL ROTATION FORCE

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**Introduction/objectives:** Adequate elevation of the femur for stem insertion during Total Hip Arthroplasty (THA) via the Direct Anterior Approach (DAA) relies on release of the hip capsule from the medial (inside) surface of the greater trochanter, and, if needed, some of the short external rotator tendons. It is unknown whether these tendons have some form of healing after release, and, if they do not, whether this is important. In this study we describe the aspect of the short external rotators after DAA and its clinical relevance.

**Methods:** We included 21 patients scheduled for THA via the DAA in a prospective study. In order to describe the degree of external rotator tendon release and muscle atrophy, an MRI was performed before, and 2 and 12 months after THA. At the same time, external rotation force of both hips was measured with a hand-held dynamometer.

**Results:** MRI showed that in 17 of the 21 patients only the Conjoined Tendon (CT) was released. In 14 patients the CT and Piriformis Tendon (PT) were released. This was always accompanied by atrophy of the muscle. In all but one of the patients the External Obturator Tendon (EOT) and muscle remained intact. Incomplete healing of all tendons was seen one year after surgery. In addition, muscle atrophy did not recover. Mean external hip rotation force did not improve 2 months after surgery. After one year the improvement was significant, also in the patients with atrophy of the short external rotators.

**Conclusion:** The CT and PT are frequently detached with proximal femoral release in the DAA. The EOT, probably a key tendon for THA stability, is not at risk. Healing of the detached tendons and subsequent muscle atrophy is incomplete. However, we could not find any effect on hip external rotation force.

## O18 Surgical approach 2

### O18-560

#### INCIDENCE OF TENSOR FASCIA LATA MUSCLE DENERVATION IN PATIENTS UNDERGOING A MIS ANTEROLATERAL APPROACH (ROTTINGER) FOR TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** Beside other advantages the minimally invasive total hip arthroplasty approaches should result in minimizing soft tissue damage especially concerning the muscles. The MIS anterolateral approach (Rottinger) is using the muscular interval between tensor fascia lata muscle (TFL) and gluteus medius muscle (GM). Anterolateral approaches are using an intermuscular plane whereas anterior approaches rely on an internervous plane. Anterolateral and lateral approaches are connected with the potential risk to compromise the gluteal superior nerve (GSN), which variably courses in the muscular interval between GM and TFL and innervates both muscles. The author described the MIS anterolateral approach (Rottinger) in 2004 and after faced with this rational discussion of potential risk at GNS the approach was modified to a more distal incision (published in 2010).

**Methods:** Thirty-four consecutive patients with THA and modified MIS anterolateral approach (Rottinger) in 2016 where analyzed 12 months after surgery by MRI regarding atrophy and fat replacement of the TFL. To describe the changes in the TFL following classification was used: grade 1 with less than 10%, grade 2 with 10 - 30%, grade 3 with 30 - 50% and grade 4 with more than 50% of muscle atrophy or fat replacement compared with the contralateral side. The MRIs were analyzed and evaluated by two independent radiologists.

**Results:** Grade 1 was found in 16 patients (47%), grade 2 in 9 patients (26%), grade 3 in 3 patients (9%), grade 4 in 6 patients (18%)

**Conclusion:** The modification of the MIS anterolateral approach with a more distal incision for total hip arthroplasty reduces the risk of compromising the GSN. But because of the variable course of the GSN there is still a potential risk of injury.

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## O18 Surgical approach 2

### O18-118

FIRST EXPERIENCES WITH THE DIRECT SUPERIOR APPROACH IN TOTAL HIP ARTHROPLASTY  
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**Introduction/objectives:** Continuing efforts have been made to improve patient outcomes in total hip arthroplasty (THA) mainly through modifications in surgical technique, implant design and peri-operative protocols. One such modification is the introduction of minimal invasive surgical approaches. Although this may lead to higher complication rates and a relatively longer learning curve. To investigate if THA can be safely performed through the direct superior approach (DSA) we performed a learning curve study and compared the DSA to the standard posterior approach.

**Methods:** We compared the short-term results in a cohort of patients with the DSA to a cohort of patients with a standard posterior approach. Operative, radiographic outcomes and complications were analysed retrospectively. In the DSA group we analysed the learning effect of the operative outcome by dividing the group into 4 subgroups over time: DSA 1-31, DSA 32-61, DSA 62-91 and DSA 92-121. We compared operation time, blood loss, complications, length of hospital stay and positioning of the prostheses in both groups. Data was compared between the two groups using an independent t-test.

**Results:** Over a period of nine months, 121 patients had surgery using the DSA technique. These patients were compared with a group of 109 patients, who had surgery using the posterior approach in the preceding year. No difference was found between both groups regarding operation time, blood loss, radiographic analysis, length of hospital stay and complications. Moreover, no learning curve was observed in the DSA group.

**Conclusion:** We consider it safe for an experienced surgeon in the posterior approach to start with this technique after proper training.

## O19 Custom implants

### O19-287

POSITIONING OF IN CUSTOM-MADE IMPLANTS BY REVISION HIP ARTHROPLASTY: DO THEY REALLY APPLY AS A "KEY TO THE LOCK"?  
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**Introduction/objectives:** Aim of our study was to evaluate the coincidence of custom-made 3D printed acetabular component position to preoperative plan at revision arthroplasty.

**Methods:** A total of 20 patients with a Paprosky type 2 and 3 defect underwent revision surgery using a custom-made trabecular titanium implant. The planned inclination, anteversion and centre of rotation position of the implant were compared with the post-operative position using CT scans. The coincidence of pre- and postoperative position was considered as a matching all parameters in range 10 degrees for inclination and anteversion and in range 5mm for centre of rotation position.

**Results:** Five of twenty custom-made implants positions matched with preoperative plan. Most mismatched parameters were centre of rotation lateral displacement (10 cases) and anteversion (9 cases). There were two cases wound debridement in two patients during early postoperative period. There were not acetabular implant position linked complications during postoperative follow-up.

**Conclusion:** Our results showed that there is high probability of custom-made acetabular implant malposition in revision hip arthroplasty. Only one quarter of acetabular implants was placed within an acceptable range of displacement. In our opinion, main reason is abnormal acetabular anatomy and difficulty of intraoperative navigation. But malpositions didn't affect on short-term results in our series. The key criteria of acceptable implant position are stable primary fixation, function recovery, percent of complications, osteointegration of implant contact surfaces and long-term survival rate.

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## O19 Custom implants

### O19-262

A 3D PRINTED CEMENTLESS MODULAR SHORT STEM FOR MIS THA: RETROSPECTIVE STUDY ON 100 CONSECUTIVE PATIENTS WITH AVERAGE 5.6 YEARS FOLLOW-UP.  
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**Introduction/objectives:** Objectives: In an effort to decrease invasivity we adopted a cementless modular mini stem made by 3D printing. This paper objective is to review this implant clinical performances.

**Methods:** Methods: We reviewed retrospectively 100 consecutive hips operated by the same surgeon between Oct 2010 and Oct 2012. We had 95 patients (56 female and 39 males). In 5 cases a bilateral THA was performed. Mean age was 70 years (Min. 48Y; Max. 86Y), mean BMI was 27.6 (Min. 19.5; Max 36.7). Mean follow-up was 5.6 years (Min. 4.5Y; Max. 6.5Y). 97% cases were operated because of arthrosis, and 3% had osteonecrosis. A mini Watson-Jones approach with the patient supine was always used. No blood transfusion was needed in any case. Patients were allowed to walk with crutches during 1st/2nd day post-op.

**Results:** Results: Mean HHS moved from 45.5 pre-op to 93.5 at the latest follow-up. No leg length discrepancy, luxation, infection or nervous lesion was reported. 2 early stem aseptic loosening due to patients over-use required revision. Patients satisfaction was high. X-Ray showed 42 radiolucent lines less than 2mm. 15 in zone 1; 5 in zone 2; 6 in zone 3; 3 in zone 4, and 13 in zone 5. We observed 9 heterotopic ossification Brooker 1; 6 Brooker 2 and 8 Brooker 3. In 27 cases the stem was positioned in varus, while in 8 it was in valgus. No stem subsidence was recorded, while a pedestal was observed in 3 cases.

**Conclusion:** Conclusion: A MIS surgery needs, besides dedicated instruments and surgical approach, a short stem with optimal primary metaphyseal stability. Results reported in this cohort with 5.6 years mean follow-up of this short modular cementless stem are encouraging. Longer follow-up will be needed to confirm those results.

## O19 Custom implants

### O19-43

CUSTOM TRIFLANGE ACETABULAR COMPONENT FOR REVISION TOTAL HIP ARTHROPLASTY.  
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**Introduction/objectives:** Results of revision total hip arthroplasty (RTHA) with massive acetabular bone loss (MABL) and pelvic discontinuity (PD) remain controversial. Conventional constructions such as cups, augments, cages in different combinations do not match expectations. Treatment strategy must be individualized and reconstructive constructions innovated to the patients' needs. The purpose of this study was to assess radiographic and clinical results in patients that underwent RTHA using Custom triflange acetabular component (CTAC).

**Methods:** This prospective clinical study includes twelve patients that underwent RTHA using CTAC. All patients had MABL (Paprosky 2C/3A/3B) combined with PD in 5 cases (42%), mean of two prior surgeries (Standard Deviation,  $\pm 0.75$ ). Radiographs, CT-scan and clinical outcome measures using Visual analogue scale (VAS), Harris hip score (HHS) were obtained preoperatively then at three, six and twelve months postoperatively. Statistical analysis was performed with Statistica v.7.1.

**Results:** At an average follow-up of 12 months, ten (83%) of cases were considered as successful. One (8%) patient had recurrent dislocations, underwent revision using double-mobility insert. One case (8%) CTAC was removed due to deep infection. Compared to the contralateral hip center of rotation the mean lateral displacement was 1,44 cm ( $\pm 0.54$ ). Mean VAS improved from 6,75 ( $\pm 0,86$ ) to 2,1 ( $\pm 2,13$ ) ( $P=0,007$ ), mean HSS improved from 28,25 ( $\pm 7$ ) to 78,4 ( $\pm 20,75$ ) at last follow-up ( $P= 0,007$ ).

**Conclusion:** CTAC are promising and reliable solution for complex RTHA. CTAC supplement the surgeons arsenal with an innovating technological solution to explore and improve. CTAC is an implant of choice for two-stage reimplantation with MABL and/or PD but with high reinfection risk.

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## O19 Custom implants

### O19-137

#### PATIENT SPECIFIC 3D PRINTED ACETABULAR CAGES AS LAST RESORT

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**Introduction/objectives:** Especially in older patients with extensive acetabular defects, the surgical treatment of an aseptic loosening of the cup can be very challenging. A patient specific 3D printed implant can then be helpful as a final surgical option for this group of patients. The combination of a patient specific 3D printed cage with a bone impaction grafting of the defect under the cage is promising and not well defined yet. We describe our first results and experience at short term with this new implant.

**Methods:** From September 2016 on, 9 patients were operated. They all had an extensive acetabular defect, 5 patients had a Paprosky 3A defect, 4 patients had a Paprosky 3B defect. At time of surgery the mean age was 74 years (range, 48 ? 89 years). Four patients had a Girdlestone situation at time of revision. For 2 patients it was their first revision, the other patients already had multiple revisions. Follow-up was prospectively with radiographs/CT scans and PROMS.

**Results:** At follow up, in 1 patient the implant was removed because of a persisting infection after a new revision because of dislocations. Two other patients also had a dislocation; one of them needed additional revision operations. Three patients underwent an antibiotic treatment because of positive cultures. CT scans showed an adequate position of the implants as pre-operative planned. At short term, PROMS (OHS, VAS pain and VAS satisfaction) improved markedly.

**Conclusion:** This patient specific 3D printed implant can be successfully used as a last resort for patients with an extensive acetabular defect at short-term follow-up. Surgery is challenging, complications are regularly seen, but in general patients are satisfied. A longer follow-up is needed.

## O19 Custom implants

### O19-350

#### EARLY CLINICAL AND RADIOGRAPHIC OUTCOMES WITH AN ADDITIVE MANUFACTURED POROUS ACETABULAR CUP

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**Introduction/objectives:** Additive manufacturing technology has been introduced to orthopaedic device design allowing for varying porosity in monolithic THA components which better mimics cancellous bone. Study purpose was to determine if additively manufactured cementless porous acetabular cup provides clinical fixation comparable to results seen in sawbone models.

**Methods:**  
Laboratory Methods: Test groups (n=9) consisted of 66mm novel shells (Group A) and clinically successful shells (Group B). A straight torque out bar was assembled to the shell dome hole and a linear load was applied with a single axis test frame. Yield moment of the shell-cavity interface was determined.  
Clinical Methods: 126 primary THA's were performed by 2 surgeons at 2 centers in this prospective trial. LEAS, HHS, HOOS Jr, VAS Pain and VR12 scores were evaluated preop and out to 6 months postop. Zonal radiographic assessment was completed on latest postoperative radiograph.

**Results:** Laboratory Results: Group A seated lower than group B suggesting good initial fixation.  
Clinical Results: Functional recovery and pain alleviation was seen in the early postop period. Radiographic review indicated well fixed cups in all zones and good restoration of patient anatomy.

**Conclusion:** As new orthopaedic devices are introduced for clinical use, it is critical to validate bench top findings in a clinical setting. The novel shell provided good time zero fixation and continued short term stability. Additionally, no clinical failures were seen in the 90 day postop period. Early PROMS suggest pain relief and improved physical function as expected in a primary THA population. Long-term results are needed to determine device performance.

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## O19 Custom implants

### O19-268

#### CLINICAL AND RADIOLOGICAL OUTCOME UP TO 4 YEARS AFTER HIP REVISION SURGERY OF COMPLEX ACETABULAR DEFECTS WITH THE AMACE CUSTOM-MADE ACETABULAR CUP. A RETROSPECTIVE STUDY

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<sup>(1)</sup> AZ Maria Middelaers, Sint-Martens-Latem, Belgium

**Case Study:** Objectives This retrospective cohort study reports changes in clinical outcome documented by PROMS, after hip revision surgery with a custom-made 3D-printed acetabular cup (aMace, Materialise NV) in patients with complex acetabular defects.

**Methods:** Ten patients with poor bone quality and Paprosky type 3b defects were included and operated by a single surgeon between 07/2013 and 03/2015. HOOS scores were reported preoperatively and at 1 and 2 yrs. post-operatively. The average total score ( $\pm$  standard deviation) and subscores were calculated. Heterotopic ossifications (HO) according Brooker scale and presence of radiolucencies around the acetabular implant were recorded.

**Results:** Mean age at surgery was 77 yrs. (range 63-92 yrs.). Average number of previous hip surgeries was 3.2 (range 1-5). Average follow-up (FU) time was 24 months (range 13-37 months). Two patients were lost to FU: 1 at 1 yr. FU (dementia), 1 at 2 yrs. FU (natural death). Total HOOS score was  $27.4 \pm 19.1$  preoperatively and increased to  $58.2 \pm 11.2$  at 1 yr. follow-up and  $66.7 \pm 16.3$  at 2 yrs. follow-up. The quality of life (QoL) subscore showed highest increase, from  $16.3 \pm 28.4$  pre-operatively, to  $64.6 \pm 18.5$  at 1 yr. FU up to  $77.3 \pm 26.7$  at 2 yrs. FU. No radiolucencies were detected around the implant. Three patients had HO grade 2 at last FU. No post-operative infections or other complications were reported.

**Conclusion:** Hip revision with the aMace custom-made implant restored clinical outcomes and QoL at 2 yrs. in a population with complex defects and a history of multiple revisions. Radiological data suggests bony integration of the implant, with no signs of loosening up to 4 yrs. post-surgery. CT follow-up is planned to confirm the osseointegration.

## O19 Custom implants

### O19-342

#### THE OUTCOME OF THE PARTIAL RESURFACING ARTHROPLASTY OF THE HIP SHOWS HIGH NUMBERS OF FAILURES AND CONVERSION TO TOTAL ARTHROPLASTY

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**Introduction/objectives:** Local cartilage and bony defects, which are too large for joint preserving cartilage treatment are difficult to treat. The implantation of a mini-resurfacing implant (Hemicap®, 2med, Hamburg, Germany) may be a possible alternative treatment for these patients. This partial replacement fills the defect and restores a smooth and continuous articular surface. The aim of this study was to determine short- to midterm results of the treatment of local cartilage defects of the femoral head using the Hemicap®.

**Methods:** Since 04/2011 16 patients with osteonecrosis of the femoral head greater ARCO stage II or local femoral cartilage lesions (< 35 mm) were treated with the implantation of the Hemicap® implant. A clinical and radiological follow-up was conducted.

**Results:** The clinical results showed a significant improvement of the function and pain of the hip according to the Harris Hip Score from  $56 (\pm 14)$  preoperative to  $77 (\pm 15)$  post-operative 25 months after implantation of the Hemicap®. In the meantime, in four patients the Hemicap® had to be converted to a total hip arthroplasty due to loosening, progression of the osteonecrosis or degeneration of the acetabulum.

**Conclusion:** The implantation of the mini-resurfacing implant Hemicap® seemed to be an alternative treatment for local cartilage defects of the femoral head to postpone the implantation of a total hip arthroplasty. However, the clinical outcome seems to be inferior to total hip arthroplasty. Furthermore, due to a high rate of conversion to total hip arthroplasty (25%) the application of this implant is questionable. If the implant is considered as a treatment option at least patient selection and enlightenment for this treatment with the high risk of failure and progression of osteoarthritis is very important.

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## O20 Hip preserving surgery 2

### O20-209

THE USE OF PLATELET RICH PLASMA IN THE TREATMENT OF GREATER TROCHANTERIC PAIN SYNDROME. A SYSTEMATIC LITERATURE REVIEW.

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**Introduction/objectives:** the aim of this systematic review is to determine whether platelet-rich plasma (PRP) has any role in improving clinical outcomes in patients with symptomatic Greater Trochanteric Pain Syndrome (GTPS).

**Methods:** A search of NICE healthcare database advanced search (HDAS) via Athens (PubMed, MEDLINE, CINAHL, EMBASE and AMED databases) was conducted from their year of inception to October 2017 with the keywords: "Greater Trochanteric Pain Syndrome" or "GTPS" or "Gluteus Medius" or "Trochanteric Bursitis" and "Platelet Rich Plasma". A quality assessment was performed using the Jadad score for RCTs and MINORS for non-RCT studies. SYSTEMATIC REVIEW REGISTRATION: PROSPERO CRD42017080662

**Results:** In total, four studies were included for analysis consisting of two RCTs and two case series. We also identified four additional studies from published conference abstracts (one RCT and three case series). 209 patients with a mean age ranging from 48 to 76.2 years. Majority were females with three months minimum duration of symptoms. Diagnosis was made using ultrasound or MRI. Included studies used a variety of outcome measures. Improvement was observed during the first 3 months after injection. Significant improvement was also noted when patients were followed up till 12 months post treatment

**Conclusion:** There is a paucity of evidence reporting the efficacy of PRP in treatment of GTPS. The current literature has revealed that PRP injections are relatively safe and can be effective. Considering the limitations in these studies, more large-sample and high-quality randomised clinical trials are required in the future to provide evidence of the efficacy for PRP as a treatment in GTPS

## O20 Hip preserving surgery 2

### O20-547

COMPARISON OF ILIZAROV HIP RECONSTRUCTION OSTEOTOMY AND TOTAL HIP ARTHROPLASTY WITH FEMORAL SHORTENING IN THE TREATMENT OF HIGH HIP DISLOCATION

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**Introduction/objectives:** We aimed to evaluate the results of two hip reconstruction methods and compare them with normal and untreated dislocated hips.

**Methods:** 33 patients with type 3 and 4 unilateral congenital high hip dislocations according to Efekhar and Crowe classification whose mean age was 31.4 years (19-57) and 17 control patient with no hip complaints whose mean age was 25.7 years (22-31), a total of 50 cases, were included in the study. Ilizarov hip reconstruction was applied to 13 and total hip arthroplasty with femoral shortening was performed on 8 of the operated patients. Clinical (Harris Hip Score; HHS; Merle d'Aubigne; Mda) and radiological evaluation were done pre- and post-operatively. SF-36 and gait analysis were performed.

**Results:** Mean follow-up period was 3 years. Significant improvement in both Mda and HHS was observed in both groups. No significant difference in the temporospatial values was observed between two operated groups. Both groups shared the features of the non-operated dislocation cases for all values but those of the stance phase. In kinematic evaluation, pelvic motion in different planes showed variability. There was a significant difference in pelvic motion between treatment groups. More pelvic motion was observed in sagittal plane in the ilizarov pelvic support group. In SF-36 scores, any differences were not obtained between operated groups in physical components.

**Conclusion:** Short-term results of these two treatment methods showed significant improvements in patient-reported outcomes. There were no significant differences observed between the treatment groups in temporospatial parameters which showed similarities with untreated patients. Nonetheless, some differences were measured in kinematic gait analysis.

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## O20 Hip preserving surgery 2

### O20-480

GLUTEAL TEARS IN GREAT TROCHANTER PAIN SYNDROME. RESULTS IN 135 CASES WITH MINI-OPEN TECHNIQUE.

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**Case Study:** Introduction: Several authors have reported 48 to 60 % of gluteal tears in patients diagnosed on Great Trochanter Pain Syndrome GTPS. We evaluate midterm results of mini open procedure to treat gluteus medius and minimum tears.

**Material and method:** from 2007 to 2015 (mean FU: 7.2 years, R: 2 - 10) 135 patients were treated: 81 with partial tears (Thomas II, Milwaukee I-II) and 54 full tears (Thomas III, Milwaukee III-IV), 104 women, 31 men, mean age 53 (24-78). Patients operated with hip replacement were ruled out. Clinical-functional outcomes were assessed by means of Ossendorf, Patrick-Fabere, Lequesne and Trendelenburg tests, WOMAC-NAHS scores preop and at latest follow-up. MRI was taken preop, at 6 months. Complications were recorded.

**Results:** 124 out of 135 patients (92.4%, p=0.007) improved significantly functional outcomes at latest follow-up in scores and MRI exam. This improvement was more significant in patients Thomas II when compared to Thomas III (p=0,016). WOMAC score improved from 57.2 (36 - 68) to 88.8 (46 - 98) and NAHS from 47.8 (31 - 57) to 77.3 (37 - 94). No neurovascular complications were registered.

**Conclusion:** Isolated gluteal tears cannot be underestimated. Risk of tear extension, or even fat deterioration can be anticipated. Surgical treatment of rotator-abductor cuff is effective in terms of clinical-functional improvement, but results of reattachment of partial tears are (Thomas II) slightly superior than extensive tears (Thomas III). Thus we recommend early diagnosis of gluteal tears and proper surgical treatment in patients with GTPS.

## O20 Hip preserving surgery 2

### O20-291

PREVALENCE OF HIP DYSPLASIA IN ADULT PATIENTS

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**Introduction/objectives:** Acetabular hip dysplasia (HD) is commonly defined as a center-edge angle (CE) <20° on pelvic x-rays. A Danish study found HD in 5% of an adult population (1). Patients with HD may develop symptoms and need joint preserving surgery or in case of secondary osteoarthritis a total hip replacement. Thus, early diagnosis is important for the patient's treatment. This study aims to describe prevalence of hip dysplasia in a Swedish population; concordance between original radiologist assessment and study measurement of dysplasia angles; association of pain and hip dysplasia.

**Methods:** 808 pelvic radiographs from 2007 were retrospectively reviewed. CE and acetabular index angle (AIA) were measured in both hips, according to Wiberg (2) and Tönnis (3). Radiological dysplasia was defined as CE equal/less than 20°. T-test, chi2-test.

**Results:** Dysplasia was seen in 10 (4.1%) of 245 acute patients and 29 (5.2%) of 563 planned patients (ns). The AIA were significantly higher in HD cases. Dysplasia was found in 5.5% of the males with acute x-rays and in 5.7% of males with planned, for women 3.0 and 4.8% (ns). According to x-ray referral, 22 of the 39 HD patients had pain, mostly groin and lateral pain. 10 had x-ray due to trauma only, 1 other cause, 6 lacked information. The radiologists' assessments mentioned dysplasia in only 4 of 39 cases.

**Conclusion:** The prevalence of HD was 5% in a sample of radiographs from a Scandinavian population. A majority of patients with radiological dysplasia had pain, but the radiology assessment described acetabular dysplasia only in a few cases. If patients are not detected in routine health care, individuals with symptoms may miss out on treatment.

1. Jacobsen S Rheumatology 2004
2. Wiberg G Acta Chir Scand 1939
3. Tönnis D CORR 1976

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## O20 Hip preserving surgery 2

O20-422

GANZ OSTECTOMY FOR TREATMENT OF HIP DYSPLASIA THROUGH INTRAPELVIC APPROACH

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**Introduction/objectives:** Periacetabular osteotomies are technically demanding surgical procedures. It requires wide surgical dissection of the pelvic bones and detachment of muscle insertions. We have developed a modification with minimal soft tissue exposure using intrapelvic approach. The purpose of the study was to review the early results in our group of patients who had this procedure.

**Methods:** The Ganz PAO was performed on eight painful dysplastic hips, using the modified Stoppa approach through the Pfannenstiel incision. All of the osteotomies were performed under fluoroscopic control and direct visualizing the osteotomy site from the same incision. After the osteotomy, the acetabulum was medialized and redirected anterolaterally, and fixed with screws. Outcome parameters were anterior center-edge angle, the lateral center-edge angle, and the acetabular index angle.

**Results:** After the osteotomy, the mean anterior center-edge angle had increased from 21.0 degrees +/- 13.9 degrees to 37.1 degrees +/- 13.3 degrees, the mean lateral center-edge angle had increased from -2.9 degrees +/- 12.4 degrees to 28.6 degrees +/- 13.1 degrees, the mean acetabular index angle had improved from 22.4 degrees +/- 5.6 degrees to 11.7 degrees +/- 5.6 degrees.

**Conclusion:** We believe that periacetabular osteotomy through a modified Stoppa approach, which allows osseous cuts to be made under direct vision of the quadrilateral surface, can be done with minimal exposure to radiation (fluoroscopy) in a relatively short time. It provides improved femoral head coverage and relief of symptoms in most painful dysplastic hips in adolescents and young adults. Bilateral painful dysplastic hips can be treated with a 10 cm, cosmetically more acceptable incision in the same session using this approach.

## O20 Hip preserving surgery 2

O20-263

COMPLICATIONS FOLLOWING MINIMALLY INVASIVE PERIACETABULAR OSTECTOMY IN A SINGLE SURGEON SERIES

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**Introduction/objectives:** The periacetabular osteotomy is a powerful surgical procedure for correcting symptomatic acetabular dysplasia, but it carries the potential for significant surgical complications. This study aims to determine the complication profile of PAO in a single surgeon series beyond the learning curve.

**Methods:** Retrospective review of a prospectively collected database including 224 hips in 201 patients (23 bilateral, 23 males, 201 females). Complication data was collected from notes and radiographic review and graded according to a modified Dindo-Clavien classification. Mean age at surgery was 28.8 years (range 13-48), mean weight was 70.9kg (range 45-115kg). Diagnosis was dysplasia in 186 hips, retroversion in 25 and a combination in 13. Median follow up was 20 months (IQR 12-30).

**Results:** Two thirds of hips (151) had no complications. 166 patients (74%) had no complications or a grade 1 complication (one that did not change management). 40 patients (18%) required pharmaceutical interventions (grade II complications). Ten (4%) patients required further unplanned surgical intervention or inpatient treatment (Grade III complications). Eight patients (3.6%) developed grade IV (life or limb threatening) complications including conversion to a total hip replacement. There were no grade V complications (death).

**Conclusion:** This is the largest single surgeon series with the longest follow up. There is a 7.6% rate of significant complication requiring further surgery or inpatient treatment. Hip replacement was performed at a mean time of 30 months post PAO in seven patients and was considered a grade IV complication.

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## O20 Hip preserving surgery 2

O20-159

RADIOLOGIC AND CLINICAL OUTCOME SIX YEARS AFTER FEMOROACETABULAR IMPINGEMENT SURGERY WITH MICROFRACTURING OF CARTILAGE LESIONS: A CONTROLLED PILOT STUDY

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**Introduction/objectives:** Microfracturing is a widely used treatment option of cartilage lesions during surgery for femoroacetabular impingement (FAI). Delayed Gadolinium Enhanced MR of cartilage (dGMEIRC) is a non-invasive tool for quantification of biochemical cartilage composition. To evaluate the benefit of microfracturing, we compared dGEMRIC indices and clinical outcome in patients who had undergone open FAI surgery with or without microfracturing of cartilage lesions.

**Methods:** IRB approval was obtained for this retrospective, controlled study. Patients with a preserved hip and a minimum 6-year follow-up who had undergone surgical hip dislocation with or without microfracturing for treatment of FAI and of extensive chondral damage were searched. We identified 46 patients: 17 in the 'Mfx group' and 29 in the 'no Mfx group'. All patients underwent indirect MR arthrography (Gd-DTPA2: 0.2 mmol/kg) for dGEMRIC at latest follow up. dGEMRIC indices of acetabular cartilage were assessed on radially reformatted images. Regions of interest were manually placed. Patient-reported outcome was evaluated at latest follow-up using WOMAC and HOOS.

**Results:** There was no significant difference ( $p > 0.05$ ) in overall dGEMRIC indices ( $438 \pm 150$ ms versus  $434 \pm 136$ ms). No differences ( $p > 0.05$ ) in regional (superior [11-1 o'clock], anterior [2-4 o'clock], posterior [8-10 o'clock]) dGEMRIC indices were observed. WOMAC ( $52 \pm 65$  versus  $39 \pm 46$ ) and HHS ( $71 \pm 27$  versus  $87 \pm 12$ ) did not differ significantly ( $p > 0.05$ ) between the two groups.

**Conclusion:** The results suggest that treatment of cartilage lesions with microfracturing during FAI surgery does not positively or negatively affect clinical or radiographic mid-term results in preserved hips compared to patients with no treatment of cartilage lesions.

## O21 Registries and outcome

O21-241

MORTALITY AND REVISION RATE OF CEMENTED AND UNCEMENTED HEMIARTHROPLASTY AFTER HIP FRACTURE. AN ANALYSIS OF THE DUTCH ARTHROPLASTY REGISTER (LROI)

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**Introduction/objectives:** This study aims to evaluate differences in mortality and revision between cemented and uncemented hemiarthroplasties (HA) after acute hip fracture.

**Methods:** From 2007 to 2017, 24,534 HA procedures from the Dutch Arthroplasty Register were included. For each HA, follow-up until death, revision or end of follow up (1-1-2017) was determined. The revision rate was determined by competing risk analysis. Multivariable Cox regression analysis were performed using death or revision as outcome. Age, gender, and body mass index (BMI), ODEP rating, ASA-classification, surgical approach and previous surgery were included as potential confounders.

**Results:** One-year mortality rates did not differ between cemented and uncemented HA. Nine-year mortality rates were 52.7% (95%CI 51.4-54.0) in cemented HA compared to 56.1% (95%CI 53.9-58.4) in uncemented HA. Multivariable Cox regression analysis showed that age, gender, BMI and ASA-classification did significantly influence mortality, whereas fixation method, ODEP-rating, surgical approach and previous surgery did not. Competing risk analysis revealed a lower nine-year revision rate of 3.2% (95%CI 2.8-3.7) in cemented HA compared to 5.0% (95% CI 4.1-6.1) in the uncemented HA. Multivariate Cox regression revealed a lower hazard ratio for revision (HR=0.60, 95%CI 0.47-0.78) in cemented compared to uncemented HA.

**Conclusion:** Mid-term mortality rates did not differ between cemented and uncemented HA after an acute fracture. Mid-term revision rates were lower in the cemented compared to uncemented HA.

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## O21 Registries and outcome

### O21-109

#### MOST PATIENTS RETURN TO WORK AND SPORTS AFTER TOTAL HIP ARTHROPLASTY - A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Introduction/objectives:** Total hip arthroplasty (THA) is a successful procedure to treat end-stage hip osteoarthritis. The procedure is increasingly performed in adults of working age (<66 years). These patients wish to return to sports (RTS) and return to work (RTW). However, a systematic overview of the evidence on RTS and RTW after THA is lacking. Our aim was to systematically review (1) the extent to which patients RTS and RTW after THA, including (2) the time to RTWS and RTW.

**Methods:** We searched MEDLINE and Embase from inception until October 2017. Two authors performed screening and data-extraction, including study information, patient demographics, rehabilitation protocols and pre- and postoperative sports and work participation. Methodological quality was assessed using the Newcastle-Ottawa scale. Data on pre- and postoperative sports and work participation were pooled using descriptive statistics.

**Results:** Thirty-seven studies were included, of which seven prospective studies and thirty retrospective studies. Methodological quality was high in 11 studies, moderate in 16 studies and low in 10 studies. RTS was reported in 14 studies. Mean RTS was 104% to the pre-surgery level and 82% to the pre-symptomatic sports level. Time to RTS varied from 16-28 weeks. RTW was reported in 23 studies and mean RTW was 69%. Time to RTW varied from 1-17 weeks.

**Conclusion:** A great majority of patients returned to sport and work after THA within a timeframe of 28 weeks and 17 weeks respectively. For the increasingly younger THA population, this is valuable information that can be used in the preoperative shared decision-making process.

## O21 Registries and outcome

### O21-50

#### 15 YEARS OF MIXED CERAMIC IN TOTAL HIP ARTHROPLASTY: INSIGHTS FROM THE NJR

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**Introduction/objectives:** The National Joint Registry (NJR) for England, Wales, Northern Ireland and the Isle of Man does not currently report the hip arthroplasty bearing outcomes by ceramic type. This analysis of the NJR data aimed to assess the clinical outcomes associated with mixed ceramic bearing components.

**Methods:** Data from all primary hip procedures including a BIOLOX<sup>®</sup> ceramic component recorded in the NJR data-set were extracted. The implant identification numbers were exploited to distinguish between both alumina (BIOLOX<sup>®</sup> forte) and mixed ceramic (BIOLOX<sup>®</sup> delta) manufactured by a single manufacturer (CeramTec GmbH). The outcome measure was time to first revision using Kaplan-Meier estimates for implant survivorship. Hazard ratios (HR) with 95% confidence intervals (CI) were adjusted by patient gender, age group and stem/cup fixation. The causes for revision were also evaluated. Comparisons were made also in respect with metal heads.

**Results:** The 12 years survival of mixed ceramic hard-on-hard articulating surfaces was 3.9% (CI 3.36%-4.7%). Aseptic loosening of the socket and head fracture were significantly lower for mixed ceramic (p<0.001). Mixed ceramic resulted to be significantly better (3.44%; CI 2.97%-4.06%) when compared with metal (4.29%; CI 4.16%-4.42%) in hard-on-soft bearings with an adjusted HR of 0.77 (CI 0.73-0.82) at 12 years. Pain, dislocation, aseptic loosening of the socket were significantly lower (p<0.001) with mixed ceramic.

**Conclusion:** BIOLOX<sup>®</sup> delta resulted to be associated with a reduced overall risk of revision, both in with hard-on-hard and hard-on-soft bearings.

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## O21 Registries and outcome

### O21-35

#### MEASUREMENT OF PHYSICAL FUNCTION IN HIP OSTEOARTHRITIS PATIENTS. MEASUREMENT PROPERTIES OF THE OARSII CORE SET OF PERFORMANCE-BASED MEASURES

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**Introduction/objectives:** Improvement of physical function is one of the main treatment goals in end-stage hip osteoarthritis (OA) patients. The Osteoarthritis Research Society International (OARSII) has identified a core set of performance-based tests to assess the construct physical function: the 30-s chair-stand test (30s CST), 4x10-meter fast-paced-walk test (40m FPWT) and a stair-climb test. Despite this recommendation, available evidence on the measurement properties is limited. The present study aims to evaluate the reliability, validity and responsiveness of these performance-based measures.

**Methods:** Baseline and 12-month follow-up measurements were prospectively obtained in 90 end-stage hip OA patients. The hypothesis testing method was used for construct validity and responsiveness analysis. A test can be assumed valid if 75% or more of the predefined hypotheses are confirmed. A subgroup (n=30) underwent test-retest measurements for reliability analysis. The Oxford Hip Score, Hip injury and Osteoarthritis Outcome Score - Physical Function Short Form, pain during activity score and muscle strength were used as comparator instruments.

**Results:** Test-retest reliability was appropriate; Intraclass Correlation Coefficient values exceed 0.70 for all three tests. Confirmation of construct validity hypotheses was 4/9 (44%) for 30s CST, 6/17 (35%) for 40m FPWT and 6/17 (35%) for 10-step Stair Climb Test (SCT). In the responsiveness analysis for 30s CST 4/8 (50%) of the hypotheses were confirmed, for 40m FPWT 5/8 (63%) and for 10-step SCT 5/8 (63%).

**Conclusion:** The performance-based tests have good reliability in the assessment of physical function. Because construct validity and responsiveness are poor, the present study does not justify their use for clinical practice.

## O21 Registries and outcome

### O21-368

#### UNCEMENTED AND CEMENTED REVISION STEMS - ANALYSIS OF 4216 REVISION STEMS REPORTED TO THE SWEDISH HIP ARTHROPLASTY REGISTER

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**Introduction/objectives:** To investigate implant survival of uncemented and cemented revision stems with re-revision due to any reason, or due to specific reasons as the endpoints.

**Methods:** 2,320 uncemented and 1,896 cemented revision stems inserted in first-time revisions due to aseptic loosening between 1999-2016 were identified in the Swedish Hip Arthroplasty Register. The mean follow-up time was 5.7 (SD 4.1) years for uncemented and 7.5 (4.6) years for cemented revision stems. The mean patient age at index surgery was 71.8 (9.9) in the uncemented and 73.7 (9.4) in the cemented group. Kaplan-Meier analysis was conducted to investigate implant survival. For hypothesis testing, the log rank test was performed. Descriptive statistics were used to analyse the reasons for re-revision.

**Results:** With re-revision for any reason as endpoint, the 10-year implant survival (with 95% confidence intervals) was 85.6 (83.7-87.5) % for uncemented and 88.0 (86.2-89.8) % for cemented revision stems (p<0.001). With aseptic loosening as endpoint, the corresponding 10-year survival was 94.8 (93.4-96.2) %, and 92.8 (91.3-94.3) % (p=0.14). The risk of re-revisions for all reasons was higher for uncemented stems during the first post-operative year, mostly due to dislocation and infection, thereafter the risk for re-revision was similar for uncemented and cemented stems.

**Conclusion:** Uncemented revision stems have slightly lower 10-year survival compared with cemented revision stems. This is due to a higher rate of early dislocation and infection amongst the uncemented stems. However, with aseptic loosening as endpoint, implant survival is comparable. We had no information about femoral bone defects, which introduces residual confounding that may explain the difference in outcomes.

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## O21 Registries and outcome

### O21-155

IMPLANT MIGRATION AND PATIENT REPORTED HIP FUNCTION TWO YEAR AFTER PRIMARY UNCEMENTED THA: A RADIOSTEREOMETRIC ANALYSIS (RSA) STUDY

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**Introduction/objectives:** This is the first study to evaluate 2 year migration patterns and patient reported hip function after primary total hip arthroplasty (THA) with a C2 stem and Delta-TT cup (LimaCorporate).

**Methods:** A prospective cohort (n=18, age=55±9 years, 13 female) completed RSA X-rays and Hip disability and Osteoarthritis Outcome Score Physical function Short form (HOOS-PS) scores at baseline, 6 weeks, 3, 6, 12, and 24 months post-surgery. Independent samples t-test and Spearman's correlation coefficients were used to assess improvement in hip function and its relation with prosthesis migration.

**Results:** Subsidence of the C2 stem ranged from -0.40-4.91 (median=0.18) mm at 6wk and from -0.32-5.36 (median=0.22) mm at 2yr. Longitudinal rotation ranged from -3.74-4.54 (median=0.52) degrees at 6wk and from -2.18-3.81 (median=0.47) degrees at 2yr. Translation of the Delta-TT cup was most prominent in cranial direction, ranging from -0.17-0.81 (median=0.13) mm at 6wk and from 0.04-1.50 (median=0.38) mm at 2yr. Rotation of the Delta-TT cup occurred mostly around the AP-axis, ranging from -0.74-4.83 (median=0.22) degrees at 6wk and from -0.40-6.40 (median=0.33) degrees at 2yr. HOOS-PS scores improved from 49.0±19.5 pre-surgery to 8.33±7.92 at two year follow up (p<0.001). No significant correlations were observed between implant migration and patient reported hip function at 2 year (all R2<0.14 and p>0.16).

**Conclusion:** Migration occurred mainly in the first 6 weeks for the stem and in the first 6 months for the cup, while stabilizing afterwards. This is in line with expectations and seems promising for long-term implant survival. Patient reported hip function substantially improved and was not associated with implant migration at 2 year follow up.

## O21 Registries and outcome

### O21-55

REVISION RATE AND REASONS FOR REVISION IN HEMI ARTHROPLASTY (HA) AND TOTAL HIP ARTHROPLASTY (THA) AFTER ACUTE HIP FRACTURES IN 30,830 PATIENTS THE NETHERLANDS. A STUDY OF THE DUTCH ARTHROPLASTY REGISTER (LROI).

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**Introduction/objectives:** Hip fractures in the elderly are prominent. In The Netherlands about 21.000 hip fractures occurs annually. In about 40% of these fractures a hemiarthroplasty (HA) or a Total Hip Arthroplasty (THA) is used. Although these procedures are claimed to have less complications than osteosynthesis, complications still occur and national registry studies are rare. For that matter an analysis of failed HA and THA (i.e. endpoint revision surgery) was performed using the Dutch arthroplasty register (LROI) database as source.

**Methods:** All patients older than 50 years of age with a hip fracture treated with arthroplasty by orthopedic surgeons and registered in the (national) Dutch arthroplasty register (LROI) were included in the study. In this register, patient characteristics and surgical details and lot and article number of implants are prospectively collected. Revision surgery and reasons for revision were evaluated. A proportional sub hazard ratio model for revision was created using competing risk analysis (with death as competing risk).

**Results:** One-year revision rate of HA was (CIF (95% CI)) 1.6% (1.4% - 1.8%) and 2.4% (2.0% - 2.7%) in THA. Dislocation was the most common reason for revision in both groups (HA 29% THA 41%). Age under 80 years, posterolateral approach and uncemented fixation were risk factors for revision in both THA and HA. THA patients with ASA classification II/IV were revised more often, whereas revision in the HA cohort was performed more often in ASA I /II patients

**Conclusion:** If an arthroplasty is indicated in hip fracture patients, both an posterolateral approach and uncemented hip prosthesis have higher risks for revision surgery.

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## O22 Revision THA 2

### O22-510

USE OF A TOTAL FEMUR PROSTHESIS FOR REVISION OF A TOTAL HIP REPLACEMENT WITH EXTREME BONE LOSS

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**Introduction/objectives:** Severe bone loss of femur caused by failed previous hip arthroplasty can require total femoral prosthesis. Push-through total femoral prosthesis (PTTF) allows replacement of the defective bone with an intramedullary metal stem which allows preservation of any remaining femoral cortex and its muscle attachments. In this study, we evaluated the results of the PTTF as an alternative in revisions with extreme bone loss.

**Methods:** Nine patients aged 38- 80 (mean 61.1) who received a PTTF for revision of failed total hip arthroplasty between 2012 and 2016 were evaluated retrospectively for baseline, complications and survival analysis with a mean follow-up of 2.3 (1-4) years. Functional outcome was evaluated using the Musculoskeletal Tumor Society (MSTS) score.

**Results:** Baseline patient diagnoses were osteoarthritis in 5, rheumatoid arthritis in 3 and ankylosing spondylitis in one patient. Patient survival was 77 % and prosthesis survival was 100 %. One patient was deceased due to pancreatic carcinoma and the other due to chronic renal failure unrelated to the surgery. There were deep infection or mechanical failure in any patient. The average MSTS score was 68 % (57-84).

**Conclusion:** PTTF stem design offers a good alternative in challenging revisions with extreme bone loss in a failed total hip arthroplasty.

## O22 Revision THA 2

### O22-242

ACETABULAR RE-REVISION WITH IMPACTION BONE GRAFTING AND A CEMENTED CUP

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**Introduction/objectives:** Biological repair of acetabular bone defects after impaction bone grafting (IBG) in total hip arthroplasty could facilitate future re-revisions in case of failure of the reconstruction again using the same technique. Few studies have analysed the outcome of these acetabular re-revisions.

**Methods:** We analysed 34 consecutive acetabular re-revisions that repeated IBG and a cemented cup in a cohort of 330 acetabular IBG revisions. Fresh-frozen femoral head allografts were morselized manually. All data were prospectively collected. Kaplan-Meier survivorship analysis was performed. The mean follow-up after re-revision was 7.2 years (2-17). Intraoperative bone defect had lessened after the first failed revision. At the first revision there were 14 hips with Paprosky 3A and 20 with Paprosky type 3B. At the re-revision there were 5 hips with Paprosky 2B, 21 with Paprosky type 3A and 8 with type 3B. Lateral mesh was used in 19 hips.

**Results:** The mean Harris Hip Score improved from 45.4±6.7 to 77.1±15.6 at final follow-up. The radiological analysis showed cup migration in 11 hips. The mean appearance time was 25 months (3-72). Of these, migration in three cups was progressive and painful requiring re-revision. Cup tilt was found in all migrated hips. There were one dislocation requiring a cemented dual mobility cup associated with IBG and one infection resolved with resection-arthroplasty. Survival with further cup revision for aseptic loosening was 80.7% (95% Confidence interval 57.4-100) at 11 years. In all surviving re-revisions trabecular incorporation was observed without radiolucent lines.

**Conclusion:** Biological repair can be obtained by restoring the bone stock, even after successive acetabular reconstructions using IBG and a cemented cup.

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## O22 Revision THA 2

### O22-175

CONSTRAINED LINERS REVISITED: GOOD 5-YEAR MID-TERM RESULTS IN 30 PATIENTS WITH ABDUCTOR INSUFFICIENCY

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**Introduction/objectives:** Our study aimed to assess the survival and the efficacy of CL to prevent dislocation following primary and revision THA in high-risk patients with abductor insufficiency at a mid-term follow-up.

**Methods:** Data were extracted from the Arthroplasty Registry Thessaloniki (ART). We reviewed 30 patients with abductor insufficiency who had a constrained polyethylene insert for primary or revision THA, over a 7-year period, from 2010 to 2017. The patients were reviewed clinically and radiologically. Oxford, Harris Hip and Charnley pain scores were also recorded.

**Results:** There were six elderly patients, 13 patients with neurologic deficit, 4 DDH patients and seven revision THA with abductor insufficiency. The average age of the patients was 71.47 years. The mean follow-up time was 57(+/- 1.7) years. 20 patients had a hydroxyapatite- (HA) coated acetabular shell with a constrained insert and 10 had a cemented constrained implant due to a small acetabular size. There were significant improvements in Oxford, Harris hip pain and function scores and Charnley pain postoperatively. Two patients had radiolucent lines around the liner on the most recent radiograph. Neither was symptomatic, and the acetabular components had not migrated. There were no dislocations, infections or other complications. There have been no further revisions or reoperations for dislocation in any of the other cases. The survival rate was 100% at five years with revision due to recurrent dislocation or loosening of the cup as the endpoint.

**Conclusion:** The use of a constrained acetabular liner at primary and revision THA in high-risk patients for dislocation can successfully prevent this complication without increasing component loosening at mid-term follow up.

## O22 Revision THA 2

### O22-219

TRABECULAR METAL CUPS AND AUGMENTS FOR THE MANAGEMENT OF PAPROSKY TYPE III DEFECTS. A MID-TERM RETROSPECTIVE STUDY.

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**Introduction/objectives:** Severe bony defects are challenging. This retrospective case series aimed to assess clinical and radiographic outcomes of TM augments and cementless TM cups for the management of Paprosky type III defects.

**Methods:** Between 2007 and 2013, 73 patients (M:F=16:57) (78 hips) undergoing acetabular reconstruction with TM-coated cup and augments were included. Average age was 63.6 years (26-88). Bony defects were Paprosky type IIIA in 57 and type IIIB in 21 hips. Harris Hip Score (HHS) was measured preoperatively and at the last follow up. Digital preoperative and postoperative radiographs in AP view were used to assess the limb length discrepancy (LLD) and center of rotation (COR) position. Radiographic assessment of loosening and heterotopic ossification was performed. Implant survival was estimated with Kaplan-Meier method.

**Results:** The average follow up was 6.6 years (4-8.9). The average HHS increased from 36.4 (24-53) preoperatively to 87.4 (63-100) at the last follow up (P<0.0001). The mean LLD changed from 17.3 mm of shortening (62 mm to 5 mm) to 3.7 mm (27 mm short to 15 mm long) (P<0.0001) after surgery. The mean vertical position of COR from the interteardrop line changed from 42.2 mm (22-73 mm) to 26.3 mm (11-46 mm) (P<0.0001) after surgery. Heterotopic ossifications were found in 17 (22%) hips. Five (6.4%) hips underwent revision of acetabular components. Four cases of aseptic loosening (5.2%), and one of recurrent instability (1.2%) were reported. The survival of the acetabular construct at 7 years of follow up was 95.1% (95%CI, 90.3%-99.9%).

**Conclusion:** Cementless TM-coated cups and TM augments are an effective management of Paprosky type III defects in acetabular reconstruction providing good clinical and radiographic outcomes in the midterm.

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## O22 Revision THA 2

### O22-195

INITIAL EXPERIENCE OF USING A CUSTOM MADER ARTICULATING SPACER WITH THE DIRECT ANTERIOR APPROACH IN TWO-STAGE REVISIONS OF INFECTED TOTAL HIP ARTHROPLASTIES

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**Introduction/objectives:** A demanding challenge for orthopaedic surgeons is the treatment of infected total hip arthroplasties. The incidence of periprosthetic joint infection (PJI) following primary total hip arthroplasty (THA) ranges from 1% to 3%. In addition, the direct anterior approach (DAA) has become a standard approach for primary as well as revision arthroplasty. We report about our results following a two-stage revision surgery through DAA using a custom made articulating spacer.

**Methods:** This technique uses widely available all-polyethylene acetabular components and a cemented stem, fixed using antibiotic loaded cement. 44 patients with PJI using this technique. Median age for all patients was 73.5 years. The patients were followed for at least 2 years after the second stage of the two-stage revision.

**Results:** Median time between explantation and re-implantation of the hip was 100.5 days. Performed as the first of a two-stage procedure, good functional results were commonly seen, leading to postponing second stage indefinitely with retention of the custom made prosthesis in 4 patients. Good functional outcome was observed in all patients after the first-stage. In addition, the incidence of dislocation and spacer fracture was lower compared to conventional spacers. All other complications were comparable with conventional spacer. Eradication of infection was comparable with conventional spacers.

**Conclusion:** This spacer technique implanted through the DAA represents an alternative to conventional spacers, allowing full weight bearing and mobility, and achieving comparable eradication rates in PJI.

## O22 Revision THA 2

### O22-372

EARLY RADIOLOGIC ASSESSMENT OF REVISION TOTAL HIP ARTHROPLASTY WITH THE RECLAIM MODULAR REVISION HIP SYSTEM

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**Introduction/objectives:** Revision total hip arthroplasty (THA) presents with increasing challenges, potentially compromising the integrity of a revision. The objective of this study was to assess radiologic outcomes of patients who underwent revision THA with a modular tapered stem (Reclaim, DePuy Synthes).

**Methods:** This study retrospectively examined all revision Reclaim THAs between 2012 and 2016. Radiologic assessment compared x-rays at two time points: immediately after surgery and the most recent x-ray available. Leg length discrepancy, subsidence and line-to-line fit was assessed. Significant subsidence was considered  $\geq 10$ mm. Adequate line-to-line fit was considered  $\geq 30$ mm of bicortical contact. Descriptive statistics included clinical factors (i.e. age, Paprosky classification), T-tests,  $\chi^2$  and logistic regression were used to analyze data. P values <0.05 were considered significant. Statistical analysis was performed using SPSS V.24.

**Results:** A total of 81 femoral revisions were completed. There were 42 females and 38 males with a mean age of 71 years (range, 46-89). Of these, 6 were revised (dislocation, fracture or infection), and 7 were lost to follow up. Average follow up time was 18 months (range, 1-46 months). Femoral revisions were classified as Paprosky 3a or 3b. Mean stem subsidence was 4.15mm (range, 0-25.6mm). Subsidence of the femoral stem was <10mm in 88% of patients. A total of 62% of patients had both subsidence <10mm and  $\geq 30$ mm of bicortical contact. In patients with <10mm subsidence, 70% had  $\geq 30$ mm of bicortical contact. There was a positive trend between cortical contact and stem stability (OR 2.3).

**Conclusion:** The Reclaim modular femoral system has demonstrated radiographic stability. Inadequate initial fit is a potential determinant of subsidence.

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## O22 Revision THA 2

### O22-202

LONG-TERM OUTCOME OF THE WAGNER SL TAPERED STEM IN COMPLEX REVISIONS  
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**Case Study:** Objectives. The management of periprosthetic femoral bone loss is a challenging problem in hip revision surgery. This retrospective study evaluates the minimum 10-year clinical and radiographic results of the Wagner tapered stem.

**Methods:** Between September 1992 and March 1998, 68 hips (66 patients) with proximal bone loss underwent femoral revision with use of the Wagner SL Revision® prosthesis. Twenty-six patients (28 hips) died without further surgery. Forty hips were available for clinical and radiographic follow-up assessment at an average follow-up of 13.9 years (range, 10.4-15.8) after surgery. They were 11 males and 29 females, with an average age of 61 years (range, 29-80). A transfemoral approach was performed in 31 cases (75.6%). Bone grafting was never supplemented.

**Results:** Five stems required revision because of infection (2), progressive subsidence (2), and recurrent dislocation (1). Complications included dislocations (3) and subsidence > 9 mm (8). The average Harris hip score improved from 33.0 points preoperatively to 73.3 points at the latest follow-up evaluation ( $p < 0.001$ ). Thirty-three stems (94.3%) demonstrated radiographic signs of bone ingrowth, and proximal bone regeneration was observed in 22 cases (62.8%). The cumulative survivorships of the Wagner prosthesis at 15.8 years with femoral revision for any reason and stem failure as the end points were 92.0% and 96.6%, respectively.

**Conclusions:** In hip revision surgery, severely deficient femoral bone stock is a critical issue as it compromises the primary stability of the new prosthesis. The tapered and distally-fixed Wagner SL stem ensured long-lasting survival after revision arthroplasty, promoting restoration of proximal bone stock.

## O23 Metal ion release & tribology

### O23-217

ADVERSE MOM WEAR MECHANISMS ARE TRIGGERED BY RELEASE OF LARGE METAL PARTICLES DURING MOM IMPINGEMENT EPISODES  
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**Introduction/objectives:** While metal-on-metal (MOM) arthroplasty is no longer popular, many patients remain at risk. Clarification is needed on wear mechanisms, their prevalence, and methods to determine edge-loading. Study goals were to elucidate (i) how patients used MOM, (ii) define wear-rates, (iii) define edge-loading algorithm, and (iv) determine risks for edge-loading vs 3rd-body wear.

**Methods:** Wear damage was analyzed on 60 MOM retrievals and 4 MOM simulator studies were developed. The 1st study (no rim-loading) represented ideal patients. The 2nd study used two cup inclinations (40 and 50°) to determine shifts in wear-patches. 3rd study with 70° inclined cups had extreme edge-loading while the 4th challenge was with insertion of metal particulates, typical of 3rd-body wear in retrievals. An algorithm integrated MOM diameter, cup types / inclinations into edge-loading criterion.

**Results:** Wear damage was identical on RSA and THA retrievals. Wear scratches were consistent evidence of cup-neck impingement. Scratch widths ranged 50-250µm. MOM simulator wear under ideal and extreme inclinations averaged 0.6 and 2 cubic-mm per million cycles, respectively, with no black lubricant colour. The 3rd-body wear challenge with metal debris raised MOM wear above 3 cubic-mm, consistently turning lubricants black.

**Conclusion:** Wear studies demonstrated edge-loading increased MOM wear by 300%. However, 3rd-body wear with metal particulates elevated MOM wear above 3 cubic-mm, and also turned lubricants black. In addition, the 3rd-body wear-tracks exactly matched MOM retrievals. Therefore our new hypothesis was that MOM impingement/subluxation provoked release of large metal particles, and these produced adverse MOM wear during normal activities.

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## O23 Metal ion release & tribology

### O23-377

LATE OCCURRENCE OF ARMD IN 28 MM METAL-ON-METAL BEARINGS  
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**Introduction/objectives:** Long-term evaluation of small diameter metal-on-metal (Metasul®) bearings. Detection of late unexpected complications

**Methods:** One-hundred eight THR, with a 28 mm metal-on-metal (Metasul®) bearing were clinically and radiographically followed between 12 and 20 years with a mean FU of 16 years. The mean age of the patients at the index operation was 40-year-old.

**Results:** Excellent functional results were noted during follow-up and no revisions for aseptic loosening were necessary. ARMD (adverse reaction to metal debris) occurred in 2 patients after more than 10 years. In both patients revision surgery was mandatory. In the first patient osteolysis with pain and functional impairment warranted revision. In the second patient vascular compression of the femoral vessels and systemic effects urged to change the hip. Both patients had a good outcome after exchange arthroplasty.

**Conclusion:** Many reports show excellent long term results with 28 M-o-M articulations. ARMD seems to be rare event in contrast with large diameter M-o-M articulations. In view, however, of the potential detrimental local and systemic effects of ARMD, long-term F-U beyond 10 years remains essential in patients with smaller diameter M-o-M bearings.

## O23 Metal ion release & tribology

### O23-357

MULTI-SYSTEM MANIFESTATION OF COBALT TOXICITY IN THE SETTING OF METAL-ON-POLYETHYLENE TOTAL HIP ARTHROPLASTY  
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**Case Study:** Objectives:

Cobalt toxicity in the setting of total hip arthroplasty is a rare and striking condition, which can lead to significant hip and systemic issues. The purpose of this case report is to describe the constellation of symptoms and importance of addressing the problem of cobalt toxicity in the operating room in a timely manner.

**Methods:**

We retrospectively reviewed the chart of a 66 year old male who underwent left total hip arthroplasty with ceramic femoral head four years prior which was subsequently revised to a cobalt chromium head on polyethylene line one year prior to presentation due to ceramic liner failure, who presented with cobalt toxicity.

**Results:**

The patient presented with progressive loss of vision and colour vision, balance issues, lower extremity swelling, cold intolerance, and progressive hearing loss with tinnitus. Blood cobalt chromium level revealed elevation to 1076 µg/L (normal < 0.5 µg/L). Intraoperatively, grey milky fluid was found consistent with diffuse metallosis. Approximately 10-15 shards of ceramic particles, ranging in size from 1-9 mm in length, were found in the periarthral area. The damaged polyethylene liner and cobalt chromium head were replaced and a ceramic head was implanted. The patient did well postoperatively. By 7 months postoperatively hearing and vision had almost completely returned to baseline.

**Conclusion:**

Cobalt toxicity from local adverse tissue reactions in the setting of metal femoral heads is exceedingly rare. As seen in our patient presented here, early recognition using serum cobalt levels and a multi-disciplinary approach can lead to timely identification of cobalt toxicity and increase the chances of full recovery with prompt revision surgery and close follow-up.

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## O23 Metal ion release & tribology

### O23-73

#### MID-TERM FUNCTIONAL OUTCOMES & COBALT CHROMIUM LEVELS FOLLOWING CERAMIC ON METAL TOTAL HIP REPLACEMENT

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**Introduction/objectives:** With controversies surrounding Metal on Metal (MoM) total hip arthroplasty (THA); alternate bearing surfaces such as Ceramic on Metal (CoM) had a surge in popularity. However, there are reports of higher than expected rate of revision and elevated serum metal ions and radiolucent lines (RLL) at mid-term follow-up. The aim of this study was to report functional & radiological outcomes of CoM THAs performed at our institution.

**Methods:** Patients undergoing CoM THA between 2008 and 2010 were identified and brought back for follow-up in 2017 where up-to-date radiographs, Oxford Hip Scores & Cobalt Chromium levels were taken. The primary outcome measure was mean Oxford hip score at follow-up. Secondary outcome measures included serum cobalt chromium levels & revision surgery

**Results:** A total of 114 CoM THAs were performed on 94 patients with a mean follow-up of 76.8 months (0-120) and a median age of 58 (42-70). The mean socket size was 54mm(42-70), median femoral head size was 36mm (28-36) & mean inclination was 42.3 (31-61). There was a significant improvement between preoperative & mean follow-up Oxford scores [Preoperative 14.6 (2-36), Follow-Up 45.7(32-48) p< 0.001]. Of the 83 patients that survived the mean serum cobalt and chromium levels were 41nmol/L (3-678) & 41nmol/L (0-196). 13 patients had RLL > 1mm. 98% of patients have well-functioning hips at follow-up with 2 patients undergoing revision with pain & elevated metal ion levels above MHRA thresholds.

**Conclusion:** Majority of patients with CoM THAs remain asymptomatic and have good functional outcomes at mid-term follow-up. Due to higher than expected serum metal ion levels and presence of RLL, all patients should be followed-up long term with annual radiographs and serum metal ion levels

## O23 Metal ion release & tribology

### O23-20

#### UPDATE ON CORROSION AND ADVERSE TISSUE REACTION OF A MODULAR NECK DESIGN IN A CURVED NECK-TISSUE CONSERVING STEM

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**Introduction/objectives:** There has been significant concern raised over the past five years of fretting abrasion debris and corrosion of modular neck/stem junctions. This is an continuation of a previous cohort of previous reported cases from 2012 and 2016 demonstrating an increase in modular neck complications due to fretting abrasion, increase in metal ion levels & adverse local tissue reaction.

**Methods:** 542 primary total hip arthroplasties (THA) were performed at four centers by four surgeons between April 2010 and June 2016. Implant design is the Apex ARC Tissue Conserving Stem with a modular wrought cobalt-chromium (c.c.) neck and titanium alloy (Ti-6Al-4V) used with a c.c. or ceramic head 32 or 36 mm diameter. All were used with a highly cross-linked polyethylene liner, metal titanium plasma sprayed cementless metal cup.

**Results:** Ten patients out of five hundred and forty-two (1.84%) who had revision of their index surgery for progressive hip pain demonstrated some visual level of corrosion on their explanted neck/stem modular junction. All had debriement of the periarticular soft tissue, and stem replacement with new primary cementless implant.

**Conclusion:** Modular necks provide a benefit to restoration of joint mechanics however, the increased complications of modular neck/stem junctions resulting in progressive pain, local tissue reaction as a result of fretting abrasion and corrosion of the mating interfaces suggest extreme caution should be considered before using these designs. Pre-assembly and insertion as a monoblock would appear to reduce and or eliminated the corrosion risk problem.

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## O23 Metal ion release & tribology

### O23-13

#### THE EFFECT OF BEARING TYPE ON THE OUTCOME OF TOTAL HIP ARTHROPLASTY

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**Introduction/objectives:** Alternative bearing surfaces such as ceramics and highly-crosslinked-polyethylene (HXLPE) were developed, in order to further improve implant performance of Total Hip Arthroplasties (THAs). Whether alternative bearing surfaces result in increased longevity, is subject to debate.

**Methods:** Using the Dutch Arthroplasty Register (LROI), we identified all patients with a primary THA implanted in the Netherlands between 2007-2016 (n=209,912). Cumulative incidence of revision was calculated to determine differences in survivorship of THAs according to bearing type: metal-on-polyethylene (MoPE), metal-on-HXLPE (MoHXLPE), ceramic-on-polyethylene (CoPE), ceramic-on-HXLPE (CoHXLPE), ceramic-on-ceramic (CoC), and oxidized-zirconium-on-(HXL) polyethylene (Ox(HXL)PE). Multivariable Cox proportional hazard regression ratios (HRs) were used for comparisons.

**Results:** After adjustment for confounders, CoHXLPE, CoC, and Ox(HXL)PE resulted in a significantly lower risk of revision compared to MoPE after 9-years (HR=0.8-0.9 respectively, compared to HR=1.0). For small (22-28mm) femoral head THAs, lower revision rates were found for CoPE and CoHXLPE (HR=0.9). In the 36mm femoral head subgroup, CoC THAs had a lower HR compared to MoHXLPE (HR=0.7 vs 1.0). Crude revision rates in young patients (<60 years) for CoHXLPE, CoC, Ox(HXL)PE (HR=0.7) were lower than MoPE (HR=1.0). However, after adjustment for case-mix and confounders these differences were not statistically significant.

**Conclusion:** We found a significant benefit in mid-term cumulative incidence of revision for CoHXLPE, CoC, and Ox(HXL)PE bearings compared to a traditional MoPE bearing surfaces in the Netherlands.

## O23 Metal ion release & tribology

### O23-199

#### SQUEAKING CERAMIC-ON-CERAMIC TOTAL HIP ARTHROPLASTIES: 3D ANALYSIS OF CT SCANS

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**Case Study:** Objectives: The primary aim of this study was to investigate if implant positioning following total hip arthroplasty (THA) is linked to noise generation. The combined anteversion, calculated by adding the acetabular and femoral anteversion, was of particular interest. Non-operated hip joints on the contralateral side were also measured. The secondary aim was to establish a database for future research on noisy hip prostheses.

**Methods:** A group of 20 patients with noisy THA was compared to a control group of 21 patients. Hectec medCAD hip 3D® software was used to measure implant position from CT scans. Investigated prostheses: DePuy Synthes Corail® stem and Pinnacle® cup with ceramic-on-ceramic bearings, implanted at the Department of Orthopaedics and Trauma, Medical University of Graz from 2005 to 2012. Statistical analysis: Chi-squared test and t-test were performed with IBM SPSS Statistics, Version 20. A p-value of < 0.05 was considered to be statistically significant.

**Results:** The statistical analysis did not show a significant correlation regarding implant position, demographic data or radiological assessment. A significant difference was found when comparing the natural hip joints. The case group had higher combined (p = .029) and acetabular (p = .046) anteversion angles, but the available data was limited due to a small case number (case group n=11, control group n=6).

**Conclusions:** There was no significant difference regarding combined anteversion between the groups. For patients with exceptional anatomical properties, a standardized anatomical reconstruction with prosthesis implantation might result in suboptimal biomechanics, which subsequently leads to a higher incidence of noise.

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## O24 Hip arthroscopy 2

### O24-491

ARTHROSCOPIC TREATMENT OF GREATER TROCHANTERIC PAIN SYNDROME  
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**Introduction/objectives:** Greater trochanteric pain syndrome (GTPS) is associated with lateral pain of the hip and palpation of the large trochanter. It is frequently associated with imaging alterations such as tendinopathy and alterations of the abductor apparatus. The aim of this study is to evaluate the clinical and radiological results of the treatment of GTPS refractory to conservative treatment with microfractures of the midbrain insertion in the large trochanter and partial tenotomy of the proximal third of the large bundle in order to decompress the peritrochanteric space.

**Methods:** We reviewed 11 patients with GTPS refractory to conservative treatment with at least 6 months of physiotherapy and 1 infiltration with corticoid, operated between 2013 and 2016. An endoscopic approach of the peritrochanteric space was used through the modified mid-anterior portal for visualization and the proximal and distal peritrochanteric portals as working portals. We evaluated the Harris Hip Score (HHS) and the Analogic Visual Pain Score (EVA)

**Results:** All treated patients were women with a mean duration of symptoms of 23 months. The mean age of the patients was 39.7 years. The mean follow-up was 21 months, all the patients returned to previous professional activity. The average HHS improved from 59 points preoperatively to 81 points postoperatively. The EVA improved from 5 preoperatively to 2 points postoperatively.

**Conclusion:** Treatment of the GTPS refractory to the conservative treatment and the presence of tendinopathy of the gluteus medius gluteus with microfractures of the insertion of the gluteus medius and tenotomy of the proximal third of the gluteus maximus to relieve the tension of the peritrochanteric space seems to be an effective treatment.

## O24 Hip arthroscopy 2

### O24-520

THE EFFICACY OF CHEMICAL PROPHYLAXIS IN PREVENTION OF HETEROTOPIC OSSIFICATION (HO) FOLLOWING HIP ARTHROSCOPY  
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**Introduction/objectives:** To assess the early effect of non-steroidal anti-inflammatory medication (NSAID) in the prevention of heterotopic ossification (HO) following primary hip arthroscopy for femoroacetabular impingement (FAI)

**Methods:** A prospective, case-control study was undertaken (January 2016 - October 2017) with patients being assigned to either Group A (No NSAID) or Group B (6-week full compliance with NSAID) following arthroscopic correction of FAI. Exclusion criteria included Tonnis Grade 2+, >45 years, previous hip surgery and incomplete NSAID compliance. The presence of HO was recorded and classified using the Brooker classification at 6 weeks post surgery. ROM was measured using a hand-held goniometer 3 months post surgery

**Results:** 198 males and 45 females were included (n=243 cases), mean age 29.3 years (15.8 - 44.7). There was a 27.8% (37/133) incidence of HO in Group A (males 33%, female 7.4%) compared to 10% (11/110) in Group B (males 12%, females 0%). Incidence of HO between groups was highly significant (p=0.001). Group A: Brooker 1 (12%), 2(13.5%), 3(2.3%); Group B: Brooker 1 (10%), 2(0%), 3(0%). A statistically significant reduction in internal rotation with increasing Brooker score was observed in males overall, (p=0.02); Brooker 2/3 had mean internal rotation of 19.9 ° (SD 9.4°) compared to 24.4° (SD 6.7°) in cases with no HO (p=0.032). Transient side effects of NSAID therapy were reported in 2.5% (2/80) of patients and included nausea and minor rectal bleeding

**Conclusion:** A 6-week course of chemical prophylaxis (NSAID) for patients undergoing hip arthroscopy for FAI can reduce the incidence of HO. Higher Brooker score (2 and 3) resulted in a statistically significant reduction in internal rotation, which was considered clinically significant

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## O24 Hip arthroscopy 2

### O24-383

LABRAL LESIONS IN HYPER MOBILITY SYNDROMES. TREATMENT WITH ARTHROSCOPIC SURGERY COMBINED WITH PHYSICAL THERAPY AIMED AT HIP STABILITY GIVES SATISFACTORY RESULTS.  
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**Introduction/objectives:** In hypermobility spectrum disease (HSD) and Hypermobile Ehler-Danlos Disease (hEDS) labral lesions can exist. The basic problem is the micro instability of the hip joint that can lead to chondral damage posterior in the hip, combined with a ventral labral lesion. In this study, we described the results of labral fixation combined with post-operative physical therapy.

**Methods:** In a single center cohort study, we analyzed the data of 9 female with HSD and labral lesions. Patients characteristics, IHOT, Beighton score, pre-operative MRI, per-operative findings and the treatment were reported. Follow-up was 1 year.

**Results:** We included 9 females. Three have hEDS and 6 HSD. Mean age 28 years. The Beighton score was >5 in all females. The duration of groin pain was in all cases more than 12 months up to 2 years. The primary treatment was conservative aiming at core-stability training. If the clicking and locking sensation was severe and MRI-arthro was made and showed labral tears at the ventral side. During the arthroscopy mild, chondral damage (grade 1) was seen in the posterior part of the acetabulum combined with a ventral labral tear. In all cases we sutured the tear and did not perform a psoas release. After that 4 weeks of partial weight bearing was allowed and intense physical therapy focused on the hip stabilizers was performed. The groin pain resolved, the same did clicking and locking sensation. The IHOT was 76-81.

**Conclusion:** One year after treatment for labral tear the results are satisfied in HSD and hEDS patients. However, the long-term outcome is still unknown and need further study.

## O24 Hip arthroscopy 2

### O24-260

IN SEARCH OF THE SPHERICAL FEMOROPLASTY: CAM OVER-RESECTION LEADS TO INFERIOR FUNCTIONAL 2 SCORES BEFORE AND AFTER REVISION HIP ARTHROSCOPY  
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**Introduction/objectives:** Femoroplasty performed for treatment of cam-type femoroacetabular impingement (FAI) has become a common procedure. The purpose of this study was to examine the effect of accuracy of previous femoroplasty on hips presenting for revision hip arthroscopy.

**Methods:** Data were prospectively collected for patients presenting for revision hip arthroscopy between June 2010 and August 2014. Based on measurements on Dunn view x-rays, cases were divided into three groups: over-resection (OR) where over-resection measured over 5% of the diameter of the femoral head, under-resection (UR) where there was a residual cam lesion (alpha angle > 60°, and neutral. Data collection included modified Harris Hip Score (mHHS), Non-Arthritic Hip Score (NAHS), Hip Outcome Score - Sports Specific Subscale (HOS-SSS), and visual analog scale (VAS).

**Results:** One hundred and thirty hips (120 patients) were included. Twenty hips (15.4%) were classified as OR, 16 (12.3%) as UR, and 94 (72.3%) as neutral. Mean follow-up was 39.6 ± 15.9 months. mHHS and NAHS at presentation were lower in the OR than the UR group (50.2 ± 15.5 vs 64.7 ± 19.4, p = 0.033 and 48.5 ± 18.6 vs 63 ± 19.1, p = 0.044 respectively). mHHS at minimum two-year follow-up was lower for the OR (66.7 ± 19.8) than for the UR group (81 ± 14.5, p = 0.031). Conversion to THR was more common in the OR than in the UR group (30% vs. 0%, p = 0.024).

**Conclusion:** Cam over-resection of more than 5% of the diameter of the femoral head on the Dunn view predicts inferior clinical measures compared to cam under-resection in this population. Furthermore, over-resection predicts inferior outcomes after revision hip arthroscopy and higher rates of conversion to THA.

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## O24 Hip arthroscopy 2

O24-341

RETURN TO WORK FOLLOWING HIP ARTHROSCOPY FOR FEMOROACETABULAR IMPINGEMENT.

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**Introduction/objectives:** The adoption of hip arthroscopy continues to increase, yet no published evidence exists from which to advise patients regarding their potential for return to work, except in workers' compensation cases. Although physiotherapy is commenced immediately post-operatively, with no restrictions to range of movement, patients require time off from work to recuperate. We hypothesize that this will vary according to occupation.

**Methods:** We analysed all cases performed between June 2015 and May 2017 by 2 specialist hip arthroscopy surgeons at a single NHS hospital, with a minimum of 6 months follow-up. Patient demographics, operative indication, and procedure performed were recorded. All patients received a booklet with a suggested rehabilitation protocol, plus weekly visits to a physiotherapist for the first six weeks were organised. We contacted all patients via postal questionnaire for their occupation and date of return to work. 3 groups were then formed, matched for age, sex, and BMI, according to their occupational exertional demands; physical, standing, and sedentary. None involved workers' compensation cases.

**Results:** Full data was gained from 93 patients who had undergone hip arthroscopy for femoroacetabular impingement; 63 females and 30 males, average age 38, average BMI 24.8. Patients with a physical job returned to work at an average of 9.45 weeks (range 1-30, median 6), a standing job 7.12 weeks (0.5-26, 6), and a sedentary job 3.52 weeks (0.5-13, 3) ( $p < 0.001$  difference physical to sedentary).

**Conclusion:** We have provided evidence so patients now be more accurately advised of when they might return to work following hip arthroscopy. Those with a more physical job should expect to take longer than those with a sedentary job.

## O24 Hip arthroscopy 2

O24-489

ARTHROSCOPIC TREATMENT OF PIGMENTED VILLODULAR SYNOVITIS OF THE HIP - CASE SERIES

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**Introduction/objectives:** Pigmented villonodular synovitis (PVNS) is a benign, locally aggressive proliferative disorder of the synovium involving a joint, bursa or tendon sheath. It's characterized by exuberant proliferation of synovium and its etiology is unknown. PVNS is a rare disease and most commonly affects individuals aged 20 to 40 years with an uncertain gender distribution. Intra-articular forms, the large joints are the most affected: the knee (70%), hip (15%) and then the ankle, shoulder and elbow. It is characterized by brownish villous and nodular lesions containing hemosiderin-laden macrophages, multinucleated giant cells and inflammatory cells. Groin or hip pain is the main symptom but joint mobility limitation can also occur. Synovectomy is the most commonly reported method of treatment.

**Methods:** The authors present a case series of 4 patients with a histologically confirmed diagnosis of hip PVNS that underwent arthroscopic synovectomy between Jan 2016 and Dec 2017. All patients undergoing hip arthroscopy are assessed with a modified Harris Hip Score (HHS) and Visual Analogue Scale (VAS) preop and postop. All patients were evaluated preoperatively with plain radiographs and magnetic resonance. Arthroscopy was performed with a standardized supine technique including the central and peripheral compartments. Arthroscopic synovectomy was performed in addition to addressing other concomitant pathology identified in arthroscopy.

**Results:** There was a slight improvement in HHS and VAS. There were no complications, but 1 patient was converted to a total hip arthroplasty (THA) at 1 year postop due to progressive osteoarthritis.

**Conclusion:** These results are quite favorable as reflected by the outcomes and low conversion rate to THA. The limitations are the nr of patients and short follow-up time.

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## O24 Hip arthroscopy 2

O24-464

SUSTAINED BENEFIT OF AUTOLOGOUS MATRIX-INDUCED CHONDROGENESIS (AMIC) FOR HIP CARTILAGE REPAIR IN ATHLETIC PATIENTS

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**Introduction/objectives:** Trauma, labral tears, femoroacetabular impingement and existence of loose bodies are the most common causes of chondral lesions in the hip joint of athletes or young active patients. For bigger cartilage defects, amongst others, autologous matrix-induced chondrogenesis (AMIC) procedure is considered to be quite effective. To investigate the clinical outcome of AMIC implementation for mid-sized chondral lesions of the acetabulum in young active patients, and assess their potential to resume an active lifestyle including return to sports.

**Methods:** 62 patients with full-thickness mid-sized acetabular chondral lesions were studied. All patients underwent an arthroscopic AMIC procedure for reconstruction of chondral defects, were assessed pre-operatively, and at least 4 years post-operatively using the Hip disability and Osteoarthritis Outcome Score (HOOS), modified Harris Hip Score (mHHS) and Visual Analog Scale (VAS) for pain.

**Results:** A significant improvement in all three scores at the time of follow-up was found. The mean HOOS improved from  $58.8 \pm 7.4$  pre-operatively to  $86.7 \pm 8.1$  at follow-up while the mean mHHS improved from  $53.4 \pm 6.6$  to  $84.7 \pm 8.7$ . There was a significant decrease from  $4.9 \pm 1.1$  pre-operatively to  $1.2 \pm 0.9$  post-operatively in the VAS pain evaluation, indicating that the patients were satisfied with their relief of pain.

**Conclusion:** The AMIC procedure is an effective single-stage technique for the reconstruction of mid-size chondral defects of acetabulum in young active patients. This intervention enhanced the potential for patients to resume daily sport-related activities and the 4-year clinical outcome as evaluated by the HOOS, mHHS and VAS showed sustained improvement over the pre-operative evaluations.

## O25 Primary THA 3

O25-530

WHY PRIMARY TOTAL HIP ARTHROPLASTY FAILS - OUR REALITY

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**Introduction/objectives:** Total hip arthroplasty (THA) has excellent functional and survival results. However, with the increase in the average life expectancy, the failure of arthroplasty has become increasingly prevalent. We intend to evaluate the survival and main causes of failure of the primary prosthesis, as well as the success of the surgical revision, and identification of risk groups.

**Methods:** We retrospectively studied 101 THA reviews performed between 2011 and 2016. The data were collected from medical records and through telephone contact, with a minimum follow-up of 1 year. Revision surgery was defined as any surgery that involved an open procedure in primary hip arthroplasty and its failure when re-revision surgery was necessary.

**Results:** We obtained 65 women and 36 men, with a mean age of 69.3 years. The mean time of survival of the primary prosthesis was 5.9 years: 39 hips were reviewed by aseptic acetabular loosening (39%), 17 by periprosthetic fracture (17%), 14 by instability (14%), 13 by aseptic femoral loosening (13%), 8 by polyethylene wear (8%), 6 per infection (6%) and 4 for mixed causes. The surgical failure rate of the primary revision was 20.7%. The mean age of review was 69.6 years in men vs 69.3 years in women. The mean survival of the primary PTA was 6.3 years in men vs 5.8 years in women. The main causes of male revision were aseptic loosening (57%) and periprosthetic fracture (14%), while the female was aseptic loosening (40%) and instability (18%).

**Conclusion:** Innovations in implant fixation and preservation of the prosthesis-bone interface are necessary since > 50% of the revisions are by aseptic loosening. The female population was more prone to instability, and its prevention was essential for better results.

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## O25 Primary THA 3

O25-143

EXCHANGEABLE NECK SAFETY AND EFFICACY ASSESSMENT: A RETROSPECTIVE STUDY ON A COHORT OF 1,033 THAS WITH A MAXIMUM 15 YEARS FOLLOW-UP.  
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**Introduction/objectives:** Evaluate the survival of modular neck THAs and analyze the main causes that can lead to their failure.

**Methods:** We have conducted a retrospective study on all patients operated in our Centre with an exchangeable neck THA, between 1/12/2000 and 31/12/2014. Follow-up has been extended up to 31/12/2015. The cohort includes 1,033 THAs or 951 patients, of which 37.6% man and 62.4% woman. The average patient age is 67.7 years. Looking at the causes for surgery, 80.9% of patients were affected by primary osteoarthritis, 9.0% had a hip fracture, 4.2% reported Congenital Hip Dysplasia or Congenital Hip Luxation, 3.2% had femoral head necrosis, while the remaining 2.7% cases were affected by other diseases. All implants were cementless, apart from 5 cases in which the cup was cemented. Modular necks enclosed in this cohort were only made of Titanium alloy. We employed univariate and multivariate statistical methods.

**Results:** The overall survival rate is 96.4% and the revisions observed are 37. The main causes of the replacement were periprosthetic fractures (12 cases, 32.4%), luxation (9 cases, 24.3%), implant mobilization (7 cases, 18.9%) and implant breakage (6 cases, 16.2%, of which 3 referred to neck). We had a neck breakages rate of 0.29% and a rate of revisions due to luxation of 0.87%, very low compared to the results reported in the literature. We also did not observe any case of femoral neck corrosion or metallosis. We believed that this could be attributed to the exclusive use we made of Titanium alloy exchangeable necks.

**Conclusion:** Our clinical experience together with the low level of complications and high survival rate shown in this retrospective study seems to support the use of exchangeable necks in THA.

## O25 Primary THA 3

O25-534

DOES HYDROXYAPATITE COATING ENHANCE INGROWTH AND IMPROVE LONGEVITY OF A ZWEYMULLER TYPE STEM? A DOUBLE-BLINDED RANDOMISED RSA TRIAL.  
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**Introduction/objectives:** An on-going discussion is whether using a hydroxy-apatite coating enhances the ingrowth and longevity of a femoral stem in total hip arthroplasty. In order to study the effect of hydroxyapatite (HA) coating on the migration of the SL-PLUS hip stem, a single center RSA, prospective double blind randomized controlled trial is being conducted. The primary objective is to investigate the early migration of the hydroxyapatite (HA)-coated SL-PLUS stem compared to the Standard (non-coated) SL-PLUS stem by means of RSA.

**Methods:** 51 patients were randomly assigned to receive either an uncoated or a HA-coated femoral component during total hip replacement. RSA images were obtained direct postoperatively and at 6 weeks, 3, 6, 12, 24 and 60 months. HOOS scores were obtained preoperative and at final follow-up. Translations and rotations of the hip stem were calculated according to RSA guidelines

**Results:** The main outcome, the MTPM (Maximal total points motion) showed no significant difference between the two groups at 60 months. (1,66 versus 1,12 mm). PROMS showed no difference between the groups.

**Conclusion:** The migration measured with MPTM shows no significant difference between the groups, We conclude that adding HA to a zweymuller type stem as tested has no positive impact on the long term outcome.

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## O25 Primary THA 3

O25-226

DISTAL FEMORAL CORTICAL HYPERTROPHY AFTER EXETER STEM IMPLANTATION  
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**Introduction/objectives:** The objective of this study was to examine the clinical relevance of the femoral cortical hypertrophy (CH) presented after cemented polished double-tapered stem (Exeter stem) implantation.

**Methods:** This was a retrospective case-control study. Consecutive 100 hips in 94 patients who completed 10-years' follow-up after primary THA with Exeter stem were included. Visual analog scale of satisfaction for hip (VAS-S; the smaller the better) and of pain (VAS-P; the smaller the less pain) were used for clinical assessment. CH was evaluated using Gruen zone classification on anteroposterior and lausenstain view of hip radiographs until 10 years, and hips with CH at 10th year were classified as CH (+) group and hips without CH as CH (-) group. Differences of VAS-S and VAS-P between in those groups were compared using t-test, and possible predictors for CH (including patients' characteristics and stem alignment) were analyzed using multivariate logistic regression analysis.

**Results:** CHs were presented in 20 hips at 10th year, and were found in Gruen zone 5 and/or 6 only. VAS-S [CH (+): 6.9 ± 8.3 mm, CH (-): 17.4 ± 23.5 mm, p<0.01] and VAS-P [CH (+): 5.1 ± 5.9 mm, CH (-): 12.0 ± 18.8 mm, p<0.01] showed significant satisfaction and lesser pain in CH (+) group, respectively. Multivariate logistic regression analysis showed that body weight of 55 kg or more [odds ratio (OR): 3.2, 95% confidence interval (CI): 1.1 - 9.7, p<0.035] and varus stem alignment [OR: 6.9, 95% CI: 1.9 - 25.0, p<0.003] significantly affected the occurrence of CH.

**Conclusion:** CH around Exeter stem is likely to occur when the stem was implanted in varus position to the patients with body weight of 55 kg or more. Patients with CH satisfied with their hip condition and complained lesser pain.

## O25 Primary THA 3

O25-299

LONGITUDINAL EVALUATION OF LEG LENGTH DISCREPANCY AFTER TOTAL HIP REPLACEMENT.  
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**Introduction/objectives:** Leg length discrepancy (LLD) after total hip replacement (THR) is a matter of concern for patient satisfaction. The subjective LLD however varies in time and objective measurements lack scientific agreement in terms of appropriate measure points. We aimed to objectify the LLD over time and assess the reliability and correlation of various measure points.

**Methods:** In a prospective study two independent researchers measured the LLD of 100 patients with THR at 1, 6, 12, 24 and 52 weeks after surgery on a-p. pelvic x-rays at five radiologic landmarks: tear drop figure, upper and lower sacroiliac joint, iliac crest, and trochanter tip (reference line). Observer agreement was assessed with intraclass correlation coefficient (ICC) and a linear mixed effect model was used to reveal changes over time.

**Results:** Analysis showed almost perfect agreement for all measure points with weakest reliability for measures at the sacroiliac joint (ICC = 0.92). The LLD over time could be best described on a quadratic function with an increase between week 1 and 6 and a consecutive steady state. Measures at the tear drop figure were in average 2.96 mm larger than at the trochanter tip (p = <.001) and not significantly different from the sacroiliac joint. Highest LLD was measured at the iliac crest (b = 1.72 mm larger than tear drop figure (p = <.001)).

**Conclusion:** Leg length discrepancies after THR seem underestimated during initial recovery. In average, LLD was about 3 mm at the tear drop figure and significantly higher when measured at the iliac crest. For reliable results, we suggest LLD measures not prior to 6 weeks after surgery.

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## O25 Primary THA 3

O25-466

ONE- OR TWO-STAGE BILATERAL TOTAL HIP ARTHROPLASTY - CLINICAL RESULTS

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**Introduction/objectives:** Total hip arthroplasty (THA) is one of the most successful orthopedic surgeries performed in the last decades. However, there is always a discussion about a one-stage or a two-stage procedure in patients with bilateral osteoarthritis. The objective of this systematic review is to compare simultaneous bilateral with staged bilateral total hip arthroplasty

**Methods:** A meta-analysis was performed with keywords of systemic complications, surgical complications, clinical outcome, and other perioperative data associated with 1- and 2-stage bilateral THA.

**Results:** There were only a few studies who underwent 1-stage bilateral THA compared to 2-stage bilateral THA. One-stage bilateral THA had a lower risk of major systemic complications, less deep venous thrombosis, and shorter operative time compared with 2-stage bilateral THA. There were no significant differences in pulmonary embolism, death, cardiovascular complication, infections, minor complications, and other surgical complications between procedures.

**Conclusion:** One-stage bilateral THA was superior to two-stage bilateral THA in terms of major systemic complication, deep venous thrombosis, and surgical time compared with 2-stage bilateral THA. However, a careful patients selection is necessary.

## O25 Primary THA 3

O25-545

PRIMARY TOTAL HIP ARTHROPLASTY WITH SHORT EXETER STEMS, CLINICAL FOLLOW-UP AND IMPLANT SURVIVAL AFTER 10 TO 15 YEARS.

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**Introduction/objectives:** Primary THA's with short Exeter stems are used in small patients, but also in patients with narrow femoral canals and abnormal hip anatomy. The use of short stems also preserves femoral bone stock. This can be important in young patients who probably face multiple revisions in the future. It remains unclear whether short stems are more vulnerable for early loosening or stem fracture, especially in heavy patients. Long-term results are not widely published. We investigated long-term outcome, complications and survival of short Exeter stems in primary THA in a mainly Caucasian cohort.

**Methods:** We retrospectively analyzed 211 patients (257 hips) who underwent a primary THA using a short Exeter stem. We analyzed complications and performed a Kaplan-Meier analysis for revision free survival with multiple endpoints for all cases. Fifty-two patients (75 hips) with a minimal follow-up of 10 years (10-22 years, mean 14 years) were included for clinical and radiographic assessment.

**Results:** Stem survival was 93% at 15 years for revision for all causes and 99% for aseptic loosening. In 75 cases with long-term follow-up, the Harris Hip Score improved from 48 preoperatively to 78 at final follow-up ( $p < 0.01$ ). Oxford hip score improved from 21 preoperatively to 35 ( $p < 0.01$ ). Sixty-nine (92%) stems had a Barrack A cementation and 6 (8%) a Barrack B. Mean subsidence was  $1.53 \pm 0.9$  mm. We observed one periprosthetic fracture (Vancouver B1) and three transverse stem fractures at the level of the lesser trochanter in 35.5 mm offset stems.

**Conclusion:** Short Exeter stems show acceptable results at long term follow-up. However, we observed three stem fractures (1.2%). This rate exceeds previously reported rates in standard Exeter stems. More studies on this topic are needed.

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## O26 Short stems

O26-471

MID-THIGH PAIN AFTER SHORT-STEM COMPARED TO CONVENTIONAL STEM UNCEMENTED TOTAL HIP ARTHROPLASTY AT MEDIUM-TERM FOLLOW-UP. A RANDOMIZED DOUBLE BLINDED CROSS-SECTIONAL STUDY.

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**Introduction/objectives:** To compare prevalent, incidental and persistent mid-thigh pain between short-stem, Collum Femoris Preserving (CFP) and conventional stem, Zweymuller Alloclassic femur prosthesis. To study associations between demographics, radiographic measurements and mid-thigh pain.

**Methods:** We contacted patients cross-sectionally within a randomized controlled trial after uncemented Total Hip Arthroplasty (THA) for hip osteoarthritis at a mean follow-up of 44 months (range 24-64 months). Patients were specifically assessed for prevalence (during survey) and incidence (any time post-operative for >1 week) of mid-thigh pain and prevalence of persisting (any time post-operative for >2 years) mid-thigh pain. Furthermore, we used regression analysis to study associations between demographics and radiographic measurements and mid-thigh pain.

**Results:** 140 of 150 patients (93%) responded to our survey. Mean age at operation was 62 years ( $\pm 7.0$ ). Mid-thigh pain was prevalent in 16 patients (23%) in the CFP-group compared to 10 patients (14%) in the Zweymuller-group ( $p = 0.192$ ). Incidental mid-thigh pain occurred in 24 patients (34%) in CFP-group compared to 15 patients (21%) in the Zweymuller-group ( $p = 0.090$ ). Persistent mid-thigh pain was found in 13 patients (19%) in the CFP-group compared to 5 patients (7%) in the Zweymuller-group ( $p = 0.043$ ). Varus malalignment (OR 1.819 (95% CI 1.034 - 3.200)) and leg length discrepancy (OR 1.107 per cm lengthening (95% CI 1.026 - 1.195)) showed significant associations with mid-thigh pain.

**Conclusion:** We found more persistent mid-thigh pain after short-stem uncemented THA compared to conventional stem uncemented THA during medium-term follow-up. Varus malalignment and leg lengthening were associated with mid-thigh pain.

## O26 Short stems

O26-518

A 5-YEAR RADIOLOGICAL STUDY OF A SHORT STEM WITH PRESERVATION OF THE FEMORAL NECK. IS METAPHYSEAL FIXATION TRUE?

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**Introduction/objectives:** Some short stems with preservation of the femoral neck studies describe loss of metaphyseal bone mass and increased distal bone density. This suggests diaphyseal fixation instead of metaphyseal fixation. The hypothesis of our study is that the distal fixation of these short stems is directly related to the size of the implant, especially in cases of oversizing.

**Methods:** We retrospectively reviewed the short stems implanted in our service between 2001 and 2012 with a radiological minimum follow-up of 5 years. 198 stems were implanted. 38 of them did not comply with the minimum follow-up. They were classified as infrased, normosized and oversized in relation to the distance between the distal rim of the stem and the cortical bone in the distal third of the stem. We studied the metaphyseal bone loss (stress shielding), the distal cortical hypertrophy and the tip sclerosis. Statistical analysis with Chi Square.

**Results:** 160 stems were studied. 36 were infrased, 81 were normosized and 46 were oversized. We found stress-shielding in 42 cases, distal cortical hypertrophy in 28 and tip sclerosis in 14. 74.4% of the oversized and 8.5% of the normo and infrased presented stress-shielding. (Statistically significant difference with  $p < 0.05$ ) Distal cortical hypertrophy was present in 49% of oversized and in 6% of normo and infrased (Statistically significant difference with  $p < 0.05$ ) No statistically significant difference was found for type sclerosis between oversized (16.3%) and normal or infrased (6%).  $P = 0.089$ .

**Conclusion:** The oversizing of our short stem with preservation of the femoral neck may involve a loss of metaphyseal bone mass and a distal cortical hypertrophy that indicates distal fixation instead of metaphyseal fixation.

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## O26 Short stems

### O26-366

THE MIGRATION PATTERN AND INITIAL STABILITY OF THE OPTIMYS SHORT STEM IN TOTAL HIP ARTHROPLASTY: A PROSPECTIVE 2-YEARS FOLLOW-UP STUDY OF 33 PATIENTS WITH RSA. de Waard, S. <sup>(1)</sup>; Siersevelt, I. <sup>(2)</sup>; Jonker, R. <sup>(3)</sup>; Hooenborg, D. <sup>(4)</sup>; van der Vis, H. <sup>(5)</sup>; Kerckhoffs, G. M. <sup>(6)</sup>; Haverkamp, D. <sup>(7)</sup>

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**Introduction/objectives:** The consensus that bone stock preservation and optimal restoration of offset and leg length is important in total hip arthroplasty is now wide spread, especially for young and active patients. Short stems seem promising in this aspect, though implant stability is still of concern. This study looked at the migration pattern of the Optimys short stem through RSA analysis.

**Methods:** Forty patients were included. RSA images were made directly postoperatively (within 5 days) at 6 weeks and at 3, 6, 12 and 24 months. Double examinations were made for precision measurement. HOOS scores were obtained preoperatively and at two years. Four patients were excluded due to protocol violation, two patients were lost to follow up (n=1 lost, n=1 deep infection with revision), one patient was excluded for RSA analysis due to a CN number >110.

**Results:** Mean age was 60 years with a mean BMI of 27. RSA analysis of 35 patients showed a significant initial median proximal translation (subsidence) of 0.21mm (IQR 0.64-0.06) and anteversion-retroversion rotation of 0.59° (IQR 0.01-1.34) at 6 weeks, after which the stem stabilizes and showed no further significant movement. Mean migration in other directions was small. Four patients had an initial subsidence of >2mm, all showed secondary stabilization. HOOS outcome scores were satisfactory, with the domain symptoms and pain showing a median score of 95/100 at two years follow-up

**Conclusion:** After initial migration the Optimys achieves secondary stabilization, predicting a satisfactory long-term survival of the stem.

## O26 Short stems

### O26-570

OUR EXPERIENCE WITH SHORT STEM HIP REPLACEMENT SURGERY- 6 YEAR FOLLOW-UP.

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**Introduction/objectives:** Increasingly, active young patients with end stage hip disease are seeking hip replacement surgery. This has increased the demand for bone and soft tissue preserving surgeries. A short anatomical cementless femoral stem is a desirable hip implant in such patients. We report our midterm experience and results with the use of a metaphyseal short stems in 50 cases.

**Methods:** 50 short stem hip replacements were performed on 41 patients between July 2006 and September 2009. Mean age of patients was 45 years. Diagnosis varied from secondary osteoarthritis, rheumatoid arthritis to dysplastic hips. 9 patients underwent simultaneous bilateral hip replacement. Majority of patients were operated through antero-lateral approach. All patients had a cementless Proxima stem (DePuy) implantation. Follow-up was till September 2015 (minimum 6 years, maximum 9, average 7 yrs.). VAS and Harris hip score were used to assess clinical outcome. X-rays were used for radiological evaluation

**Results:** Two patients were lost in follow-up. There was no cases of peri-operative mortality or morbidity, no incidences of DVT, dislocation or Heterotopic Ossification. Complications included lateral cortex fracture, greater trochanter fracture, aseptic loosening, stem migration, superficial infection and thigh pain. Two patient required stem revision surgery for loosening. Harris score improved from 52 to 89 at 6 years, VAS averaged 0.85 at 3 months. 37/ 39 (94.8%) followed up patients had good to excellent outcome at 6 years

**Conclusion:** This metaphyseal stem provided clinically and radiologically stable fixation through snug fit initially, followed by bone in-growth and ideally suited the requirements of a bone and soft tissue preserving hip implant in young patients with hip arthritis.

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## O26 Short stems

### O26-543

IS THERE A ROLE FOR SHORT STEMS IN THE TREATMENT OF HIGH DISLOCATED PATIENTS WITH TOTAL HIP ARTHROPLASTY? A COMPARATIVE PROSPECTIVE COHORT COMPARING SHORT VS. STANDARD STEMS

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**Introduction/objectives:** Since 2012 we are using Short stems in selected cases; one of our preferred indications because of small endostic diameters would become Hip Arthroplasty in High dislocated hips; we have decided to compare our outcomes, with one only short stem model with a well-recognized Standard Stem, performing Total Hip Arthroplasty in 76 Crowe III & IV hips, in two different cohorts

**Methods:** Since 2012, we have created a prospective protocol to treat all our Crowe 3 & 4 hips with a Total Hip Arthroplasty, descending it to the original acetabulum, with two different stems according each institution. In the first one we didn't change our protocol and use the combination Pinnacle/Corail® and at the second one we begin to perform our femoral side with a Minihip® Short Stem from Corin (J.K) pairing two cohorts of 38 hips each, evaluating results, hip scores, complications included fractures and/or sciatic neuropaxia.

**Results:** We perform a THA with a Supracondylar femoral Osteotomy in 78 Crowe 3 & 4 dislocated hips, performed for one only surgeon with the same team, divided in two cohorts according the utilization of a Corail® standard stem (6 or 8) or Minihip® short stem. Our results were impressive, correcting from 36 to 79 mms of leg discrepancy, with only one Sciatic neuropaxia in each group, with no fractures or subsidence, increasing our hip scores and with similar satisfaction in both groups.

**Conclusion:** THA in High Chronically dislocated hips are a technical challenge for surgeons; with the advent of short stems, with small diameters and an optimal geometry to avoid removal of old hardware, we have decided to prove it in equal condition to our standard protocol, finding that we can solve difficult hips as well as usually with a short stem

## O26 Short stems

### O26-497

A NEW TRICONICAL GREATER TROCHANTER SPARING SHORT STEM. RESULTS AT FOUR YEARS.

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**Case Study:** In the last decade, different short stems have appeared, but not all are equal in design, femoral cut level, biomechanical properties or host bone response. A new non cemented titanium alloy porous coated triconical short stem with calcar resection was introduced. The aim of this study is to analyse clinical-functional results as well as data related to stem behaviour.

**Material and method:** 128 hips in 119 patients were included in this study with a mean follow-up of 45.4 months (range: 37-61 months). All patients were implanted with a new short stem of titanium alloy without cement, with modular neck or monoblock and mini posterior or supracapsular portal assisted approaches were used. Patients were followed at 6, 12 months and annually. WOMAC, Merle D'Aubigne, Harris Hip Scores and the UCLA activity scale were recorded in the preoperative and postoperative clinical records. Selection criteria for the implantation of this stem were a value of femoral T-score above -1, Dorr femur type A and B, age less than 75 years and BMI <30. Results: The mean WOMAC score improved from 42.2 points (29 - 51) to 96.7 (66 - 100, p <0.001), Merle D'Aubigne from 11.8 (10 - 14) - 17.1 (16 - 18, p <0.01), HHS of 37.4 points (range 26 - 66) to 93.8 (61 - 100, p <0.001). The UCLA Scale was 7.1 (R +/- 1.1, 95% CI). Radiolucencies <1 mm were observed in zone 4 in 13 cases without further changes later. Neoformation of trabecular pattern was observed in zones 2,3,5 and 6 without peripheral widening. One stem had to be explanted due to deep infection. Conclusion: the evaluation over 4 years of this new implant offers promising results in terms of clinical, functional, radiological, although more long-term results are needed.

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## O26 Short stems

### O26-171

#### SHORT STEMS IN OBESE PATIENTS: A CASE-CONTROL RETROSPECTIVE STUDY

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**Case Study:** Background: Short stem hip prostheses are well known but scarcely used in obese patients. The prevalence of obesity is increasing and more young people will need prosthetic surgery, so bone saving will be helpful in case of future revision.

**Objectives:** The purpose of this retrospective case-control study is to evaluate THA in patients with BMI greater than 30, comparing the use of short vs traditional stems. The aim is to evaluate if short stems are reliable in obese patients or not.

**Materials and Methods:** 48 THA patients (age 43-85 years, M:F=24:24) with BMI greater than 30 (30,1-44,5) were selected, including 31 short stems and 17 long stems, affected by primary, post-traumatic osteoarthritis and avascular necrosis. The clinical outcomes were evaluated by HHS, WOMAC, VAS and SF-12 F-M scales. Osseointegration, subsidence, offset, CD angle, limb length discrepancy, acetabular inclination, heterotopic ossification were analyzed by 3 blinded authors on X-ray by AXIOVISION software (Carl Zeiss Microimaging GmbH) and stem stability was quantified by Engh criteria's. Statistical analysis was performed using SPSS (Chi-square, T-Test).

**Results:** The mean follow-up was 36 months. All the stems are well positioned and osseointegrated. There were no implants failure. Short stems had higher scores in SF-12F and SF-12M (P<005), and better cup inclination (P<001) while the two groups were comparable for WOMAC, VAS and HHS.

**Conclusion:** Short stem hip prostheses showed good clinical and radiographic results and are reliable even in obese patients. Long-term studies will be helpful to assess the risk of weight on the survival of these implants over the time.

## O27 Revision THA 3

### O27-567

#### LONG TERM OUTCOME AND SURVIVORSHIP OF EXTENSIVELY HYDROXYAPATITE-COATED LONG FEMORAL STEM IN REVISION HIP ARTHROPLASTY

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**Introduction/objectives:** Long femoral stem revision hip arthroplasty is based on the principle of diaphyseal fixation, which overcome the problem of proximal femoral bone deficiencies. This study was conducted to determine the long term outcome and survivorship of extensively hydroxyapatite-coated long femoral stem in revision hip arthroplasty, which is under-reported in current literature.

**Methods:** A retrospective review of 43 revision hip arthroplasties using extensively hydroxyapatite-coated long femoral stem (Restoration HA, Stryker Howmedica, Osteonics, Allendale, NJ) performed in a teaching hospital from 1998 to 2005 was conducted. Patient demographic data, operative details and clinical outcomes were evaluated. Kaplan-Meier survival analysis was performed.

**Results:** The mean age at revision surgery was 63.7 years. The mean follow-up was 13.8 years (11-17.5 years). In the latest follow up, all patients reported either no or mild hip or thigh pain. 29.2% of patients were able to walk unaided, 25.0% were able to walk with stick, and 33.3% were able to walk with quadripod. The average Harris hip score in the latest follow up was 78.8 (55-100). Two hips (4.7%) were complicated with implant loosening requiring re-revision and 2 hips (4.7%) were complicated with peri-prosthetic infection requiring implant removal. The survival rate was 89.9% at 17.5 years.

**Conclusion:** Extensively hydroxyapatite-coated long femoral stem is a good option for revision hip arthroplasty with good clinical outcome and survivorship.

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## O27 Revision THA 3

### O27-44

#### EXTENDED TROCHANTERIC OSTEOTOMY FOR THE MANAGEMENT OF PERIPROSTHETIC FEMORAL FRACTURES.

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**Introduction/objectives:** Extended trochanteric osteotomy (ETO) is a reliable surgical technique that simplifies components extracting and implanting. Conversion of periprosthetic femur fractures (PFF) using ETO is supposed to help achieve better fracture stability with less complications and higher union rate. The aim of this study was to evaluate the clinical results of the management of PFF compared in two groups, with and without ETO.

**Methods:** The clinical data of fifty-nine patients (61 hips) with PFF were analyzed retrospectively. Group-A included twenty-one patients (21 hips) treated using ETO, group-B had thirty-eight (40 hips) treated without ETO. Preoperative assessment using radiography and clinically using the visual analog scale (VAS), Hip disability and osteoarthritis outcome score (HOOS) then postoperatively in three, six and twelve months. The mean follow-up time was two years. Statistical analysis was performed with Statistica 7.

**Results:** The two groups were homogeneous regarding demographic data. Radiography assessment demonstrated higher union rate in group-A, 19 (90%) then in group-B, 28 (70%) (p= 0,042). Complication occurrence was not significantly different in the two groups; 4 (20%) group-A, 11 (28%) (p= 0,113). According to VAS and HOOS improvement was observed over the entire follow-up period compared to baseline, but more significant in group-A, then in group-B (P<0,0001).

**Conclusion:** ETO is a safe and reliable technique in the management of PFF. ETO allows converting complicated PFF into manageable fractures for stable fixation and optimal fracture union.

## O27 Revision THA 3

### O27-181

#### TANTALUM AUGMENTS FOR PAPROSKY TYPE IIIA AND IIIB ACETABULAR REVISION: EXCELLENT MID-TERM RESULTS IN 15 PATIENTS; A PROSPECTIVE COHORT STUDY

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**Introduction/objectives:** Our study aims to determine whether the use of tantalum implants (cups and augments) could provide stable reconstruction for type IIIA and IIIB of acetabular revision.

**Methods:** Data were extracted for the Arthroplasty Registry Thessaloniki. 15 patients with non-infected failed acetabular components after THA that were reconstructed using porous tantalum acetabular components and augments, between 2012 and 2017, were included. There were twelve Paprosky type IIIA and two type IIIB acetabular defects. Radiographic signs of osseointegration were classified according to Moore. The HHS, SF-12 and WOMAC Scores were evaluated. A metal backed or a fully Tantalum socket was used in 8 patients and in 7 patients a cemented liner was implanted.

**Results:** The mean age of the patients was 71.3 years and the mean follow-up was 3.5 years. The hip centre of rotation was restored in 14 patients. The improvement of mean HHS, WOMAC Index, and SF-12 scores were statistically significant (p=0.001) at the last follow-up. 10% of patients demonstrated radiological persistent loosening up to the last follow-up. The radiolucencies were about the ream of the augment due to incongruency but no instability or pain were recorded. At the last follow-up, all cups were radiographically stable and none required re-revision for loosening. The acetabular revision was considered successful in 87% of cases. No other complications were recorded.

**Conclusion:** Good clinical and radiological results can be expected for bone-deficient acetabula with Paprosky type IIIA / B defects treated by a TM cup and augment, but for pelvic discontinuities this might not be a reliable option. Given their mechanical properties, tantalum implants are reliable in creating a durable composite for midterm follow up.

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## O27 Revision THA 3

### O27-559

REVISION TOTAL HIP: VALIDATING POROUS TITANIUM SHELLS IN RAPID RECOVERY  
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**Introduction/objectives:** An aging population has led to increased demand for acetabular bone-deficient revision hip surgery. Traditional methods to reconstruct acetabular defects are arduous for both patient and surgeon. Metals with elasticity similar to bone can achieve good osseous integration. We study the use of porous titanium press-fit acetabular shells for a range of revision stems.

**Methods:** We captured data retrospectively on a cohort of 70 consecutive patients who underwent Revision THR performed by the senior author. All patients received a Tritanium press fit acetabular shell. Patient charts, operative notes and radiology were reviewed. Indications for surgery included: aseptic loosening, joint infection, instability or periprosthetic fracture.

**Results:** This single-surgeon study includes 70 consecutive porous titanium press-fit acetabular shells. Cemented arthroplasty was the most common primary replacement (71%) with mean 13 [0.4 to 37] years since index surgery. 34 patients (49%) had Paprosky Type 2b or greater acetabular deficiency. Only 5 (7%) cases resulted in inclination change over 5 degrees. 10 cases (15%) had horizontal movement of  $\pm 4$  mm. Paired t-test did not reveal significant horizontal migration ( $p = 0.98$ ). Acetabular inclination and horizontal movement reveal variability without significance.

**Conclusion:** We present good early results with porous titanium press-fit shells for acetabular revision. No dislocations have been reported in this cohort despite a femoral revision rate of 88%. We are compiling follow-up at 5-years since revision with radiological assessment. Porous titanium shells provide good early results and stability in all acetabular deficiencies without bone graft or metal augments: allowing rapid recovery following revision arthroplasty.

## O27 Revision THA 3

### O27-216

ACETABULAR REVISION WITH TRABECULAR TITANIUM CUPS: A RETROSPECTIVE ANALYSIS OF A PROSPECTIVE CASE SERIES  
Massari, L.\*<sup>(1)</sup>; Lorusso, V.<sup>(1)</sup>; Bottin, D.<sup>(1)</sup>; Pieratelli, G.<sup>(1)</sup>; Osti, R.<sup>(2)</sup>; Caruso, G.<sup>(1)</sup>  
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**Introduction/objectives:** Hip revision is a demanding procedure even for skilled surgeons due to severe periprosthetic bone loss, which can be managed with bone graft or with bone substitute, but cannot neglect the use of implants providing firm grip and optimal bone ingrowth. Aim of this study is to evaluate short to mid-term outcomes of Trabecular Titanium revision cups.

**Methods:** We retrospectively assessed 25 revision cases using Delta-TT-Revision (N° 13) or Delta-One-TT (N° 11) cups. Revision procedures were due to aseptic loosening in 18 cases (72%), metal-on-metal pseudotumor in 3 cases (12%) and periprosthetic fractures in 4 cases (16%). Mean age of the patients was 74 years (range 59-84); 56% was men. According to Paprosky classification, we treated 1 type 1, 5 type 2a, 6 type 2b, 5 type 2c, 3 type 3a and 5 type 3b. We evaluated patients clinically, with Harris Hip Score (HHS), and radiographically.

**Results:** Mean follow-up was 44 months (range 13-67). We managed bone loss with bone allograft in 13 cases and with bone substitute in 12 cases. In 7 cases, we used modular TT hemispheric modules to fill the acetabular gaps. Aside of the periprosthetic fractures group, mean HHS increased from 37.2 (18-58) preoperatively to 87.1 (64-100). By X-ray analysis, we observed signs of osseointegration, without osteolysis, radiolucent lines, or migration.

**Conclusion:** Trabecular Titanium is an excellent solution for revision surgery; the rough surface provided an optimal mechanical grip and showed a high capacity for osseointegration. The possibility of using modular spacers to restore the hip geometry makes these cups a versatile solution in cases of severe acetabular bone loss.

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## O27 Revision THA 3

### O27-266

OUTCOME OF REVISION ARTHROPLASTY IN YOUNG PATIENTS WITH INFLAMMATORY ARTHRITIS.  
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**Introduction/objectives:** Revision arthroplasty in young patients with inflammatory arthritis is particularly challenging given host bone stock, bone quality, and deformity. There is limited literature regarding the outcome of revision surgery these patients. This study reviews the indications and natural history of revision surgery in a group of these patients.

**Methods:** Retrospective review of prospectively collected data. Patients aged 40 years or under at the time of the first revision procedure were included. 41 hips in 30 patients were identified. 29 patients had JIA, and one had SLE. Average age at time of the first revision was 28 years (SD 5.6). Follow up ranges from 3 years to 29 years (mean 13.2 years)

**Results:** Eight of the revisions were for both components, 29 were the cup or liner only, and four were stem only. Indications for revision were loosening in 25 patients, osteolysis in eight, liner wear/fracture in six, femoral fracture in one, and adverse reaction to metal debris in one. Sixteen hips required at least one more revision. Of these, three hips required two further revisions and two hips had three further revisions. Mean survival since the most recent revision is 10 years, with no signs of impending failure.

**Conclusion:** This historical series demonstrates that it is possible to successfully revise hips in these patients. 43% of the revisions have outlasted the index primary, and all the hips at minimum of three years' follow up are stable with no radiographic or clinical signs of loosening or osteolysis.

## O27 Revision THA 3

### O27-76

ACETABULAR REVISION USING TRABECULAR METAL AUGMENTS FOR PAPROSKY TYPE 3A AND 3B DEFECTS  
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**Introduction/objectives:** This study is aimed at evaluating the fixation of trabecular metal wedges in patients who underwent revision of total hip arthroplasty with large acetabular bone defects.

**Methods:** We retrospectively reviewed 27 acetabular revisions in 25 patients (two patients with bilateral revisions) treated with a porous tantalum acetabular component and augment from September 2010 to December 2015. This study included only cases of Paprosky 3A and 3B. Functional outcomes (Merle d'Aubigne) were analysed. Osseointegration of the acetabular component was assessed according to the criteria set by Moore. The minimum follow up was 26 months.

**Results:** The mean follow-up time was 39.7 months (26-68). Fixation was achieved in all cases despite its complexity. Clinically, the patients were evaluated by the criteria of Merle D'Aubigne and Postel, evolving from 6.67 points in the preoperative to 14.86 in the postoperative period. Student's t-test indicated that this difference was statistically significant ( $p < 0.0001$ ). There was only one case of dislocation that was treated with open reduction. One case developed infection, and was surgically approached on two occasions, with extensive debridement and intravenous antibiotics following protocol, with good evolution.

**Conclusion:** The use of the trabecular metal wedges in revision surgeries for cases with severe bone defects (Paprosky 3A and 3B) present good clinical results and high survival in the short- and medium-terms, representing an alternative in complex joint reconstructions.

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## O28 Infection

### O28-135

REDUCTION IN PROSTHETIC JOINT INFECTION AFTER INTRODUCTION OF PER-OPERATIVE WOUND IRRIGATION WITH CHLORHEXIDINE. A LARGE SCALE EVALUATION OF A CHANGE IN STANDARD CARE  
Rutgers, M.\*<sup>(1)</sup>; Yesilkaya, F.<sup>(2)</sup>; Moojen, D.-J.<sup>(2)</sup>; Poolman, R. W.<sup>(2)</sup>; Willigenburg, N.<sup>(2)</sup>; Kempen, D.<sup>(2)</sup>  
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**Introduction/objectives:** The consequences of a prosthetic joint infection (PJI) can be devastating. Preoperative application of chlorhexidine could provide a valuable additive to systemic antibiotics to reduce the infection rate after total joint arthroplasty. However, it may cause cytotoxicity, and impair wound healing. The purpose of this study was to compare the rates of infection and wound leakage before- and after introduction of perioperative chlorhexidine lavage.

**Methods:** All 4494 patients receiving a primary hip or knee prosthesis between 2007-2013 were retrospectively included. Initially, wound irrigation with 0.9% NaCl was standard care (n=2304). In 2008, irrigation with chlorhexidine was gradually introduced (n=2190). The incidence of PJI and wound leakage were correlated to baseline characteristics and details from the medical and surgical reports. The effect of chlorhexidine on infection and wound leakage was determined using multivariate logistic regression models and corrected for relevant baseline characteristics.

**Results:** The prosthetic infection rate was 2.5% in the NaCl group and 1.5% in the chlorhexidine group, while wound leakage occurred in 15.9% of the NaCl group and 19.0% of the chlorhexidine group. Multivariate logistic regression revealed that chlorhexidine significantly reduced the risk of infection (OR=0.55, 95%CI=0.35-0.86, p=0.009) and did not significantly affect wound leakage (p=0.254).

**Conclusion:** Implementation of chlorhexidine lavage before wound closure as standard clinical practice reduced the incidence of prosthetic joint infections. With an odds ratio of 0.55 after correction for potential confounders, chlorhexidine lavage seems more effective than NaCl irrigation in reducing infection after total hip and knee arthroplasty.

## O28 Infection

### O28-536

DOES LAMINAR FLOW REDUCE THE RISK OF EARLY SURGICAL SITE INFECTION IN HIP FRACTURE PATIENTS?  
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**Introduction/objectives:** To determine if there is a difference in the rate of early infection in trauma operations performed in patients who sustained a hip fracture and underwent surgery in laminar flow and plenum ventilation.

**Methods:** We assessed the rate of early surgical site infection (SSI) in patients who sustained a hip fracture after our trauma theatre was moved from a laminar flow to a non-laminar flow theatre following the merge of the trauma service in NHS Lanarkshire. We retrospectively collected data for six months prior to the merging of the trauma service and six months after. For each operation: age, gender, ASA grade, co-morbidities, drug history, smoking status, duration of surgery, administration of peri-operative antibiotics, surgeon grade, method of skin closure, and SSI were extracted from the hospital electronic notes and with input from the trust's SSI surveillance team.

**Results:** 252 patients included, 95 patients in the laminar flow group and 157 in the non-laminar flow group. There were no SSIs in the former group but there was a 3.2% SSI rate (Fisher's exact p=0.16) in the latter group. This was not statistically significant. Each of the patient characteristics was included in a Firth logistic regression model. There was no large change in the odds ratio for laminar flow after adjusting for each of the characteristic. Therefore, these were not responsible for the non-significantly higher rates of SSIs in the non-laminar flow group.

**Conclusion:** There was a higher incidence of early SSI when hip fracture surgery was performed under non-laminar flow but this was not statistically significant. Future studies with larger number of patients is required to obtain a higher number of SSIs which would help ascertain if laminar flow reduces the incidence of SSI.

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## O28 Infection

### O28-127

RISK FACTORS FOR PERIPROSTHETIC JOINT INFECTION AFTER PRIMARY TOTAL HIP ARTHROPLASTY: AN ANALYSIS OF INSTITUTIONAL DATA  
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**Introduction/objectives:** Our purpose was to determine the rate of deep periprosthetic joint infection (PJI) and risk factors for developing PJI in patients treated with primary total hip arthroplasty (THA) in a tertiary institution.

**Methods:** We retrospectively reviewed clinical characteristics of patients treated with primary THA between 1/1999 and 12/2013, including demographics, comorbidities, length of stay, primary diagnosis, total/allogeneic blood transfusion rate and in-hospital complications. Minimum follow-up was 29 months. The overall deep PJI rate, and the rates for early- (within 2 years after index surgery) and late-onset PJI (more than 2 years after surgery) were calculated. A Cox proportional hazards regression model was constructed to identify risk factors for developing deep PJI. Significance level was set at 0.05.

**Results:** Overall, 36,494 primary THAs were included (20,497 men and 15,997 women; mean age, 64.44 years). A deep PJI occurred in 154 patients (0.4%). An early-onset PJI occurred in 122 patients (0.3%); 32 patients (0.1%) developed a late-onset PJI. At any given time, patients with coronary artery disease were 1.65 times more likely to develop deep PJI (HR=1.65, 95%CI [1.07, 2.55], p=0.023) than patients without coronary artery disease. Obese patients were 2.84 times more likely to develop deep PJI at any given time than non-obese patients (HR=2.84, 95%CI [1.51, 5.35], p=0.001). Patients with pulmonary hypertension were 205% more likely to develop deep PJI at any given time than patients without pulmonary hypertension (HR=3.05, 95%CI [1.23, 7.56], p=0.016).

**Conclusion:** Despite low rates of deep PJI after THA, identifying patients with modifiable risk factors remains of critical importance.

## O28 Infection

### O28-515

COMPARISON OF DIFFERENT ANTIBIOTICS PROPHYLAXIS REGIMES IN THE RISK OF REVISION FOR INFECTION FOLLOWING PRIMARY JOINT ARTHROPLASTY OF THE HIP AND KNEE IN THE NETHERLANDS.  
Veltman, E.\*<sup>(1)</sup>; Lenguerand, E.<sup>(2)</sup>; Moojen, D. J.<sup>(1)</sup>; Whitehouse, M.<sup>(2)</sup>; Nelissen, R. G.H.H.<sup>(3)</sup>; Blom, A.<sup>(2)</sup>; Poolman, R. W.<sup>(4)</sup>

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**Introduction/objectives:** Administration of perioperative antibiotic prophylaxis (AP) reduces the risk of prosthetic joint infection (PJI) following primary total hip arthroplasty (THA). The optimal type of antibiotic used and duration of prophylaxis are subject to debate.

**Methods:** We compared the risk of revision surgery for PJI in the first year following THA by AP regimen. A national survey collecting information on hospital-level AP regimen policy was conducted across the Netherlands and linked to data from the LROI arthroplasty registry for 2011-2015. PJI status was defined using the surgical indication reported at revision by surgeons in the registry form. Restricted cubic splines Poisson model adjusted for hospital clustering were used to conduct the comparisons on 130,712 THAs performed across 99 institutions. These included 399 THAs revised for an indication of PJI.

**Results:** Multiple shot of Cefazolin (MCZ), of cefuroxime (MCX) and single shot of Cefazolin (SCZ) were respectively administered to 87%, 4% and 9% of patients. For THA, the rates of revision for PJI were respectively 31/10,000 person-years 95%CI[28, 35], 39[25, 59] and 23[15, 34] in the groups which received MCZ, MCX and SCZ.

**Conclusion:** No evidence of difference between AP regimens was found in the unadjusted and adjusted model (age, gender, BMI and ASA grade). Further work is advocated to confirm whether there is an association between AP regimen collected at patient-level and the risk of subsequent revision for PJI after primary THA.

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## O28 Infection

### O28-129

#### LOW SENSITIVITY OF ALPHA-DEFENSIN (SYNOVASURE) TEST FOR INTRAOPERATIVE EXCLUSION OF PROSTHETIC JOINT INFECTION

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**Introduction/objectives:** The Synovasure lateral flow test was developed as a rapid test for the detection or exclusion of periprosthetic joint infection (PJI). 3 studies have reported promising results on its diagnostic value in total joint revision surgery. We aimed to assess the sensitivity and specificity of the Synovasure test to exclude infection in patients undergoing revision surgery for suspected early aseptic loosening of a total hip or knee arthroplasty.

**Methods:** In a prospective study design, 37 patients who underwent revision surgery for suspected early aseptic loosening (< 3 years after primary arthroplasty) were included. The Synovasure test was used intraoperatively to confirm the aseptic nature of the loosening and 6 tissue cultures were obtained in all cases. Exclusion criteria were patients with a preoperatively confirmed PJI, acute revisions (< 90 days after primary arthroplasty) and cases with malpositioning, wear, or instability of the prosthesis.

**Results:** 5 of the 37 patients were diagnosed with a PJI based on the intraoperative tissue cultures. In only 1 out of these 5 cases this was confirmed by the intraoperative Synovasure test. No tests were falsely positive.

**Conclusion:** In this case series the Synovasure lateral flow test had a low sensitivity to exclude PJI in patients with suspected aseptic loosening. The role of the Synovasure lateral flow test in the intraoperative exclusion of PJI during revision surgery for suspected early aseptic loosening appears to be more limited than previously indicated.

## O28 Infection

### O28-126

#### DOES SURGICAL APPROACH AFFECT THE RISK FOR DEEP INFECTION AFTER PRIMARY TOTAL HIP ARTHROPLASTY?

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**Introduction/objectives:** Our objectives were (a) to compare the periprosthetic joint infection (PJI) risk of patients undergoing primary total hip arthroplasty (THA) with the direct anterior (DAA) or the posterior approach (PA); and, (b) to identify risk factors for deep PJI after primary THA.

**Methods:** We retrospectively reviewed clinical characteristics of patients treated with primary THA in our institution between 1/2010 and 12/2015, using either the DAA or the PA. The respective deep PJI rates were determined. We constructed a logistic regression model to determine a potential difference in the deep PJI risk between the two groups, and risk factors for deep PJI in all patients. Significance level was set at 0.05.

**Results:** During the period studied, the DAA and the PA were utilized in 1,096 and 18,213 procedures respectively (8,562 men, 10,747 women; mean age: 64.23 ± 11.96 years). The PJI rates for the DAA and the PA group were 0.27% and 0.32% respectively. The DAA showed similar PJI risk compared to the PA (OR=1.126, 95%CI [0.347, 3.656]). Older patients had lower PJI risk than younger patients (OR=0.973, 95%CI [0.953, 0.993]). Discharge to home was associated with lower PJI risk than other discharge disposition (OR=0.434, 95%CI [0.224, 0.844]). Prolonged length of stay was associated with higher PJI risk than shorter length of stay (OR=1.133, 95%CI [1.011, 1.271]).

**Conclusion:** The DAA does not increase the risk for deep PJI compared to the PA. Regardless of the approach, risk stratification of patients plays an important role for reducing the rate of this catastrophic complication.

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## O28 Infection

### O28-69

#### THE INFLUENCE OF RECENT DISLOCATION AND/OR PERIPROSTHETIC FRACTURE ON INTRAOPERATIVE FROZEN SECTION HISTOPATHOLOGY FOR THE DIAGNOSIS OF PERIPROSTHETIC JOINT INFECTION IN HIP REVISION SURGERY.

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**Introduction/objectives:** Low grade Periprosthetic Joint Infection (PJI) can be difficult to diagnose and its incidence could be underestimated in revision THR. Feldman described the use of intraoperative frozen section histopathology for the intra-operative diagnosis of PJI in revision hip and knee surgery, and proposed a mean polymorphonuclear (PMN) cell count of >5 per High Power Field (HPF) as indicative of PJI. We hypothesised that frozen section histopathology is only reliable to establish PJI during revision THR in the absence of recent major trauma.

**Methods:** The study included all revision total hip arthroplasty procedures where intra-operative frozen section histopathology had been used for the evaluation of infection in a single institution between 2008 and 2015. Intra-operative tissue cultures were used to define infection. Two hundred and ten hips were included for evaluation. Prior to revision surgery, 36 hips had a dislocation or a periprosthetic fracture (group A), and 174 did not (group B).

**Results:** The prevalence of infection was 14.3% (5.6% in group A and 16.1% in group B). Using Feldman criteria, the sensitivity of histopathology was 50.0%, specificity 47.1%, positive predictive value 5.3% and negative predictive value 94.1% in group A. The sensitivity of frozen section histopathology was 75.0%, specificity 96.5%, positive predictive value 85% and negative predictive value 95.3% in group B. We could not establish a valid threshold for PMN count in the trauma group.

**Conclusion:** Intra-operative frozen section histopathology is reliable for the diagnosis of periprosthetic joint infection if no dislocation or periprosthetic fracture has occurred prior to hip revision surgery. Recent trauma makes frozen section unreliable in revision hip surgery.

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