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LEARNING CURVE IN MANAGEMENT OF ACETABULAR BOTH-COLUMN FRACTURES: DOES EXPERIENCE IN PELVIC SURGERY MODIFY THE RESULTS?

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Introduction: Both-column fractures are about the 25% of all acetabular fractures and are often the hardest challenges for a pelvic surgeon. Open reduction and internal fixation is widely accepted as the standard treatment: the goal of the surgical treatment is an anatomical reduction of the articular surface. In literature a significant correlation between the accuracy of reduction and clinical outcome has been demonstrated. Several approaches for open reduction and internal fixation of a both-column fracture have been described: single ilioinguinal approach, combined approaches (ilioinguinal and Kocher-Langenbeck posterolateral) and extended iliofemoral approach. Ideally a single approach could reduce the operating time, the blood loss and the risk to soft tissues iatrogenic injuries. The ilioinguinal approach, therefore, is often the preferred solution because it allows a direct view of the anterior column and an indirect possibility of posterior column reduction and fixation. Surgeon skills are essential to obtain either a good indirect reduction of the posterior column either a good screws' placement.

Objectives: The learning curve for this subtype of fractures has not previously been quantified. The purpose of this study is to describe the learning curve for both column fractures in a specialized trauma center and to study how a specific experience in pelvic surgery could lead to an improvement of clinical outcomes and a decreased need of combined approaches.

Methods: We reviewed the first consecutive 62 both-column fractures performed by a single pelvic surgeon. Patients were divided into two groups according to the experience of the surgeon before (group A) and after (group B) 500 cases of pelvic trauma. We assessed the operative time, patient's age, date of surgery, performed surgical approach, peri-operative complications, immediate post-operative reduction, clinical outcome, and radiographic results at the last follow-up.

Results: We performed a single ilio-inguinal approach in all patients of group B and in 25 patients of Group A (then indicated as group AIL), combined approaches (ilio-inguinal + Kocher-Langenbeck) was performed in the remaining seven cases of group A (then indicated as group ACA). All the complications were recorded. Mean surgical time was significantly shorter in group B than group AIL ($p = 0,013$). The mean follow-up was 86 months, respectively 107 months for group A and 60 months for group B. Mean Merle d'Aubigné score were 15,2 in group A (respectively 14,7 in group ACA and 15,7 in group AIL) and 16,6 in group B, with a significant difference between A and B ($p = 0,028$) and between AIL and B ($p = 0,020$). Significant correlations between surgeon experience and clinical outcome ($p = 0,744$; $r = 0,046$) and number of anatomic reduction ($p = 0,002$) were demonstrated. Group A and group AIL radiographic results were significantly worse than group B (respectively $p < 0,001$ and $p = 0,005$). Mean radiographic scores at the last follow-up were 3, 6 points for group B and 2, 3 points for group A (with no differences between group AIL and group ACA). Group A and group AIL results were significantly lower than group B (both $p < 0,001$).

Conclusions: We demonstrate the learning curve in surgical management of both-column acetabular fractures, treated by an indirect reduction of the posterior column through the ilioinguinal approach. Depending on the surgeon's experience the second group of patients showed significant better clinical results and radiographic outcomes comparing with the cases performed at the beginning. With respect to surgeon education, the large number of cases required before the learning curve plateau suggests the need to expand opportunities for training in surgical technique for surgeons in the early years after residency training.

FEMORAL CORTICAL INDEX AS A SPY OF BONE FRAGILITY IN PATIENTS WITH HIP FRACTURE

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Introduction: The femoral cortical index (FCI) assesses bone stock using the ratio between the diameter of the femoral shaft and the thickness of the cortical bone calculated 10 cm distal to the center of the small trochanter in an AP view X-Ray of the femur. Aim of our study is to evaluate a possible association among low values of FCI, risk factors, comorbidities and serum 25 hydroxyvitamin D levels and to establish the importance of FCI as a potential predictor of a new fracture.

Materials and methods: We conducted a retrospective study on 366 consecutive patients (90 men and 296 women) (range 60 to 103 ya) surgically treated for hip fractures from March 2013 to June 2015, after informed consent in our Orthopaedic Department and that never received any medical treatment for osteoporosis. FCI has been calculated by routine clinical radiographs of the pelvis both on fractured femur and on the opposite side. For each patient, we analyzed the presence of comorbidities (such as diabetes, hypertension, IRC, rheumatoid arthritis), osteoporosis risk factors and blood levels of vitamin D, usually evaluated in our patients with fragility fractures.

Results: Average values of FCI were 0.42 (range 0.18 to 0.58) at the fractured femur and 0.48 at the opposite side (range 0.25 to 0.66) with a statistically significant difference ($p = 0.002$). At the fractured side an average value of 0.45 was found in men, and of 0.40 in women. Patients with severe hypovitaminosis D (serum concentration < 12 ng/ml) had a minor FCI compared to those with a moderate deficiency (0.41 vs. 0.46, $P < 0.01$). The presence of comorbidities or osteoporosis risk factors had a different influence on the values of FCI.

Conclusions: In our study, we found a correlation among low values of FCI, clinical factors related to bone fragility and severe hypovitaminosis D in elderly patients with hip fractures. Comorbidities and risk factors have a different weight in FCI variations, while the severe hypovitaminosis has a major impact on it. As described in the literature regard the DXA limitations in elderly FCI could be an useful tool in terms of bone fragility evaluation and fracture risk prediction. As osteoporosis causes a cortical bone trabecularization that leads to fracture, this index can therefore give a measure of specific cortical bone at low cost using a X-ray standard examination.

HIP ARTHROSCOPY IN FEMORO ACETABULAR IMPINGEMENT: CHONDRAL DAMAGE IS A GOOD PREDICTOR OF OUTCOME

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Introduction: Femoro Acetabular Impingement (FAI) can lead to chondrolabral damage and secondary osteoarthritis. Hip arthroscopy is increasingly popular as a modality to abolish impingement and to manage the secondary damage that ensues. There is limited data on the medium term functional outcome of hip arthroscopy for FAI and on the best predictors of outcome.

The aim of this study was to prospectively evaluate the presentation, treatment and functional outcome after hip arthroscopic surgery for patients presenting with FAI between 2007 and 2010.

Patients, methods and materials: 196 consecutive patients who had proven impingement without osteoarthritis were included in this study and subjects were assessed pre-operatively and post-operatively at 12, 24 and 36 months. The non-arthritic hip score, the UCLA activity score, the Harris hip (HHS) score and the VAS pain score were used as assessment tools. Ten patients were lost to follow up, leaving 186 patients with a mean follow up of 35.8 months.

Results: Improvements were seen in the majority with the 3 year mean NAHS score increased by 26.4 points, the UCLA activity score increased by 3.9 points, the HHS improved by 22.3 points and the VAS pain score decreased by 3.2 points. There was a significant difference between patients who had no chondral damage (who maintained their improvement), relative to those with full thickness defects who often started to deteriorate after 12-24 months.

Discussion: Hip arthroscopic surgery is a safe and effective procedure for appropriately selected patients suffering from FAI. Good results were seen with sustained improvement in functional outcome at 3 years follow up. Poorer outcomes are associated with arthroscopic evidence of full thickness chondral damage.

Conclusions: Hip arthroscopy improves symptoms and activity levels in patients with FAI. Critical analysis of chondral damage is needed in order to stratify patients appropriately and avoid short term deterioration.

NO DIFFERENCE IN BLOOD LOSS FOLLOWING TOTAL HIP REPLACEMENT WITH THREE THROMBOPROPHYLACTIC REGIMES (ENOXAPARIN, DABIGATRAN OR RIVAROXABAN) - RESULTS FROM A RANDOMIZED, DOUBLE-BLIND CLINICAL TRIAL

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Introduction: Hitherto, no study has directly compared blood loss (BL) after different thromboprophylactic regimes (TRs) after total hip replacement (THR).

Objectives: The objective of this study was to quantify and compare BL in THR under three different TRs. The secondary objective was to record the frequency of wound healing disturbances (WHDs) with different TRs.

Methods: Between September 2013 and July 2014, sixty primary, unilateral, same-implant THRs entered a randomized, double-blind clinical trial at a tertiary referral university hospital. The patients were randomized to receive manufacturers' recommended doses of enoxaparin, dabigatran or rivaroxaban. None of those patients received tranexamic acid. Complete blood counts were obtained preoperatively and on the third day postoperatively. BL was calculated according to the Nadler formula (Nadler et al Surgery 1962). All data were analysed using R statistical software. WHDs were assessed according to the Centers for Disease Control definition of superficial surgical site infection (Mangram et al Infect Control Hosp Epidemiol. 1999). The local ethics committee approved this study and it was registered with ClinicalTrials.gov (NCT02085824).

Results: The mean BL and standard deviations were 844 ± 222 ml for enoxaparin, 854 ± 205 ml for dabigatran and 806 ± 227 ml for rivaroxaban. The BL did not significantly differ between groups (Kruskal-Wallis, $p = 0.92$). More WHDs occurred in the rivaroxaban group (5/20), compared to enoxaparin (2/20) and dabigatran (3/20).

Conclusions: None of the chemical TR is superior to others in terms of reducing the BL and the differences in blood loss between different regimes were insignificant from clinical viewpoint. There seems to be more WHDs with the use of oral agents.

POTENTIAL MARKERS OF SYSTEMIC TOXICITY INDUCED BY METAL IONS IN PATIENTS WITH HIP RESURFACING

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Introduction: The use of Metal-on-metal hip resurfacing (MOM-HR) decreased over the past years; nevertheless, it remains a viable solution for young and active male. MOM-HR generates both metal particles and ions, whose systemic toxicity remains a matter of concern.

Objectives: We aimed to investigate whether chronic exposure to high levels of cobalt (Co) and chromium (Cr) induced a state of oxidative stress, DNA damage and a hypoxia-like response in patients with well-functioning MOM-HR.

Methods: We measured serum concentration of 8-hydroxydeoxyguanosine (8-OHDG), the most critical biomarker in the estimation of reactive oxygen species-induced DNA damage, circulating free DNA (cfDNA) marker for DNA tumor-specific alterations, and hypoxia-inducible factor-1 α (HIF-1 α), which is a common feature of tumor tissues, in 22 patients with MOM-HR at an average follow-up of 8.7 years. Co and Cr serum levels were measured as well. Twenty-one osteoarthritic subjects waiting for MOM-HR were enrolled for comparison.

Results: Ion values were 5-to-15 times higher in MOM-HR patients than controls (Cr: 1.82 vs. 0.11 ng/ml; Co: 0.90 vs. 0.16 ng/ml). Biomarkers did not

differ between MOM HR patients and controls (8-OHDG, $p = 0.09$; cfDNA, $p = 0.82$; HIF-1 α , $p = 0.49$). In MOM-HR patients, females had higher Cr and Co serum levels compared with males ($p = 0.05$ and $p = 0.08$, respectively). On the contrary, males showed higher serum levels of 8-OHDG than females ($p = 0.01$). Average cfDNA serum value, in MOM-HR males, was 44% higher compared with controls and of 56% higher compared with MOM-HR females. Such differences were not statistically significant ($p = 0.42$ and $p = 0.50$, respectively). Serum HIF-1 α concentration did not differ between genders ($p = 0.75$). No correlation was found between biomarker serum levels and Cr or Co.

Conclusions: Our findings showed that chronic raise of metal ions concentration in well-functioning MOM-HR is not associated with systemic increase of both oxidative DNA damage and hypoxia biomarkers. Further studies, designed to carry out a careful biomonitoring, and a larger sample size, are necessary to validate these findings.

EFFECT OF IMPACT ASSEMBLY ON THE INTERFACE DEFORMATION AND FRETTING CORROSION OF MODULAR HIP TAPERS: AN *IN VITRO* STUDY

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Introduction: Failure of large head diameter metal-on-metal hip replacements has been attributed to wear and corrosion of modular head-neck tapers. Manufacturing tolerances, surgical technique, non-axial alignment, material combination, high frictional torque and high bending moment have all been implicated in the failure process. There is limited guidance on the force of impaction with which surgeons should assemble modular hip prostheses.

Objectives: This study aims to investigate the effect of impaction force on the deformation and corrosion of modular tapers.

Methods: Short neck tapers with high surface roughness (average $R_a = 16.58 \mu\text{m}$, $R_b = 4.14 \mu\text{m}$) and long neck tapers with low surface roughness (average $R_a = 3.82 \mu\text{m}$, $R_b = 0.81 \mu\text{m}$), were assembled with CoCrMo alloy heads (smooth finish) under controlled conditions with 2kN, 4kN or 8kN of impaction force. Material combinations tested included CoCrMo-head/CoCrMo-neck and CoCrMo-head/Ti-6Al-4V-neck. Assessment of surface deformation before and after impaction was made using surface profilometry. Measurement of fretting current during sinusoidal cyclic loading evaluated mechanically assisted corrosion for each assembly load during short-term cyclic loading (1000-cycles) and long-term cyclic loading (5 million-cycles).

Results: Deformation on head and neck tapers increased with assembly load. Fretting currents during short term simulation testing showed significantly lower currents ($p < 0.05$), in 8kN assemblies when compared to 2kN and 4kN, especially for the short-rough tapers. Long term simulator testing demonstrated a progressive reduction in fretting corrosion for samples impacted with 4kN and 8kN; however, this reduction was greater for samples impacted at 8kN even at the start of testing.

Conclusions: The impaction force used to assemble modular heads of hip implants should be more than 4kN.

WHAT IS THE NATURAL HISTORY OF ASYMPTOMATIC PSEUDOTUMOURS ASSOCIATED WITH METAL-ON-METAL HIP RESURFACINGS?

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Introduction: Metal-on-metal hip resurfacing (MoMHR) patients with asymptomatic pseudotumours currently pose a management dilemma to surgeons because the natural history of these lesions remains unclear.

Objectives: To assess: (1) the natural history of asymptomatic pseudotumours associated with MoMHRs, and (2) factors from the initial assessment associated with future revision surgery.

Methods: A prospective cohort study performed between 2007/2008 identified 25 asymptomatic pseudotumours (mean age 59.9 years; 76% female). All patients underwent the same initial assessment: ultrasound, blood metal ions, radiographs, Oxford Hip Score (OHS). All non-revised MoMHRs underwent repeat assessment in 2012/13. Factors associated with future revision surgery were analysed.

Results: Revision was performed/recommended in 15 MoMHRs (60%) at a mean 2.7 years (range 0.4-6.4 years) from initial assessment. Ten non-revised MoMHRs underwent repeat ultrasound at a mean 5.1 years (range 4.0-6.5 years) from initial assessment with 20% (n = 2) of pseudotumours increasing in volume, 40% (n = 4) remaining stable, and 40% (n = 4) decreasing. No significant changes in pseudotumour volume ($p = 0.956$) or OHS ($p = 0.065$) occurred between repeat assessments. Factors associated with revision were high blood cobalt ($p = 0.0048$) and chromium ($p = 0.0162$), large pseudotumour volume ($p = 0.0458$), low OHS ($p = 0.0183$) and bilateral MoMHRs ($p = 0.049$). Patients with blood metal ions above established unilateral/bilateral MoMHR thresholds and/or initial pseudotumour volumes $>30 \text{ cm}^3$ had an 86.7% sensitivity, 70.0% specificity 81.2% positive predictive value, and 77.8% negative predictive value for future revision.

Conclusions: Asymptomatic pseudotumours often require revision. High blood metal ions and/or initial pseudotumour volumes above 30 cm^3 provide a threshold for considering revision in asymptomatic MoMHRs. Surveillance of patients outside these parameters appears acceptable given little changes occur at extended follow-up.

SUPERCAP APPROACH IN HIP REPLACEMENT AFTER FEMORAL NECK FRACTURES

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Introduction: Prosthesis in femoral neck fracture always has higher complications rate than election's procedure. Among these complications is the dislocation. In the strategies to reduce the risk of dislocation there is the use of tissue-sparing approaches that preserve integrity of the capsule. Among these is the approach type SUPER-Cap. Since 2003, micro-posterior approaches, including Supercap, PATH and Super-Path, diffused rapidly. Stephen B. Murphy introduced the Superior Capsulotomy as an elective procedure. Although they are not an evolution of previous surgical techniques but totally new approaches, they are considered by the Authors the end point of a continuum, started with the standard posterior surgical access followed by the mini-invasive technique and the micro-approaches. The similarity with the previous techniques is considered extremely important for the learning curve, because the surgeon can learn progressively less invasive procedures without totally changing the classic technique, and eventually, he can rapidly go back to a more invasive operation he is more familiar with. After 2006, the number of patients has increased beyond 1500. Despite the numbers none of the patients had an emergency surgery for hip fracture but all the procedures were elective. In this case series, we evaluate our experience with the Supercap approach in traumatology, assessing clinical outcomes and the learning curve.

Materials and methods: 52 patients with a fracture of proximal femoral were treated with total or emi-arthroplasty using the Supercap approach. 41 patients were available to be included in this study. 33/41 were women (80%), avg age 83 y, 51% were left femoral fracture. 37 patients had intracapsular fractures, while 4 were basicervical and one of which was classified as intertrochanteric during surgery. These parameters were evaluated: prosthesis model implanted, need of blood transfusion during surgery and in the post-op, anesthetic technique, time of surgery, possible complications, hospital length stay, HHS/OHS one year after surgery, and x-ray evaluation (Complication, mobilization, length differences) one year after surgery.

Results: Bipolar emi-arthroplasty replacement was chosen in 70% of the patients. Cement fixation was always used. No surgical navigation was employed. Cup inclination angle typically ranges from 30° to 50° . No dysmetria more than 1 cm. Femoral head size diameter were 28 mm in 55% patients, 36 mm in 27,5% and 22,25 mm in 17,5%. Finned stem were used in 100% of patients and modular neck were always used, 80% straight and in 20% with 8° var/val. Cup used were mostly 50 and 48 mm. Only 55% of patients underwent surgery within 48 hours from hospital admission due to the need of a multidisciplinary clinical evaluation in patients with critical comorbidity. Subarachnoid anesthesia was provided in 75%, otherwise general anesthesia, and in one case spinal was converted in general anesthesia. No intra-operative fractures, neuro-vascular lesions or cup slipping were recorded during surgery. Duration of surgery was in a range of 60-125 minutes, with a reduction of avg duration in the last operations performed (90 min vs 100 min). Blood transfusion was in average 0.8 blood units during surgery (0-4) and 1,6 after surgery (0-4). Hospital length stay was in average 9.7 days (range 7-15) due to high comorbidity in our patient.

Conclusions: The supercap approach proved safe, without intraoperative complications and the learning curve was short. There are no differences in terms of morbidity and morbidity after surgery compared with the posterolateral approach in use at our institution. There were no mechanical complications in the post operative and in follow up. In conclusion, the supercap approach can be easily used also in traumatology, with the advantage of preserving tissues, external rotators and the posterior capsule: thus reducing the risk of dislocation related to the access.

USE OF A POROUS TANTALUM MONOBLOCK ACETABULAR CUP IN PRIMARY THA: 10 TO 15 YEAR FOLLOW-UP

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Introduction: One of the most important factors leading to the early failure of cemented or uncemented acetabular fixation is periprosthetic osteolysis. Tantalum monoblock acetabular components have been utilized as an alternative to cemented polyethylene and uncemented modular acetabular implants in an attempt to enhance primary fixation and reduce the rate of osteolysis (1). Press-fit techniques and trabecular metal provide optimal conditions for bone ingrowth and fixation.

Objectives: The purpose of the study was to evaluate clinical and radiographic results of a porous tantalum monoblock acetabular cup in primary THA, with a minimum follow-up of 10 years.

Methods: A total of 188 porous tantalum monoblock acetabular cup were implanted in 182 consecutive patients who underwent a primary THA. Patients were assessed with the Harris Hip score (HHS) and radiographically, with AP and lateral X-rays, to determine osteolysis, polar gaps, progressive radiolucent lines, loosening and poly dislodgement. Data were prospectively collected.

Results: The average total HHS improved from 44 preoperatively to 96 at the latest follow-up. There were no revisions for polyethylene wear, periacetabular osteolysis or aseptic loosening. Radiolucent lines were observed only in zone I in 1.9% of cups; they were $<1 \text{ mm}$ in width, not progressive. Ten-year survival rate was 99.5%, with revision for any reason as end point. Only one cup was revised for deep infection.

Conclusions: Our results are comparable to those previously presented (2, 3, 4) and suggest that porous tantalum monoblock acetabular cup can provide excellent clinical and radiological results up to a 15-year follow-up.

ACETABULAR SPACERS IN TWO STAGE HIP REVISION: DOES IT WORTH? A CONTROLLED CLINICAL TRIAL

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Introduction: Giving the increasing number of periprosthetic joint infection (PJI), a better surgical strategy to eradicate infection must be identified. Two-stage procedure achieved positive clinical and radiological results. One of the main issues in hip revision surgery is loss of bone stock, both in femoral and acetabular side. The use of femoral antibiotic loaded cement spacers has obtained a general consensus in literature and it is widely used in everyday clinical practice. Conversely, the use of an acetabular antibiotic loaded bone cement in two-stage revision has not gained the same popularity. Few data are available in literature confirming the role of the acetabular spacer in hip revision surgery. Our hypothesis is that the use of an acetabular spacer in two-stage revision surgery could improve bone stock sparing and simplify the implantation of a definitive acetabular cup. Antibiotic elution could also benefit from the increasing friction surface area. These supposed advantages could lead to better biomechanical hip restoration.

Objectives: The aim of this work is to evaluate an acetabular antibiotic loaded bone cement as a potential approach able to: reduce complication on inter-stage period (dislocation, acetabular wear), improve patient activity of daily life, simplify two-stage hip revision surgery and better recover hip biomechanics.

Methods: We retrospectively evaluated the surgical and radiological outcome of 66 patients affected by PJI. 26 patients were treated using an acetabular spacer (group A), while 40 underwent a standard revision surgery (femoral spacer only, group B). We evaluated radiological data such as: lateral offset, leg length discrepancy and mobilization or dislocation of components. Clinical and surgical data were also collected: grade of acetabular defect according to Paprosky classification, general complications, number of failures, mean time of surgery of both two-stages and mean time between first and second stage. Statistical analysis was performed with unpaired T-Student test.

Results: Mean follow up period was 33,2 months (range 8-44) for the acetabular spacer group and 45,3 months (range 10-52) for the control group. Group A was composed of 14 males and 12 females with mean age of 68 years (range 37-83). Group B was formed by 19 males and 21 females, with a mean age of 67 years (range 32-81). All patients completed two stage procedures. Paprosky stage distribution in group A was: 7 type 1; 4 type 2, 3 type 3A and 1 type 3B. Eleven patients have no acetabular defects. Group B distribution was: 12 type 1; 6 type 2; 3 type 3A and 1 type 3B. In 18 patients no acetabular defects was present. Mean time of surgery for the first stage was 148 ± 59 min and 142 ± 45 min for group A and B respectively. For the second stage mean time of surgery was 83 ± 35 min (group A) and 109 ± 36 min (group B). No statistically significant difference was found in the first stage time of surgery between groups (mean difference: 6 min, $P = 0,65$). Conversely, we observed a statistically significant difference in the same data related to the second stage procedure (mean difference: 26 min, $P = 0,015$) Definitive stem was a primary one for the 68% of procedures in group A and 46% for the group B. Mean radiological leg length discrepancy at the end of surgeries was $1,1 \pm 6,8$ mm and $2,6 \pm 6,6$ mm for group A and B respectively ($P = 0,39$). Mean contralateral offset was $52,5 \pm 6,4$ mm (group A) and $53,4 \pm 7,6$ mm (group B). The same parameter of the affected hip at the end of the two stage procedure was $61,9 \pm 9,4$ mm (group A) and $57,1 \pm 7,2$ mm (group B). Mean time between the first and the second stage was 5 months (range 3-15) and 7 months (range 3-16) for group A and B respectively. We observed 2 acetabular spacer mobilization, 6 dislocation of femoral component (2 for group A and 4 for group B); 1 spacer fracture in the group B and 3 periprosthetic fractures (1 in group A and 2 in group B). One patients failed after the second stage in the acetabular spacer group while 3 failed in the control group.

Conclusions: Our retrospective study confirmed that the use of an acetabular antibiotic loaded bone cement reduce surgery duration, especially during second stage, without reducing the effectiveness of the two stage procedure. No statistically significant increase in time of surgery was noted in the first stage. The use of an acetabular spacer lead to lower invasivity in the implantation of definitive cup and lower inter-stage rate of complications. Moreover, it allows everyday life activities. Evidence about lateral offset lead us to conclude that hip biomechanics can be easily restored with the use of this additional device. From our point of view, this could be due to the bone stock and soft tissue tension preservation.

have been 5 iatrogenic lesions in the intracapsular group (3 cartilage lesions, 2 labral lesions), none in the extracapsular group. No significant difference was found between the two groups in terms of functional outcomes, evaluated with Harris Hip Score.

Conclusions: This study showed that FAI can be successfully managed using the extracapsular approach, reducing traction time. Although we did not find differences in clinical outcomes, we consider extracapsular approach to be a promising technique.

HIP ARTHROSCOPY - A NEW VISION ABOUT THE HIP PATHOLOGY. 3 YEARS EXPERIENCE WITH THE OUT-INSIDE TECHNIQUE

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Introduction: The spectrum of hip pathology has significantly increased in the last five years, greatly at the expense of progress-art radiology examinations and diagnostic hip arthroscopic technique. The femoroacetabular impingement is undoubtedly one of the main reasons for the recent development of the hip arthroscopy. Today it is seen as the main cause of coxalgia in a young adult with an incidence of 10-15% in the population, accounting for labrum ruptures and chondral lesions. There is a growing evidence about this being a precursor of hip osteoarthritis.

Objectives: Describe the clinical results of patients submitted to arthroscopic treatment with out-inside technique since its implementation on the department.

Methods: The exclusion criteria were the follow: procedure performed by another surgeon, loss of follow-up, supporting technique for treatment of other hip diseases, including infectious (septic arthritis), pediatric (hip dislocation by sequel to cerebral palsy) or other unrelated to the topic. From May 2011 to May 2014 (3 years), the senior author operated 37 patients. The average age was 41 years (16-62 years). Of the 37, 18 patients were male and 19 female. The average follow-up was 7.81 months (1-18 months). All patients underwent surgical treatment with an arthroscopic surgery using out-inside technique. The procedures performed included the the femoral head and acetabular rim osteocondroplasty, labrum ruptures repairs through reinsertion with anchors, liberation of ileo-tibial band and/or psoas tendon and removal of free bodies. Postoperatively patients are discharged on the first day with indication for partial load, crutches support for 2 weeks and eviction of hip flexion $>80^\circ$ during 4 weeks. Rehabilitation physical therapy is started early with realization of assisted active and passive movements. Sporting activities were restricted for 3-6 months. All patients were evaluated and submitted to clinical evaluation, radiologic and subjective satisfaction. The hips were studied according to the classification of Ganz and Tonnis.

Results: So far 37 patients were operated: 28 with the diagnosis of femoroacetabular impingement, 24 of which have associated labrum rupture and the remaining 4 with a conflict resulting of other condition (Perthes disease, dysplastic hip disease and post intertrochanteric fracture submitted to internal fixation status), 7 of them by snapping hip, 1 for trochanteritis resistant to conservative treatment and 1 for removal of an intraarticular free body. In cases of conflict and according to the classification of Ganz, 21% were type B, 10.7% type C, 67.8% Ganz type D. According to the classification of Tonnis, 42.8% were Tonnis 1, 53.5% Tonnis 2 and 3.5% Tonnis 3. 92% of the patients with femoroacetabular impingement saw the result as very good or excellent. 100% of patients with snapping hip considered the result as very good or excellent. All patients presented resolution of complaints with the exception of two cases (Tonnis 2 and 3 Tonnis) in which there was lesion progression to hip osteoarthritis despite initial symptomatic relief. As complications, there was 1 case of transient meralgia paraesthetica, 2 cases of heterotopic calcification and 5 cases of wounds/skin lesions in the scrotal region/labia majora, which were resolved without squeals.

Conclusions: With the progressive establishment of this technique the interest for the identification and treatment of these "new" diseases, whose incidence and prevalence appears to be increasing. The out-inside technique because of its easy accessing to this articulation and low rate of complications related to the traction, allowed to demystify and boost the development of arthroscopy of the hip, making it a technique within everyone's reach. In this series, despite the short follow-up time and the small cases, the authors want to emphasize especially the easy implementation of this technique.

RESIDENTS' SESSION

CONSERVATIVE AND TRAUMA

EXTRACAPSULAR VS STANDARD APPROACH IN HIP ARTHROSCOPY: OUR EXPERIENCE

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Purpose: To compare the outcomes among patients with femoroacetabular impingement (FAI) undergoing hip arthroscopy performed via the standard vs extracapsular approach.

Methods: Between April 2010 and March 2012, 55 patients (30 males, 25 females; age 18-52, mean 35 y) were randomly assigned to standard intracapsular approach (25 subjects) or extracapsular approach (30 subjects). All procedures were performed by the same surgeon. Average follow up was 20 months (14-28 m).

Results: Average traction time in the extracapsular group was significantly shorter than in the traditional approach (16 vs 98 minutes, $p < 0.05$). There

SURGICAL DISLOCATION FOR PEDIATRIC AND ADOLESCENT HIP DEFORMITY

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Introduction: Hip deformities due to paediatric pathologies and complex abnormalities leading to femoroacetabular impingement (FAI), functional limitation and eventually premature osteoarthritis (OA) may be approached with surgical hip dislocation (SHD).

Objectives: The aim of this study is to evaluate the clinical, radiographic short-term results and complications after SHD in young patients (<18 Years).

Methods: Clinical and radiographic outcomes were assessed in patients who underwent a SHD Ganz-type approach between 2008 and 2012. Diagnosis included Perthes (LCPD), epiphysiolysis (SCFE), FAI, osteonecrosis (ON), Ombredanne disease (MHE), pigmented villonodular synovitis (PVNS). Preoperative and postoperative clinical data, radiographs, modified Harris hip score (mHHS), non-arthritis hip score (NAHS) and short form 12 (SF-12) questionnaires were evaluated.

Results: After a mean 3 years follow-up (range, 0.5-6 years) were evaluated 53 hips (51 patients): 15 LCPD, 13 ECF, 18 FAI, 4 MHE, 3 miscellaneous. Mean age at surgery was 14 years (range, 10-18 years). Through this approach femoral head-neck osteoplasty (33), Dunn-type osteotomy (10), labrum re-fixation (5), synovectomy (2), femoral head mosaicplasty (2) open reduction and fixation for SCFE (1) were performed, eventually in association with pelvic (3), intertrochanteric (4) osteotomy or flake repair (2). At FU, better outcome scores were obtained and 90% of the patients were satisfied with the procedure. ON progression was observed in four cases and in three further patients a THA was implanted; another with LCPD and preoperative osteonecrosis had a functional anchilosis.

Conclusions: Severe hip deformities in paediatric/young patients may be approached with SHD. After three years FU results are comparable to previous studies and patients have a high rate of satisfaction, however the effectiveness of those procedures have to be proved on the long term. Results and complications seem to be related with preoperative lesion(s) and type of treatment.

THE MANAGEMENT OF OSTEONECROSIS OF THE FEMORAL HEAD: CURRENT PRACTICE OF MEMBERS OF THE BRITISH HIP SOCIETY

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Introduction: The management of osteonecrosis of the femoral head (ONFH) remains controversial. In the absence of published guidelines, a 2005 survey of AAHKS members found significant variation in practice. Considering recent advances in joint-preserving surgery and arthroplasty bearing surface technology, the current practice of ONFH management, including the influence of patient age, is of particular interest.

Objectives: This study reports the current practice of specialist lower limb surgeons in the UK regarding the management of ONFH, with particular respect to factors affecting decision-making.

Methods: An internet survey was e-mailed to all 352 active specialist lower limb surgeon members of the British Hip Society. 10 question stems with a range of styles were used. 8 clinical scenarios were presented as combinations of symptoms and stage of ONFH in a 24 and 48 year-old patient. Surgeons were asked to indicate their preferred treatment for each scenario from a range non-operative and operative interventions.

Results: 115/352 (33%) eligible surgeons responded. For symptomatic pre-collapse ONFH, core decompression was the commonest choice for 24 (59%) and 48-yr-old patients (51%), while non-operative management was selected for 18% and 23%, respectively. Operative intervention was selected by 47-89% of symptomatic pre-collapse scenarios for the 24-yr-old compared with 42-86% for the 48-yr-old patient. Surgeons were also more likely to offer vascularized bone graft procedures to the 24-year-old. For post-collapse ONFH without arthritic changes, arthroplasty was selected by 85% for 24-yr-old

and 98% for 48-yr-old patients. With osteoarthritic changes and severe symptoms, this rose to 97% and 100%, respectively.

Conclusions: There remains a wide variation in practice, and the threshold for certain operative interventions is dependent on patient age. In the absence of robust evidence, guidelines based on consensus opinion from a working group of the BHS and EHS is suggested.

CAPSULAR DETENSIONING IN HIP OSTEOARTHRITIS

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The causes of pain in Hip Osteoarthritis (OA) can be divided in Intra-articular causes (i.e. cartilage or labrum lesions, subcondral bone damages or loose bodies) and Extrarticular causes (i.e. capsule or muscles sufferance).

For patients in good general condition, under eighteens the first choice of treatment is the hip replacement that ensures excellent results. How orthopaedic surgeons can manage symptomatic hip OA in elderly or fragile patients? We have some possibilities like therapeutic exercise or pharmacological therapies that provide few guarantees in term of clinical evidences.

Our experience in recent years has led us to practice a new therapeutic option called Ca.S.L.I. that combines all the safer treatments to ensure an effective therapy for older patients.

What is the rationale: the Ca. S. is for Capsular Stretching. In patient in whom movements are almost lost and deformities are big, the capsular derived pain is predominant because the capsule surrounding the femoral neck, is like a thought collar. So the first step is the Capsular detensioning: patient is placed on bed tractions and is praticated 10 times of tractioning and unloading under fluoroscopy check.

The second step is the articular Lavage: using an hip needle by Anterolateral portal is inflated from 500 cc to 2000 cc of saline solution until the joint fluid does not become clear.

The last step is the Injection of Hyaluronic Acid and Long acting Corticosteroid to ensure the pain and inflammation decrease.

Since 2014 we treated 22 patients with Ca.S.L.I. procedure with the mean age of 84 years (range of 78-89 years) with primary Hip OA obtaining good results at 12 months follow-up in terms of HHS, VAS, use of NSADs and better function.

THE INFLUENCE OF ACETABULAR AND PROXIMAL FEMORAL MORPHOLOGY ON THE FEMORAL NECK AND TROCHANTERIC FRACTURES

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Introduction: There are many studies about the relationship between hip fractures and proximal femoral morphology. But little attention has been paid to correlation between acetabular morphology and hip fractures.

Objectives: The purpose of the study was to investigate the importance of the acetabular morphology affecting the hip fracture pattern.

Methods: 60 Patients with hip fractures caused by low-energy trauma between September 2010-December 2014 were retrospectively reviewed. Male to female ratio was 0.46 (Male = 19, Female = 41). The mean age was 77.56 years ± 9.99 (ranged between 58-95 years). Radiographic analysis was made for the contralateral healthy hips. Acetabular depth and acetabular index were measured in true pelvis ap radiographs. Femoral neck/shaft angle (NSA), Hip Axis Length (HAL) and Cortical index (CI) were measured on the pelvic coronal CT images.

Femoral neck/shaft angle (NSA), was described as the angle between the mid-cervical axis and mid-shaft axis of the femur in coronal plane.

Hip Axis Length (HAL) was defined as the angle from the internal pelvic rim extending to lateral edge of the trochanter major in coronal plane.

Cortical index (CI) was defined as the ratio of the femoral intramedullary diameter to the ratio of the femoral intramedullary diameter, measured at 2 cm inferior to the trochanter minor in coronal plane.

Acetabular depth (AD) is calculated as the vertical distance from the deepest point of the acetabulum to a second line joining the tear drope and the medial edge of the acetabulum in coronal plane.

Acetabular index (AI) was defined as the angle between the horizontal line connecting inferior margins of bilateral tear drops and a second line extending along the acetabular roofs of the healthy hip in coronal plane.

Results: Higher age was detected in femur intertrochanteric fractures compared to femoral neck fractures. ($79,22 \pm 9,09$ vs $74,77 \pm 8,29$; $p < 0,036$).

No significant difference existed between femur intertrochanteric fractures and femoral neck fractures with respect to Neck Shaft Angle ($132,24 \pm 16,71$ vs $128,74 \pm 3,39$), Acetabular Depth ($11,38 \pm 1,77$ vs $11,43 \pm 1,95$) and Cortical Index values ($0,43 \pm 0,06$ vs $0,44 \pm 0,06$) ($p > 0,05$).

But Acetabular Index (AI) has been found significantly higher in patients with femur intertrochanteric fractures than in patients with femoral neck fractures ($37,95 \pm 2,35$ vs $32,57 \pm 4,02$; $p = 0,001$; $p < 0,01$).

Additionally, Hip-Axis Length (HAL) was lower in patients with intertrochanteric fractures than in patients with femoral neck fractures ($97,00 \pm 6,5$ vs $104,52 \pm 6,69$; $p = 0,001$; $p < 0,01$).

Conclusions: Acetabular and proximal femoral morphology including HAL and AI can provide valuable insight in prediction of different fracture types of the hip. These can be used for determine high-risk people for different hip fracture types. Comparative studies with large series are needed to clarify the predictive role of proximal femoral and acetabular morphology on the mechanism of different hip fracture types.

RETHINKING OF TIP APEX DISTANCE WITH A NEW CEPHALOMEDULLARY NAILING DEVICE (PFNA) FOR HIP FRACTURE FIXATION

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Introduction: Proximal femoral nail anti-rotation (PFNA) blade design compacts the cancellous bone in femoral head. This has been suggested to provide biomechanical advantage of reducing rotation and varus collapse.

Objectives: We sought to investigate the importance of tip apex distance for cut out in PFNA.

Methods: Between 2006 and 2014, 228 consecutive patients with unstable proximal femoral fractures were treated with the PFNA at a single institution. Retrospective review of prospectively collected clinical and radiological outcome data was performed. AO/ASIF classification system was used to classify the fracture pattern.

Results: 228 (60 males and 168 females) patients with a mean age of 81 (range 25-100) years were reviewed. The majority of the fractures belonged to AO/ASIF classification types 31A3.3 (77) and 31A2.3 (43). The mean tip-apex distance (TAD) was 22 mm (range 4-34 mm). Post-operatively, fifteen patients died within 30 days. Patients were followed up for a median time of 18.9 months. The PFNA blade cut out rate was 3.07%. The overall implant failure rate requiring revision surgery was 5.7%. The Kaplan-Meier 100 month survival for PFNA with TAD greater than 25 mm was 95% (CI 89 -100%) and 97% (CI:94 to 100%) for TAD <25 mm ($p = 0.4$).

Conclusions: Unstable proximal femoral fractures were treated successfully with the PFNA. Our series showed no statistically significant difference in PFNA blade cut out rate with TAD <25 mm and >25 mm. This suggests that the PFNA blade may be tolerant of TAD greater than 25 mm with a comparable survivorship in this cohort.

SHORTENING AND VARUS COLLAPSE AFTER FEMORAL NECK FRACTURES IN YOUNG PATIENTS

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Introduction: The treatment of femoral neck fractures in younger patients is controversial. Avascular necrosis of the femoral head and nonunion are potential complications specially in displaced fractures. Nevertheless functional result in these patients is based on the restoration of the anatomy of the proximal femur. We compared the varization and shortening of the femoral neck, in patients treated with cancellous screw fixation or with dynamic plate fixation.

Methods: We analyzed femoral neck fractures in under 55 year old patients treated at our institution between 2008 and 2013. Mean age was 43.6 years (range, 22-55) and mean follow-up of 29 months (range, 9-66). Fractures were classified according to AOTA, Garden and Pauwels classifications. Femoral neck shortening was assessed (<5 mm, 5-10 mm, >10 mm) as well as

varization (<5°, 5-10°, >10°) with relation with the unfractured hip. Euroqol-5D (EQ5D) questionnaires were employed for clinical results.

Results: Out of 52 patients were treated with internal fixation. 34 fractures were treated with cancellous screws and 10 with dynamic hip screw fixation. There were 23 undisplaced fractures and 21 displaced fractures. 15 fractures showed comminution of the medial cortex and 14 of the posterior cortex. The rate of avascular necrosis was of 6.8% (3 cases). There was not any non-union. Mean femoral neck shortening was of 3.6 mm (range, 0-18) and mean varus collapse was of 2° (range, 0-15°). Patients with severe shortening or avascular necrosis of their hip had significantly lower quality of life scores. We found a higher degree of varus collapse in patients treated with cancellous screws.

Conclusions: A large proportion of displaced and undisplaced femoral neck fractures fixed with cancellous screws heal in a shortened position and varus. This affects the functional result in this group of patients.

THE USE OF CABLE PLATING AND A SINGLE STRUT ALLOGRAFT IN THE TREATMENT OF PERIPROSTHETIC FEMORAL FRACTURES

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Introduction: As the number of primary hip arthroplasties has risen with an increasingly elderly population, there has been an inevitable rise in the number of peri-prosthetic fractures. The consequent burden on orthopaedic departments is predicted to increase dramatically over the coming years. This, in combination with increasing financial constraints, requires that we treat these patients successfully and efficiently as possible.

Objectives: Generally surgeons are guided by stem stability, bone stock and the type of implant before deciding on how to treat a peri-prosthetic fracture. We report a single-surgeon, single-centre series of 28 patients who had a peri-prosthetic fracture treated using a cable and single plate system combined with a single strut allograft and adjunctive bone grafting.

Methods: From a prospectively collected database we identified 28 consecutive patients who, between 2006 and 2015, had been treated by the senior author for a peri-prosthetic fracture that required open reduction and internal fixation. There were 13 males and 15 females, with an average age of 75.7 years. Patients were classified according to the Unified Classification System and Vancouver Classification System.

Results: The range of follow-up was three months to five years with a mean of 2.2 years. A total of six patients had died by the time this study was undertaken but all had achieved fracture union at final clinical follow-up. Overall, 27 of the 28 patients achieved fracture union within a year of surgery. An average Oxford Hip Score was 32 and Modified Harris Hip Score was 67. There were three complications: one failure of the construct, one infection, one patient with persistent thigh pain.

Conclusions: This method of "restoring the tube" by internal fixation is an effective method of treating this complex patient group and should be considered as a first line of treatment by revision arthroplasty surgeons in UCS B1 and certain C and D fractures.

THE EFFECT OF DELAY TO SURGERY ON OUTCOME AND LENGTH OF STAY FOLLOWING PERIPROSTHETIC FRACTURE AROUND THE HIP

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With the increasing prevalence of total hip arthroplasty and the increasing longevity of patients with implants in situ, periprosthetic fractures of the proximal femur are seen with increasing frequency. They represent a challenging surgical problem, requiring combined arthroplasty and trauma skills in a frequently compromised surgical bed. We present data from the 82 patients with periprosthetic fractures around the hip presenting to the Newcastle upon Tyne Hospitals Trust and the Northumbria Healthcare Foundation Trust in the period January 2009 to February 2014.

Inpatient mortality across all sites was 11.0%. This increased to 17.1% at 1 year. There was no association between delay to surgery and either inpatient or 1 year mortality. Mean delay to surgery was 4.1 days in those without inpatient mortality, 5.2 days in those with ($p = 0.3075$). Mean delay to surgery was 4.5 days in those with 1 year mortality, 4.16 days in those without ($p = 0.6203$).

The number of post-operative complications was not significantly positively correlated with increasing delay to surgery (Pearson correlation coefficient -0.04437). The mean length of stay was 34.9 days (range 4-136). There was no significant positive correlation between delay to surgery and overall length of stay (Pearson correlation coefficient -0.1191).

It would appear that a delay to order necessary equipment and obtain relevant surgical expertise for the treatment of these complex fractures is safe and not associated with increased mortality, length of stay or post-operative complications.

RESIDENTS' SESSION

PRIMARY THA AND COMPLICATIONS

ITALIAN VERSION OF UNIVERSITY OF CALIFORNIA AT LOS ANGELES (UCLA) ACTIVITY SCORE: CROSS-CULTURAL ADAPTATION

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Introduction: Orthopedic outcome measurements have usually focused on objective parameters such as radiographic measures or other technical aspects. However, these parameters are weakly correlated with the outcomes that are most relevant to patients. The UCLA activity score represents a reliable tool for assessing the level of physical activity and the return to sport high functional demand after hip arthroplasty.

Objectives: The aim of this research was to evaluate if the Italian cross-cultural adapted version of University of California at Los Angeles (UCLA) activity score is a statistically valid representation of the English version.

Materials and methods: We performed a cross-cultural adaptation and translation, as recommend by the World Health Organization and also by Guillemin and Beaton. The study was carried out on 65 patients (all male; mean age 55.86, range: 34-72; mean BMI 31.06, range: 22.21-39.71) suffering from hip arthritis, all of whom underwent hip resurfacing. We have used WOMAC also to assess responsiveness of our Italian version of UCLA.

Results: Our version of UCLA activity score has showed an excellent reproducibility (ICC = 0.994; C.I. = 989-997) and a good internal consistency (Spearman-Brown coefficient = 0.754). There was a good correlation between the test and retest results and the questionnaire proved good homogeneity in split-half test. The value of effect size for our version of UCLA activity score was 0.705. The ROC curve analysis has shown a value of AUC of 0.899 (95% CI: 0.83, 0.92) for our version of UCLA activity score and a value of 0.983 (95% CI: 0.99, 0.1) for WOMAC score. The standard error values were 0.032 for UCLA activity score and 0.014 for WOMAC.

Conclusions: The Italian version of University of California at Los Angeles (UCLA) activity score showed levels of reliability and validity comparable to the English version.

THE ARTHROPLASTY DISCHARGE SCORING SYSTEM FOR FAST-TRACK TOTAL HIP ARTHROPLASTY: A PILOT STUDY

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Introduction: During the last decade, fast track recovery programs have proven to be effective in total hip arthroplasty (THA) procedure in terms of reduction in length of hospital stay, morbidity, and convalescence. In order to ensure a safe discharge and to avoid early readmissions it is imperative to have well defined discharge criteria. However, there is no consensus regarding the definition of these criteria and there is no score described in literature that could help the clinician to define the time of discharge after a THA procedure.

Objectives: The aim of this study was to develop a comprehensive discharge scoring system specifically designed for the hip and knee arthroplasty population, that could guide the clinician in determining the optimal timing of safe discharge after surgery.

Methods: The Arthroplasty Discharge Scoring System (ADSS) is a comprehensive score that is based on 3 major criteria: medical status (hemoglobin level, mental wellness, vital parameters 45 percentile of ADSS), functional status (evaluated with a functional scale validated in a previous study 40 percentile of ADSS) and wound status (15 percentile of ADSS). Sixty-seven patients (38 males and 29 females) undergoing THA with a Fast Track protocol between January 2014 and July 2014 were enrolled in this study. The mean age was 62,7 years \pm 9.7 (range 39-79) and the mean BMI was 26.7 \pm 4 (range 18.75-38.06). The mean number of major comorbidities was 1,56 \pm 0.97 (range 0-3). All the patients underwent the same fast-track recovery program and were discharged if the ADSS was equal or major of 80 percentile. All the patients were clinically evaluated at 20 days, 3 months and 1 year after surgery. Readmissions and early office visits were recorded.

Results: Three patients were excluded from the study (two patients refused fast-track program, one patient had a bronchospasm episode during anaesthesia). During the hospital stay, 23 patients presented minor complications (nausea, hypotension, swelling, urinary retention) while 41 patients had no complications. The mean length of hospital stay was 3.1 days \pm 0.60 (range 2-3 days). No blood transfusion was required. At the final follow-up no patient had any hospital re-admission because of problems related to the surgery. Only 1 patient declared hospital re-admission because of nephrolithiasis after 3 weeks from discharge. Two patients needed an earlier office visit for pain control advices. The Harris Hip Scale (HHS) increased from a mean value of 52 \pm 16 (range 20-90) preoperatively to 91.41 \pm 4.5 (range 82-96) 12 months after surgery. The WOMAC score increased from a mean value of 47.54 \pm 16.73 (range 10-88) to 5.5 \pm 7.84 (range 0-30) 12 months after surgery.

Conclusions: The discharge scoring system represents a safe and helpful tool that allows for an earlier patient discharge after THA procedure. The use of this score allows for the majority of patients to be discharged within 3 days after surgery in safe and optimal conditions. From the result of this pilot study it will be possible to quantify the importance of every single item of the ADSS and to generate the final configuration of the score.

THE PUGLIA REGISTER OF HIP PROSTHETIC IMPLANTS. A FIVE-YEARS EXPERIENCE

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Introduction: The establishment of registers is now a requirement confirmed by the highest bodies responsible for the protection of public health. In Italy, the National Health Plan 2011-2013 called for the creation of registers of medical devices at higher risk, referring primarily to the implantable prostheses. The high number of joint replacement surgeries performed in our country - about 160,000 each year, with an impact on health care costs amounted to approximately 1.5% of the National Health Fund. In Puglia, a region in the south-east of the Country, with a population approximately of 5 million people, the Register of hip prosthetic implants is occupying a central role in the epidemiological and social care sectors. Set up in 2000, this register has evolved and in 2010 it overcame one of the main problems, also found in other registers, and that is the lack of cooperation of the doctors in preparing the survey data. This result was achieved through the voluntary participation in the registry that mandatory (Article 40 of Regional Law n. 4 of 25 February 2010). The advantage today is to possess a valid, and now fundamental tool for the prevention and protection of public health.

Methods: The orthopedic surgeons of the Puglia Units of Orthopaedics and Traumatology, where they are performed implantology prosthetic hip, compiled at the time of patient discharge or transfer to another Unit, a special form of data collection. The completed forms are sent to the Medical Department of the Hospital, who shall collect, verify the correspondence of the same with implantology carried out in the hospital and to send monthly Regional Epidemiological Observatory. The input of data and subsequent statistical analyses were performed by specialized personnel of the Regional Epidemiological Observatory, through the use of STATA software MP11.2.

Results: During the period 2010-2014 the Regional Epidemiological Observatory received 21,452 paper forms regarding prosthetic hips. 94.4%

(n. = 21,257) of the patients underwent surgery for primary arthroplasty and 5.6% (n = 1,195) for revision. In primary interventions, 13,026 (60.7%) were total hip arthroplasties and 7,231 (33.7%) were hemiarthroplasties. The average age of the patients undergoing hip replacement, involving females in 65% of the cases, was 73 years. The main causes of primary arthroplasty were fractures of the neck of the femur (47%) and primary osteoarthritis (44%); the most frequent cause for revision was aseptic loosening of the cup (28.5% of the cases). The direct lateral approach was reported to be used in 64.8% of the surgeries. 70% of the stems and 82% of the cups had a biological fixation. Polyethylene inlays, coupled with ceramic or metallic heads, were used in 85% of the operations.

Conclusions: Data recording of prosthetic hip implants continues to be of fundamental importance both for the patients, who can be traced quickly in the event of suspected complication, and the specialists, who have a considerable amount of information at their disposal.

IS THERE A ROLE FOR THE PERIARTICULAR INJECTION IN DECREASING POST OPERATIVE PAIN AND LENGTH OF INPATIENT STAY IN PRIMARY TOTAL HIP ARTHROPLASTY?

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Introduction: Total hip arthroplasty (THA) is the most common elective orthopaedic operation in the UK. Demand is set to rise with an estimated 174% increase by 2030.

The duration of inpatient stay represents a significant healthcare cost. Enhanced recovery seeks to address this by reducing pain, encouraging mobility. Periarticular injections have been utilised as one such technique to enhance pain relief.

Objectives: The primary objective of this review is to systematically review the literature and examine whether periarticular injection in primary THA reduces postoperative pain at 24 hours and facilitates a decrease in hospital inpatient stay.

Methods: The Ovid-Medline, EMBASE, CENTRAL & EBSCO bibliographic databases were searched using the terms "total hip replacement", "total hip arthroplasty" and "periarticular injection". Articles written in English & examining the effect of periarticular injection in primary THA population were included. Index procedures other than THA or a periarticular injection in the form of a continuous infusion post operatively, were excluded. Two independent reviewers using a standardised form extracted the data. Primary outcomes included visual analogue scale measurement of pain at 24 hours & average opioid consumption secondary to breakthrough pain at 3 days. The secondary outcomes included the average length of hospital stay after THA.

Results: 6 randomised controlled studies (RCTs) were identified, 4 studies were of evidence level 1 whilst 2 had evidence level 2. Our results demonstrate no difference between control and study groups in terms of post operative pain at 24 hours, $p = 0.78$, average length of stay, $p = 0.87$, or morphine consumption $p = 0.66$.

Conclusions: Our meta-analysis does not support the notion that the periarticular injection promotes a reduction in postoperative pain at 24 hours neither affects opioid consumption nor length of inpatient stay. However study quality is low and further prospective RCTs are required to validate these results.

HIP DIRECT ANTERIOR APPROACH – A NATURAL EVOLUTION. FROM WATSON-JONES TO ANTERIOR APPROACH WITH BIKINI LINE INCISION

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Introduction: Several surgical approaches are used in a total hip replacement surgery. Within this diversity of approaches there seems to be no superiority of one over another in terms of medium to long term results and classically is stated that the best results outcome using the approach that is commonly used by the surgeon. With the surgical techniques evolution towards minimally invasive surgery and with the achievement of total hip replacement surgery in patients increasingly young, the degree of achievement of results was clearly modified in the last decade as such did the ways to the several approaches. The anterior approach is a true minimally invasive (mini incision)

approach with the patient supine positioning that facilitates the correct placement of the implants. This position is less susceptible to variability (in the position of the hip) of the lateral decubitus.

Objectives: In this paper the authors seek to show their experience in the transition from an anterolateral approach to an anterior one, as well as the description of the surgical technique used in total hip arthroplasty.

Methods: During 20 years it has been used the Watson-Jones approach in supine position using fluoroscopy. Despite the good results (low dislocation rate and low rate of revision) the authors sought to optimize its results mainly due to iatrogenic lesions of the middle gluteal, trochanteric bursitis and the need for transfusion support in the vast majority of patients. In 2012 they began to use ASI approach (anterior supine intermuscular) and exposing the femur was found to be difficult. This difficulty resulted in frequent iatrogenic lesions of the tensor fasciae lata muscle, with few repercussions in function, but important ones in postoperative transfusion support and pain. Concerning this, the authors changed their approach, and instead of using the interval between the sartorius and the tensor fasciae lata (ASI), they began to use the lateral inter-muscular interval to the tensor fasciae lata. With an incision above the tensor, just similar to the ASI approach but spreading it in the middle and not laterally. This resulted in a better and easier femur exposure, without muscular iatrogenic injuries and a greater protection of the lateral femoro-cutaneous nerve. In 2013 the authors began using this approach but with a skin incision following the skin tension lines in the extension of the inguinal crease (bikini).

Results: Since the authors started using the bikini incision in supine position using fluoroscopy that they found some differences in relation to the previous approach. There is a reduced need for postoperative analgesia; no need for transfusion support; standing up in the first 24 hours; discharge on the third postoperative day without limitations in sitting and lying down (without the necessity of toilet lifts or pillows between the legs to sleep); march with just the 2 crutches during 2/3 weeks and without crutches 4/6 weeks; return to work in 12 weeks; greater satisfaction with the cosmetic of the scar (almost indistinguishable).

Conclusions: The ideal approach is the one that best takes into account the patient's expectations, in terms of satisfaction, and that allows the surgeon to place with ease and accuracy the implants to avoid complications and that allows a functional "joint" and with the greatest longevity possible. The anterior approach by bikini incision facilitates exposure of femur and increases the degree of patient's satisfaction. The inter-muscular approach allows better control of pain, of hematic loss and optimizes the function. The supine position facilitates the use of fluoroscopy thereby allowing precise placement of the acetabular component, stem scaling and control of dysmetria and off-set, that are fundamental to obtain a natural and durable as possible joint.

REVISION TOTAL HIP ARTHROPLASTY: DIAGNOSING PROSTHETIC JOINT INFECTION, IS HIP ASPIRATION CULTURE STUDY USEFUL?

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Introduction: A total of 89,895 Total Hip Replacements (THR) are done every year in UK (NJR, 2014). There is a predicted increase in the number of procedure by 0.6%. An increase in primary arthroplasty has predictably increased the need for revision. Hip aspiration study (HAS) is done before the revision surgery to guide the surgeons in diagnosis and the use of appropriate antibiotic in case of suspected prosthetic joint infection (PJI).

Objectives: HAS necessitates patient to be admitted for a day, involves a lot of multidisciplinary team effort and planning before the procedure. The study was planned to see if there is any justification to the added cost and logistic for the HAS in cases of suspected PJI.

Methods: Retrospective analysis of data of patients who had revision THR in 2014. The data were collected from electronic patient records. Of 286 patients who underwent revision THR, 51 patients were subjected to hip aspiration for suspected infection. 3 patients (6.25%) had dry tap, so a total of 48 patients were included in the study.

Results: 3 patients (6.25%) were aspirate positive, intraoperative culture positive and treated with antibiotics. True positive was 3(6.25%). 45 patients had negative aspiration culture (93.75%). 21 out of the aspirate negative patients were intraoperative culture positive, so false negative was 21 (43.75%). True negative was 24 (50%). Sensitivity of hip aspiration study in

our series is 12.5%, specificity is 100%. Positive predictive value is 100% but negative predictive value is 53.33%

Conclusions: Diagnosis of prosthetic joint infection can be challenging. Our series of hip aspiration studies for PJI showed low sensitivity and low negative predictive value. The results were not encouraging to consider hip aspiration culture study as a routine diagnostic procedure for PJI. Considering the small number of patients in our study more research with larger series would be needed to validate this claim.

THE USE OF SYNOVASURE® PJI IN THE DIAGNOSIS OF PERIPROSTHETIC JOINT INFECTIONS: FIRST EXPERIENCES

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Introduction: Periprosthetic joint infection (PJI) is considered one of the most feared causes of implant failure. In the diagnostic workup are often used test with a low specificity or sensitivity. The alpha-defensin is an antimicrobial peptide released by neutrophils in response to pathogens and it is an ideal biomarker for the diagnosis of PJI. It is now possible to verify the presence of alpha-defensin in periprosthetic synovial fluid with an ELISA (Synovasure® PJI, Zimmer) that provides results in 10 minutes, with a sensitivity of 97% and a specificity of 96%, without being affected by systemic inflammatory diseases or by the assumption of antibiotics.

Objectives: The purpose of this study is to assess the applicability and reliability of Synovasure® PJI, correlating its results with microbiological analyzes, laboratory tests and imaging studies of the patient.

Materials and methods: The test can be performed either during surgery or during the diagnostic iter, through the execution of an arthrocentesis. The synovial fluid is partly used for Synovasure® PJI and partly put in culture for microbiological analyzes.

Results: Up to now we have full results in 10 patients (11 implants). In four cases, the test showed the presence of alpha-defensin in the synovial fluid, while in seven cases the test results were negative. In case of negative test culture of synovial fluid showed no growth of microorganisms that could indicate the presence of false negatives. All patients with positive test have arthrocentesis positive for pathogenic microorganisms.

Conclusions: New synovial markers such as alpha-defensin and rapid ELISA tests for their dosage open new horizons in the diagnosis of periprosthetic infections.

Thanks to the quick response and the ease of execution the test can be used both during the diagnostic iter and during the revision surgery helping the orthopedic to apply the most appropriate measures to each case.

ATYPICAL THR INFECTIONS, MANAGEMENT

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Periprosthetic joint infections are one of the most dreaded and complex complications of total joint arthroplasty, with fungal infection accounting for less than 1% of the cases. Treatment is challenging due to the lack of scientific evidence.

We report a case of a *Candida albicans* total hip arthroplasty (THA) infection and performed a review of the literature.

We report a case of a 79-year-old woman with an early THA infection (less of one month) from the primary surgery.

She presented with pain and serous drainage from the operative wound and for that was submitted to surgical debridement and revision of polyethylene. Cultures were taken (sterile) and empirical vancomycin and rifampicin treatment was initiated.

Because of persistent complains and drainage, the patient was submitted to another surgery. Cultures were taken at the time of surgery. A cement spacer impregnated with gentamicin was placed after implant removal.

Cultures isolated *Candida albicans*. In light of this new evidence fluconazole was added to the previous scheme.

After introduction of fluconazole, the clinical evolution was good. Drainage stopped 1 week after, and the wound closed. The inflammatory markers became normal shortly after. Leg pain became better.

The patient was given oral suppressive treatment with fluconazole and was discharged, weight bearing as tolerated.

A total of 4 months of treatment is programmed with close follow-up, until the second staged revision is programmed.

Prosthetic fungal infections are rare with most of the published articles being case reports.

A substantial delay in diagnosis may occur because culture results are sometimes interpreted as contamination and there is a need for obtaining multiple samples, prolonged culture, and special staining.

The best results are being reported with a long period of oral antifungal treatment and a two staged joint revision but there is an absence of standardized clinical and evidence-based treatment guidelines

UNCOMMON SURGICAL SOLUTIONS TO TREAT LOWER LIMBS DISMETRIES EXCEEDING 4 CENTIMETERS, SUBSEQUENT TO MULTIPLE PROSTHETIC FAILURES

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Introduction: Multiple prosthetic revisions represent a complex field in Orthopaedic practice. Surgeons should manage in the same time various complications related to previous prosthetic failures, such as infections, post-surgical dysmetries, inadequate bone stock.

Objectives: Aim of this work is to present new technological solutions available for selected patients affected by lower limb discrepancy exceeding 4 cm, secondary to multiple prosthetic failures.

Methods: Authors present two uncommon technological solutions to treat lower limbs dismetries exceeding 4 centimeters, subsequent to multiple prosthetic failures. One patient received a prosthesis with iliac stemmed cup, the other a femoral electromagnetic expandable prosthesis.

Results: One patient recovered 5,5 cm over 7 of femoral dismetry; in the other the inadequate acetabular bone stock was compensated with a modular prosthesis. None reported intraoperative and postoperative complications. At last follow up (4 years) the lower limbs alignment was maintained, allowing the patients return to autonomous deambulation. Radiological findings show no peri-prosthetic loosening or mobilization.

Discussion: In selected cases, adoption of innovative surgical solution allowed to restore the limb length, avoiding amputation. Despite multiple prosthetic failures and several related complications, patients regained lower limb deambulative functions.

Conclusions: The described surgical solutions are characterized by elevate costs. An accurate patient selection, allows to limitate adoption of these technological prosthesis in cases which can not be treated otherwise in a cheapest manner. In the described cases, the adoption of these prostheses allowed to treat severe lower limb dismetries.

RESIDENTS' SESSION

PRIMARY THA AND TRIBOLOGY

BODY MASS INDEX, WOUND FAT DEPTH AND RADIOGRAPHIC ACETABULAR INCLINATION IN TOTAL HIP ARTHROPLASTY

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Background: The prevalence of being overweight (BMI>25) and of obesity (BMI>30) is increasing in the general population. Associations have been made between being overweight and the incidence of osteoarthritis and the need for arthroplasty surgery for large joints. In particular THA is considered particularly challenging in obese patients due to the difficulty with acetabular exposure and acetabular component placement. There is evidence that component malposition and in particular a high acetabular inclination is associated with an increased risk of complications and a poor outcome after THA. The aim of this study was to investigate if patient BMI or the fat depth of the hip wound were a risk factors for a high acetabular component inclination following THA.

Methods: A systematic review and critical appraisal of relevant identified literature was performed to assess what other studies had found on the affect

of BMI or Fat depth on component orientation. Retrospective analysis of a consecutive series of 311 THA patients was then performed collecting their pre-op BMI, intraoperative hip wound fat depth and measuring the inclination of the acetabular component on the postoperative check x-ray. In all cases the acetabular component was inserted using a straight handled introducer through wound lengths which range from 12-14 cm. Analysis was then performed to assess if increasing BMI or fat depth were risk factors for a high acetabular inclination.

Results: The literature review found mixed results with only two out of the six papers finding a statistically significant effect of BMI on component orientation. No studies were identified that measured the effect of wound fat depth on component orientation. In our own study only weak correlations were found in the Pearson's Correlation analysis showing an R_2 value of 0.08 for BMI and 0.035 for fat depth. An independent *t*-test showed that the mean acetabular component inclination was higher for patients with a BMI of 25 kg/m² or more (mean = 42.44°) compared to patients with a normal BMI (mean = 39.09°) (*P* = 0.026).

Conclusions: Obesity is an increasing problem for hip arthroplasty surgeons and optimal component orientation is vital to give the patient the best chance of a good outcome from surgery. BMI appears to be a greater risk factor than wound fat depth for a high acetabular inclination after surgery. This suggest that the problem may not be as simple as impingement of the introducer handle on the soft tissue in obese patients and findings may be related to the movement of the pelvis during surgery.

METAL ON METAL TOTAL HIP REPLACEMENT: OUR EXPERIENCE AT MID-TERM FOLLOW-UP

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Introduction: The metal-on-metal in hip arthroplasty is the result of over one and a half decades of research, from which, in 1988, the acetabular component Durom® (Zimmer USA) originated and employed, designed for patients with high functional requirements so as to guarantee preservation of bone stock, a high range of motion and a long-lasting implant. Although wear debris is lower to that found in implants made of other materials, recent studies have, however, underlined the risk of possible local and systemic (A.R.M.D.) toxicity, mediated by immunological and non-immunological mechanisms. The literature is controversial and the scientific debate is still open.

Aim of the present study was to assess the state of health of patients who have undergone metal-on-metal hip replacements, by means of radiological and clinical assessments and of evaluation of heavy metals in blood and urine.

Materials and methods: The study group consisted of 13 patients (9 male and 4 female, aged between 35 and 75) who underwent hip replacement surgery between January 2005 and December 2007 with metal on metal Durom® components. The clinical follow-up obtained by using the Merilè-D'aubigne Postel (MDP) score, and radiological evaluations, were carried out at 1, 3 and 6 months during the first year, and successively, annually. During 2014-2015 all the patients were called to undergo radiological and clinical studies, and evaluation of chromium and cobalt levels. The mean follow-up was 9 years (range 10-8 years).

Results: The radiological follow-up showed 12 patients with a stable implant and no signs of loosening, periprosthetic osteolysis or tissue reactions. Clinical evaluation showed average MDP values of 12 (excellent rating). The relative average blood values for chromium and cobalt was 5.19 µg/L and 4.36 µg/L respectively, whilst urinary values were 4.01 µg/L and 6.83 µg/L. One failure case with metallosis was recorded and required subsequent revision.

Discussion: According to our results, blood and urinary concentrations differed somewhat from the average values reported in literature (2 µg/L in non-mobilized prosthesis), which, instead, referred cases of systemic toxicity with levels above 200 µg/L. All studies, however, confirm that stationary values are reached in 1-2 years.

Conclusions: The follow-up of the present study shows the good results of the implant in the medium term; local and systemic toxicity has been not observed according to the normal blood-chemical values and absence of systemic pathologies. Moreover, the heavy metal values were similar to those reported in the literature. Strict long term monitoring and observational epidemiological study are worthwhile.

METALLOSIS IN TOTAL HIP ARTHROPLASTY: AN EXPERIMENTAL COMPARATIVE STUDY IN THREE DIFFERENT BEARINGS

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Background: The total hip arthroplasty with metal-on-metal bearings, especially when using large diameter femoral head, has already aroused problems of biocompatibility in 2010 for the high rates of revision to short-middle term and the numerous cases of Adverse Reaction to Metal Debris (ARMD). The interpretation of metal ion concentrations and their role in clinical management of patients with metal-on-metal implants is still controversial.

Objectives: This is a prospective and comparative study investigating patients with 3 different kinds of bearings: Metal-on-Metal, Ceramic-on-Ceramic and Tribofit®. The blood and urinary levels of metallic ions have been compared considering the three groups of prosthesis, analyzing the correlations between the concentrations of the metallic ions and various mechanical and biochemical parameters, in order to identify the patients with greater risk of ARMD. Therefore it's necessary to monitor these patients on a long term follow-up with the aim to identify an increased risk of metal ion release and if these blood and urinary levels measured change over time and if/how they are influenced by renal function.

Methods: This study involved 127 patients: 52 with MoM THA, 25 with Tribofit THA and 50 with CoC THA. Blood and urine metal ions levels were assessed and patients were evaluated with orthopedic examination, Harris Hip Score (HHS), SF-36 and with standard Radiography in anterior-posterior and lateral projections. Patients with MoM and Tribofit bearings were followed with follow-up at 2 years with checks every 6 months, while the CoC group, as control group, was followed for 2 years as well but with a check-up at recruitment and at 24 months. Patients at high risk for metal ion release had also additional assessments on a quarterly basis from recruitment.

Results: All types of arthroplasty are well functioning; HHS and SF-36 did not demonstrate statistically significant differences among the three prosthetic types. The protocol for patients monitoring was effective and allowed to identify 3 cases of ARMD in the MoM group at an early stage; these patients underwent prosthesis revision. The levels of metal ions were statistically higher in the MoM than Tribofit and CoC arthroplasty, but we haven't identified certain correlations between the mechanical and bio-clinical parameters and the increased risk of high release of metal ions. The measurement of urinary Chromium and Cobalt ions was also more related to the relative blood levels when corrected by creatinine.

Conclusions: The decisional algorithm used during the follow-up was effective and identified patients with ARMD in the MoM group at an early stage. Cobalt and Chromium ions release from MoM implants was significantly higher than the other two groups; however the research of mechanical and bio-clinical parameters that can predict in advance the failure of the prosthesis didn't lead to unequivocal conclusions. The end of the two-year follow-up of all patients recruited will be useful for a better interpretation of these preliminary data. As regards the risk - benefit ratio among the three types of prosthesis considered, the Tribofit prosthesis performed poorly from mechanical and functional point of view, so even today the prosthesis with CoC bearing is indicated in the elderly as well as in patients with less than 70 years, because of the disadvantageous risk - benefit ratio of the MoM bearing despite its greater resistance.

THE DIRECT ANTERIOR APPROACH TOTAL HIP ARTHROPLASTY LEARNING CURVE: EVALUATION OF THE FIRST 70 CASES

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Introduction: The direct anterior approach (DAA) for total hip arthroplasty (THA) has the advantages of using intermuscular and internervous planes which allows faster recovery, less pain after surgery and low dislocation rates. However there is some concern about long learning curve and the high number of complications induced by the technique.

Objectives: The aim of this study was to prospectively analyse the learning curve for the DAA performed by a single surgeon experienced in direct lateral approach.

Methods: 70 consecutive patients underwent DAA THA on standard operative table from November 2014 till august 2015. There were 67 primary arthroplasties, 2 avascular necrosis and 1 femoral neck fracture. 36 patients were

treated with Biomet Exceed Exception, 23 with Zimmer Allofit Fitmore and 11 with DePuy Pinnacle Corail prosthesis type. Operating time, blood loss, number of transfusions, peri-operative complications and hospitalisation time were assessed. Patients were evaluated with the Harris Hip Score (HHS) before, 1 and 3 months after surgery. Radiographs were done immediately after surgery and at the follow-ups, in order to assess positioning of the components. The average follow up period was 5 months.

Results: Average operating time was 76 min (range 45-115 min), blood loss 371 ml (range 100-900 ml), number of transfusions 0.5 (range 0-4) and post-operative hospitalisation 5.3 days (range 3-26 days). We had 5 major surgical complications: early deep infection, intraoperative calcar fracture, dislocation, partial n. femoralis palsy and femoral component subsidence. HHS improved from 56 preoperatively to 85 at 3 month follow-up. Average cup inclination was 43° and anteversion 15°.

Conclusions: Graphical analysis of the results showed that we have reached the learning curve plateau. Comparison with the data available in the literature is satisfying, so we will continue to use DAA as our main approach for THA.

IS MINIMALLY INVASIVE ANTERIOR APPROACH TO THE HIP RELATED TO HIGH RISK OF HETEROTOPIC OSSIFICATION? A CLINICAL AND RADIOGRAPHIC ASSESSMENT

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Introduction: Giving the increasing request for tissue-sparing surgery, which is the best surgical approach for total hip replacement, is object of debate. One of the main concerns is: are they really respectful of muscle tissues? Periprosthetic heterotopic ossification (HO) is considered as an indirect sign of muscle damage.

Objectives: The aim of this study is to evaluate the incidence of heterotopic ossification using the minimally invasive direct anterior approach (DAA) to the hip. We evaluated clinical and radiological outcomes as well as the relationship with the type of stem used.

Methods: 203 patients, who underwent to total hip arthroplasty using DAA, were evaluated at least after 10 months from the operation. A clinical and functional assessment was performed using pre and postoperative Visual Analogue Scale (VAS) and Harris Hip Score (HHS). A t-score statistics was used. The evaluation has been completed with the research of HO at the pelvis radiographs. HO was classified according to Brooker's. Patients were also divided in three groups in relation to the type of stem: straight, anatomical and short stems.

Results: HO was observed in 44/203 patients (21.6%). 13.6% was classified as "mild/moderate" and 86.4% as "severe". There was no relationship between clinical results and severity of HO. As regards the type of stem, straight stems developed HO in 26.4% of cases, mini stems in 25.8% and anatomical stems in 17.0% (p>0.05).

Conclusions: Incidence of HO using DAA is slightly lower than traditional approaches. We have not noticed a statistically significant reduction in developing HO using short stems and no relationship between HO severity and clinical outcome was observed.

CLINICAL AND FUNCTIONAL OUTCOMES FOLLOWING PRIMARY TOTAL HIP REPLACEMENT USING A MINIMALLY INVASIVE LATERAL APPROACH

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Introduction: In order to improve patient outcomes and satisfaction rates, minimally invasive surgery (MIS) for total hip replacement (THR) has been introduced and is increasing in popularity. However, current MIS techniques involve specialist instrumentation and unfamiliar approaches which require substantial training.

Objectives: The aim of this study was to evaluate the clinical and functional outcomes of patients undergoing THR via a simple MIS modification of a familiar lateral approach to the hip without the use of specialist equipment.

Methods: A retrospective review of 65 consecutive patients undergoing THR for degenerative arthritis via a MIS lateral approach between 2011 and 2012 was performed. Primary outcome measures were the Oxford Hip Score and Visual Analogue Score. Secondary outcome measures were operating time, blood loss, length of hospital stay and complications.

Results: Data for 51 patients was available at a mean follow-up of 28 months (range, 18-40 months). Patient demographics include a mean age of 74 years (range, 51-92), 45 female patients, 37 right-sided THRs and 49 cemented THRs.

The mean Oxford Hip Score was 45 out of 48 (range, 38-48) and the mean Visual Analogue Score was 0.5 out of 10 (range, 0-5). The mean operating time was 108 minutes (range, 50-165). Blood loss was estimated by a mean drop in haemoglobin by 26 mg/dL (range, 9-46), a mean drain output at 24 hrs of 253 mls (range, 30-600) and transfusion requirement in six patients (9%, mean 2.5 units). Mean hospital length of stay was 5.6 days (range, 2-21). Overall, there were 3 complications (4.6%), which included a symptomatic deep vein thrombosis, a chest infection and a sciatic nerve palsy. There were no re-operations or revisions for any cause.

Conclusions: The results of this study confirm that our technique provides excellent functional outcomes and pain relief. In addition, the results show that this is a safe approach with an acceptable hospital length of stay and complication rate.

EARLY RESULTS OF A CONSERVATIVE HIP STEM

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Introduction: Different conservative stems are available for primary cementless total hip arthroplasty (THA). The aim of this preliminary study is to assess short-term results of the GTS femoral stem (Biomet) for THA.

Patients and methods: For this retrospective study of prospectively collected data, 40 patients (28 males, 12 females) who received a THA with a GTS femoral stem from 2011 to 2013 were evaluated. The mean age at the time of surgery was 48.5 years (range 31-81). All patients were operated by one surgeon with a postero-lateral approach. Etiology: 30 osteoarthritis (19 primary, 6 post-traumatic, 5 post-dysplastic) and 10 AVN of the femoral head. A press-fit hemispheric titanium acetabular component was used in all cases. Tribology: 32 ceramic on polyethylene, 8 metal on polyethylene. The mean follow-up was 26.3 month (range 15-40 months). All patients were assessed preoperatively and at the last follow-up with two patient-oriented instruments, the Harris Hip score (HHS) and WOMAC questionnaires. As a part of routine care, radiographs were obtained preoperatively and at set intervals (One day postoperative, 6 months postoperatively, 1 year postoperatively, and annually thereafter) and evaluated for any radiolucencies or osteolysis in Gruen zones, heterotopic ossifications (Brooker scale), and stem subsidence.

Results: The mean HHS increased from 44 points (range 17-61) before surgery to 91.3 points (range 82-99.7) at the last follow-up (P<0.001). The disability according to mean WOMAC Score decreased from 61.8 before surgery (range 32-100) to 9.2 (range 0-47) at the final follow-up (P<0.001). Thirty-eight patients (95%) were fully satisfied with their result. The radiographic analysis at the last follow-up showed non-significant radiolucencies (less than 1 mm of width) in 3 cases (2 Gruen zone 1 and 1 in Gruen zone 5). Heterotopic ossification was present in 1 hip (Brooker 1). No stem showed subsidence of more than 5 mm at the time of final follow-up. No implant-related complication was diagnosed in this series. No implant showed radiographic loosening or was revised for any reason.

Conclusions: Short term subjective clinical outcomes and radiographic results of the GTS femoral stem are excellent and comparable with published data for contemporary cementless stems. The level of post-surgical satisfaction was high in this study group.

NEW DESIGN FOR DOUBLE TAPERED STEM (MODULUS R): PRELIMINARY RESULTS

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Introduction: The project of a modular, double-tapered stem born from the need to obtain primary stability and correct osseointegration in patients with developmental hip dysplasia, or proximal femoral dysmorphism requiring a



femoral shortening osteotomy or presenting characteristics of non-adaptability to single-tapered or straight stems. Such an implant could also be employed in femoral nail failures, or lateral femoral neck fractures requiring prosthetic substitution.

Objectives: The aim of the study is to evaluate preliminary clinical and radiological results of Modulus-R stem trough periodic follow-up.

Methods: Thirty-one double-tapered modular stems were implanted between December 2013 and April 2015. Modular necks with cervico-diaphyseal angle of 125° or 135° (short or long) were implanted, to preserve the correct centre of rotation and femoral offset. The preoperative diagnosis was: 14 primary osteoarthritis (Grade III-IV), 7 medial or lateral hip fractures, 3 evolutive hip dysplasias, 7 THA revisions for aseptic loosening. Mean age was 61 years (17-94). All patients underwent to clinical (HHS-VAS scale) and radiological follow-up, evaluation of periprosthetic calcifications, osseointegration of the implant at two levels of taper and subsidence.

Results: Implanted stems respected pre-operative planning. Preoperative HHS was 42 (32-58), last follow-up was 84 (55-92), VAS scale reduced from 8.7 (5-10) to 3.8 (2-7). Radiological evaluation showed a good contact bone-stem at two levels of taper, a correct alignment of the stem, no calcifications and all stems had subsidence lower than 5 mm. No microfractures, either intraoperative or following stress testing, were evidenced. Modular neck allowed to restore correct biomechanical parameters of the hip.

Conclusions: The double-tapered prosthetic stem showed good implantability, also with the ability to allow a good stability in case of femoral shortening osteotomies without use of plates or wires fixation. It could be a good solution for dysmorphic femurs or for THR revisions that require a good distal fit and proximal fill. Prospective clinical studies are necessary to assess efficacy with longer follow-up.

SURVIVAL ANALYSIS OF PRIMARY TOTAL HIP ARTHROPLASTY WITH TRABECULAR METAL CUPS: A SINGLE CENTRE EXPERIENCE AND SYSTEMATIC REVIEW OF THE LITERATURE

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The primary aim was to compare revision/survival rates for primary total hip arthroplasty (THA) with a modular Trabecular Metal (TM) cup (Zimmer, Warsaw, IN, USA) at our institution with revision/survival rates for primary THA with a monoblock TM cup or a modular TM cup documented in published articles and in national registry reports. The primary measure was revisions per 100 observed components years.

We first analysed 1001 consecutive primary THAs performed at our institution between 2003 and 2008 using the modular TM cup in combination with the SL-Plus stem (Smith & Nephew Orthopaedics, Rotkreuz, CH). A systematic search of studies in the PubMed and Cochrane Library databases reporting results with the monoblock or modular TM cups was then conducted. Finally, we searched national registry reports for data on the TM cups.

At our institution, there were 0.1 revisions per 100 observed components years, with cup revision as the endpoint, and 0.2 revisions per 100 observed components years with any component revision as the endpoint. Based on data pooled from published articles, we calculated a value of 0.1 revisions per 100 observed components years for THAs performed using the monoblock TM cup. This value was not significantly different from that calculated for our cohort ($p > 0.5$). For the modular cup, the published articles did not provide enough information to calculate the number of revisions per 100 observed components years. Data pooled from the Australian and the New Zealand registry reports yielded a revision rate of 1.0 revisions per 100 observed components years, with revision of any component for any reason as the endpoint. This value was significantly higher than that calculated for our cohort ($p < 0.001$). The two registries did not document the type of the cup design (i.e., monoblock or modular).

In conclusion, we found very low revision rates for the modular TM cup at our institution. They are in line with those on the TM cups documented in published studies, and lower than those recorded in registry reports.

RESIDENTS' SESSION REVISION

A MINIMUM OF 10-YEARS FOLLOW-UP OF THE BURCH-SCHNEIDER CAGE AND BULK ALLOGRAFTS FOR THE REVISION OF ACETABULAR BONE LOSS

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Introduction: Revision of the acetabular component of a total hip arthroplasty (THA) with associated bone loss is a complex challenge, due to the difficulty to obtain a primary stability and to reconstitute periprosthetic bone stock.

Materials and methods: Between January 1992 and December 2000, 97 hips with periprosthetic acetabular bone loss in 94 patients were revised using bulk allografts and the Burch-Schneider APC. Sixty-five hips in 65 patients were available for retrospective evaluation at an average of 14.6 years (range, 10.0 to 18.9 years) postoperatively. They were 16 males and 49 females, with a mean age at surgery of 60 years (range, 29 to 83 years). No case was lost to follow-up. The indication for revision surgery was painful aseptic loosening of the cup with extensive acetabular bone loss in 62 hips.

Results: The average Harris hip score improved from 33.1 points preoperatively to 75.6 points at follow-up ($P < 0.001$). Radiographically, graft incorporation and cage stability were detected in 48 and 52 hips, respectively. The cumulative survival rates at 18.9 years with removal for any reason or X-ray migration of the cage and aseptic or radiographic loosening as the end points were 80.0% and 84.6%, respectively.

Discussion: Acetabular reconstruction with the use of the Burch-Schneider antiprotusio cage and bulk allografts has to be considered as a reliable procedure to manage severe periprosthetic deficiencies, enabling restoration of vital bone stock and providing highly successful long-term outcomes after revision arthroplasty.

TRABECULAR METAL FOR ACETABULAR DEFECTS IN HIP REVISION SURGERY. SHORT TERM CLINICAL AND RADIOGRAPHIC EVALUATION

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Introduction: The management of acetabular bone defects presents a challenge in revision total hip arthroplasty (THA). Porous tantalum acetabular implants provide a potential solution for dealing with significant acetabular bone loss. Tantalum acetabular implants are characterized by higher friction, higher porosity, and greater osteoconductivity than titanium mesh or chrome-cobalt beads.

Aim: The aim of this study was to assess the early clinical and radiological outcome of revision of acetabular components using trabecular metal (TM) cups and augments for acetabular reconstruction.

Material and methods: The study included 30 consecutive patients, 15 males and 15 females, with failed acetabular components after total hip arthroplasty. Mean age at the time of surgery was 67,5 years. Median follow up was 18 months (range, 12-24 months). All patients had conventional radiographs in anteroposterior (AP) view of the pelvis and lateral view of the hip in both preoperative and follow-up evaluations. According to Paprosky classification a Type II (10 IIa, 7 IIb, 7 IIc) defect was found in 24 hips, whereas a Paprosky type III (4 IIIa, 3 IIIb) defect was present in 7 hips. 16 patients had CT and Angio CT scan of the pelvis. All 30 patients underwent revision THA surgery using a trabecular metal acetabular shell, whereas in 6 cases augments were associated. In 3 cases were required cages. Patients were clinically evaluated according to Western Ontario and McMaster Universities scores at 1 month, at 6 months and then at 1 year. Radiological evaluation investigated the restore of hip center of rotation, and signs of radiolucent lines and loosening.

Results: At the most recent follow-up, 19 patients showed excellent results according to the WOMAC score, whereas 11 patient showed limitation in gait and function. The acetabular components and augments appeared osteointegrated, and no sign of loosening and radiolucent lines were found. There were no cases of hip dislocation.

Conclusions: Based on these early clinical and radiological results, TM acetabular components and augments for acetabular defects (Paprosky II and III) appear to be a promising solution for this complex situation. We continue to monitor these patients, and a larger series with longer follow-up will be required to determine the long-term outcome of these augments.

THE ROLE OF TMT AND THE BONE DEFECT MANAGEMENT IN THE ACETABULAR REPLACEMENT

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Introduction: Acetabular component loosening is the main cause of total hip arthroplasty revision in long-term studies. Acetabular loosening usually occurs as a result of the implant fixation failure, due to the micromovements that occur between the prosthesis and the bone. In these cases, there are many issues that must be resolved but the principal is to manage a poor bone stock and accidental bone defects. For these reasons it could be very hard to obtain an effective primary stability, but especially to achieve a good secondary osseointegration.

Methods: From March 2011 to July 2014, 86 patients (mean age: 71 years; male: female ratio 2,1:1) with prosthetic acetabular component loosening, underwent to a revision surgery using TMT acetabular component. In 29 patients was also associated a femoral revision. All patients were preoperatively classified according to Paprosky score. A clinical (Harris Hip score and Merle Daubigné-score) and radiographic follow-up (Benson and Gill classification) was performed at 1, 3, 6, 12 and 24 months post-operative. At month 36 a CT scan with 3D reconstruction and analysis of chrome-densitometry was obtained. The mean follow-up was 52 months.

Discussion: One of the most important factors which can limit the integration is the low porosity of the implants that were commonly used until now. In order to overcome this problem, new materials were developed to achieve prosthetic components with high power of osseointegration. Trabecular Metal (TM) is a highly porous material (80%) made of porous tantalum. The TM appears to be an ideal material for its integration properties, if compared with the porosity of the others conventional cups (30%). The average diameter of the pores is 550 microns. This is the optimal size in order to allow the osseointegration and it is affine to the size of the bone trabeculae. The TMT modulus of elasticity is very similar to that of cancellous bone and compact and is significantly different from that of titanium and alloy Co-Cr. Another fundamental property is the high friction coefficient (against the bone cortical and cancellous bone) that results from 40% to 80% higher if compared to other porous coatings.

Results: To date, no patients were subjected to a further revision and there were no cases of infection. During the observation period, no early mobilization radiographic signs were detected. The patients to walk independently and only 6 make daily use of aids for walking.

Conclusions: In our experience, the use of the cup in tantalum reduced the use of bone grafts. The cup should seek the support on the wall acetabular and partly act as "bone grafting" which will be integrated.

LATE RESULTS OF ACETABULAR IMPACTION GRAFTING IN REVISION HIP REPLACEMENT USING WHOLE FEMORAL HEAD ALLOGRAFT AND RETAINING THE ARTICULAR CARTILAGE

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Introduction: Acetabular reconstruction with impaction bone grafting and a cemented polyethylene aims to reconstitute the bone stock in hip revision. This is an effective but, resource intensive and time consuming technique. Most surgeons remove the articular cartilage from the femoral head allograft.

Objectives: The aim of this study is to reproduce the results using the whole femoral head with the articular cartilage for acetabular impaction grafting.

Methods: 42 acetabular revisions using impacted morselised bone graft retaining the articular cartilage and a cemented cup performed with trochanteric osteotomy were studied retrospectively. The mean follow up was 8.3 years (range, 4-14 years). Clinical and radiological assessment was made using the Oxford hip score, Hodgkinson's criteria (1988) for socket loosening and the Gie classification (1993) for evaluation of allograft incorporation.

Results: 75% of the sockets were considered radiologically stable (type 0, 1, 2 demarcations), 15.6% were radiologically loose (type 3 demarcations) and 9.4% presented socket migration. 61.4% of the cases showed good trabecular remodeling (grade 3) and 15.6% showed trabecular remodeling (grade 2). 6 patients were lost to follow up. Mean preoperative hip score was 41 and post operative hip score was 21. There were 5 (11.4%) trochanteric non unions, one (2.3%) periprosthetic femoral fracture, one (2.3%) dislocation and four (4.1%) cases of asymptomatic heterotopic ossification. The Kaplan-Meier survivorship at a mean of 8.3 years for all reasons of failure was 95.5% (95% CI between 8.1 and 10.4).

Conclusions: At a mean follow up of 8.3 years results with the aforementioned technique are comparable to other major studies. Particularly when the supply of allograft and operative time are limited retaining the articular cartilage of the femoral head is a safe and effective alternative to be considered.

DUAL MOBILITY ACETABULAR COMPONENTS FOR REVISION OF METAL ON METAL TOTAL HIP ARTHROPLASTY

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Introduction: Revision of metal-on-metal (MoM) total hip arthroplasty (THA) is associated with high complication rate and dislocation in one most relevant. Probably the reduction of the diameter and offset of the femoral head may produce an inadequate soft tissues tension. The introduction of a nonconstrained dual-mobility cup was designed to improve prosthetic stability without increasing loosening rates, but it is unclear whether the risk of dislocation is reduced. The purpose of this study was to report early results, complications, and clinical outcomes in revision THA for large MoM articulations using the dual-mobility liner.

Material and methods: We prospectively followed 23 selected patients who underwent metal on metal acetabular revisions. In 18 patients a fully cementless trabecular titanium (TT) acetabular modular implant (Delta Trabecular Titanium, Limacorporate, Udine, Italy) was implanted. 15 of them without flanges and 3 with flanges which were screwed in the ilium. In 5 five cases it was possible to revise only the metal femoral head which was converted to a double mobility insert. We determined Harris hip (HHS) and WOMAC scores and examined radiographs for migration, loosening, and osteolysis.

Results: There were no dislocations. We had one infection. At final follow-up, the mean HHS increased from 58 points preoperatively to 89 points. No patients had progressive osteolysis, component migration, or loosening on radiographs.

Discussion: Revision of large-head MoM articulations has been largely unsuccessful. It has been postulated that the higher dislocation rate may be related to the decrease in femoral head size when revising large MoM articulations to smaller metal-on-polyethylene articulations. Dual mobility cups and large femoral heads have their rationale in limiting instability, ensuring a wide ROM with respect to traditional implants, and maintaining low wear in primary and revision hip arthroplasties. Satisfactory long term outcomes have been reported in several series in primary and revision hip arthroplasty. In this select group of metal on metal revisions, our data suggest the use of a dual-mobility cup was successful to reduce the risk of dislocation by increasing functional diameter of the head without increasing loosening.

TROCHANTER SPARING EXTENDED ANTERIOR FEMORAL OSTEOTOMY: A NOVEL TECHNIQUE IN REVISION TOTAL HIP ARTHROPLASTY

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Introduction: Revision arthroplasty poses many challenges including extensile exposure and difficulty in safe removal of cemented or uncemented femoral component and/or distal cement particularly from a poor bone stock. Femoral reconstruction and correction of proximal femoral deformities further increase the complexity of revision surgery. The three well described techniques are the standard trochanteric osteotomy (TO), the trochanteric slide and several modifications of extended trochanteric osteotomy (ETO). However, all these techniques are associated with complications including non-union, fibrous union, migration of the trochanter or osteotomised segment, wire breakage and difficulties associated with reattachment of the fragment. Unopposed abductor pull on the osteotomised fragment contributes to the above problems.

Aims: We present a previously undescribed technique of trochanter sparing extended anterior femoral osteotomy (AFO) through a modified Hardinge

approach in reducing the difficulties associated in conventional and extended trochanteric osteotomy. We assessed the performance of this technique in 23 patients with a maximum follow-up of 9 years.

Methodology: All cases of revision hip arthroplasties utilising the AFO technique from 2004 performed by single surgeon were reviewed. Clinical and radiographic assessments of 23 patients with a mean follow-up of 5.4 years (range 1-9 years) were performed.

Surgical technique: Pre-op templating was performed in every case. A large anterior femoral osteotomy about equal in length to the failed femoral component was created. The muscle attachment to the elevated anterior fragment was preserved. Greater trochanter along with its muscle attachments remain untouched. Lateral bone cut made using power saw. On the medial side, one of two techniques: i) multiple perforations through overlying muscle belly using osteotome. ii) In case of femoral components with a rectangular cross section, a power saw with blade passed lateral to medial cortex anterior to femoral component.

Anterior osteotomy flap was opened hinging on medial soft tissue. A modular long uncemented femoral component was used in all revisions. Osteotomy was closed with 2 or 3 cerclage wire or cable loops. Post-operatively, weight bearing was permitted as tolerated.

Results: No trochanteric escape or trochanteric fractures seen in any cases. No proximal migration, subsidence or failure of femoral component seen. Union was seen in all but 2 cases; fibrous non union seen in 1 patient. Mean time for union was 6 months (3-7 months). One intra-op fracture during hip reduction. 1 patient developed recurrent dislocation that required change of socket liner. Improvement in Harris Hip scores was noted from 13 (pain) and 9 (function) pre-operatively to 39 (pain) and 22 (function) ($p < 0.05$).

Conclusions: Extended trochanter sparing AFO allows extensive exposure similar to traditional ETO. It heals reliably without the use of vertical wires, trochanteric plates or grips. The avoidance of abductor mechanism and osteotomy through weakest anterior non weight bearing area of the proximal femur may be a significant advantage.

RESULTS AFTER REVISION OF THE STEM IN PERIPROSTHETIC FRACTURES OF THE HIP

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Introduction: Periprosthetic femoral fractures following primary total hip arthroplasty (THA) represent an emerging challenge for the orthopaedic surgeon, because of their increasing incidence and negative impact on clinical and functional patient outcome. For these reasons, in the last decade, many efforts were made to prevent and manage this complication and a large number of studies were focused on finding out the best treatment.

Objectives: The type of treatment depends on several factors such as morphology and location of the fracture, implant stability, quality and quantity of bone stock, patient's age and clinical conditions. Fractures that cause loosening of the stem always require its revision, with a contextual assessment of the quality and quantity of remaining bone stock, which is generally good in type B2 and poor in type B3 according to Vancouver's classification.

Methods: In this context, the authors performed the following study and analyzed the results of 45 patients treated surgically for periprosthetic femoral fractures with revision of the femoral stem during a fifteen years period, between June 1999 and June 2014.

Results: The mean follow-up was 57 months (range 12-180). The average HHS was 81/100 (range 59-100) before fracture and 80/100 (range 55-100) at follow-up without significant differences in the statistical analysis ($p < 0.05$).

Conclusions: Periprosthetic fractures are a major problem whose incidence is expected to increase. The use of a reliable and precise classification is essential for proper treatment planning, although this is not always feasible. For these fractures, treatment is influenced by several factors and its correct choice depends on type and level of the fracture, periprosthetic bone quality, stability of the previously implanted prosthesis, and age and general condition of the patient.

TWO STAGE REVISION WITH PREFORMED SPACERS IN INFECTED HIP ARTHROPLASTY

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Introduction: Infection is a frequent cause of failure after hip replacement surgery and treating deep infection has been a challenge. The negative impli-

cation are several: length of treatment, difficulties of therapeutic approach and high cost. However the infection rate after THA has been reduced to 0,3%-1,7% in the last years. The gold standard to treat infected THA is two stage implant exchange protocol.

Materials and methods: A preformed cement spacer (spacer G) has been used in 37 patients with infected THA between 1999 and 2013. The therapeutic protocol included a first procedure with prosthetic components removal, accurate debridement of infected tissues, removal of any cement residues and implantation of a preformed antibiotic spacer. After eradication of infection, the second stage consisted of removal of the spacer and implantation of a definitive prosthesis.

Results: The mean follow-up was of 95 months (range 24-166 months). The spacer was left in situ for five months (range 1-13). Before treatment the mean HHS was 45 (range 13-77). At the final follow-up the mean HHS was 83 (range 35-96). Following second stage surgery, recurrence of infection was observed in two patients. Major complications were observed in 6 patients: 4 spacer dislocations, 1 distal femoral fracture occurred during stem removal, and 1 femoral artery pseudo-aneurysm. At final follow-up no dislocation or loosening of the definitive implants was observed.

Discussion: A preformed cement spacer has been shown to be a safe and effective device for the management of the infected THA. Limits of this treatment are the mechanical complications, such as dislocation, related to size adaptability of the device and the impossibility to choose the most effective antibiotic. To overcome these problems the manufacturer suggests fixing the proximal part of the spacer using PMMA with a different antibiotic. The last aspect to consider is the possible damage to the acetabular side during the two stages. We observed that the use of Spacer did preserve acetabular bone stock, due to smooth surface finish of the head, allowing the use of primary hemispherical cups in most of the cases treated.

Conclusions: Two-stage revision of septic hip prosthesis with preformed antibiotic-loaded spacers provides satisfactory long-term results.

MEGAPROSTHESES OF THE PROXIMAL FEMUR: COULD FUNCTIONAL OUTCOME BE COMPARABLE BETWEEN ONCOLOGY AND COMPLEX REVISION?

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Introduction: In recent years, an increasing number of patient has been treated with modular proximal femoral replacement for neoplasms or complex revision surgery with global good/fair outcomes. We hypothesized that severe cases of bone stock loss such as metallosis, prosthetic mobilization, periprosthetic fractures and infections with necessary "oncologic" debridement could have the same functional outcome than tumors. These patients could be treated following oncologic criteria and consequently scored (with dedicated MSTs, TESS and RNL index).

Objectives: To evaluate outcomes in proximal femoral replacement considering different parameters such as survivorship, functional performance and re-intervention rate; to evaluate differences in functional outcomes in oncologic versus non oncologic conditions.

Methods: Megaprosthesis implanted for all reasons (primitive tumors, metastasis, complex periprosthetic fractures and infections with associated poor bone stock) have been included to evaluate outcomes after treatment in comparison with literature data.

Results: Globally fair outcomes in term of survivorship, performance and re-intervention rate could be assessed in proximal femoral megaprosthesis, comparable with outcomes using standard revision prostheses.

Conclusions: Megaprosthesis of the proximal femur are a routine treatment for proximal femur primary and metastatic neoplasms. Due to earlier weight bearing, possibly shorter surgical time and comparable outcomes, this could be a viable solution also for severe bone stock loss or if large debridement is required. Moreover, the need of a modular prosthesis is already often present in femoral revision surgery. MSTs, TESS and RNL index could be viable scores for these classes of patients. Literature confirms this trend in selected cases but further studies are mandatory for an international consensus.