ROUNDUP360

Hip & Pelvis

For other Roundups in this issue that cross-reference with Hip & Pelvis see: Knee Roundup 4, 5 & 6.

That all-important length of stay

With the worry of the potential impending implosion of funding within the majority of developed healthcare systems, and the spectre of rising costs and dramatically rising numbers of patients presenting with neck of femur (NOF) fractures, any intervention that has the added benefit of increased quality and decreased costs is a welcome innovation. Researchers in **Rotterdam (the Netherlands)** have evaluated the effects the implementation of a new clinical pathway for NOF care has had on hospital length of stay (HLOS). The authors report a retrospective cohort-based study (Level III evidence), examining the HLOS related to the implementation of a new NOF treatment pathway. This before-and-after study included 212 'before' patients and 314 'after' patients. The researchers used the hospitals' electronic patient records, and recorded demographics, diagnosis, HLOS, mortality, complications and readmissions. There were some slight differences in demographics with a slightly higher intracapsular fracture rate (53% *versus* 57%) and an increased incidence of treatment with hemiarthroplasty in the 'after' cohort. Pertrochanteric fractures remained treated with a gamma nail in the majority of cases in both timeframes. The introduction of a comprehensive care pathway for NOF fracture patients in this series resulted in a decrease from a median of nine to six days HLOS. Within the hemiarthroplasty group itself (which had grown in size considerably) this reduction was less marked although still a significant improvement from a median of nine to seven days. There were no statistically significant differences in HLOS for the internal fixation group although the gamma nails benefited by a median decrease of four days (from ten to six days). There were no significant differences in complications as a whole, although there was a significant decrease in the gamma nail group in readmissions or mortality as a result of the introduction of the care pathway.[1] Care pathways have transformed orthopaedic care for NOF fracture patients, resulting in massive leaps in care. The UK system of incentivised best practice has identified benefits in mortality in addition to the benefits of HLOS outlined here.

Cementless metaphyseal fixation effective in the elderly

The ultra-short metaphyseal-fit hips (mini cementless stems) have risen in popularity over the past decade. With improvements in stem surface treatments and evolution of the prosthesis, the option of improved proximal loading and preservation of bone stock for potential revision surgery offers an attractive option. Despite the enthusiasm of proponents there is a lack of evidence for the use of these stems, particularly in the elderly. Reasoning that the metaphyseal bone may be of poorer quality and less able to provide reliable fixation in the elderly, researchers in **Seoul (Korea)** have set out to establish (or otherwise) the effectiveness of ultra-short metaphyseal-fitting anatomic cementless stems without diaphyseal fixation in both elderly and younger patients. The researchers designed a prospective cohort study (Level II evidence) to investigate the functional results, bone preservation, complication rates and radiological evidence of fixation for an ultra-short, metaphyseal-fitting anatomic cementless femoral stem. Their impressive comparative case series included 226 arthroplasties performed in 200 patients, divided equally between the younger and older group. The mean age was 43.9 years (31 to 65) in the younger group and 78.9 years (66 to 91) in the older patient group, with follow-up achieved to a mean of around 7.5 years (6 to 9) in both groups. There were no statistically significant differences in functional scores (Harris hip scores 95 *versus* 91, WOMAC score 11 *versus* 15, thigh pain incidence or UCLA activity scores 6.5 *versus* 4.5 points) nor in radiological outcomes between the two groups. Surprisingly, despite the relatively large series, there were no cases of aseptic loosening or adverse ceramic bearing features (clicking, squeaking or fracture).[2] The authors of this case series have established that this technique is reliable and equally effective in the elderly. Concerns about metaphyseal-fit stems in elderly patients certainly seem to have no founding based on the results presented here.

Mortality trends in over 400,000 total hip replacements

In one of the few orthopaedic publications to grace the pages of the Lancet this year, researchers from **Bristol (UK)** have performed an important analysis of 409,096 total joint replacements over an eight-year period. The authors comment that although death following planned hip replacement is rare, these deaths, following planned procedures where there is appropriate pre-operative assessment and which are undertaken in a controlled elective environment, are likely avoidable. They used the data collated as part of the National Joint Registry for England and Wales to establish if death caused by hip replacement has reduced in frequency and what, if any, modifiable peri-operative factors exist that could reduce deaths. The study includes all patients who underwent total hip replacement in England and Wales between April 2003 and December 2011. The primary endpoint was death within 90 days of the study using data linkage between the National Joint Registry and the Hospital Episode Statistics data. The investigators used Kaplan-Meier analysis and Cox proportional hazards modelling to establish linkage between comorbidities, peri-operative factors and death. This study is likely the largest population study of peri-operative patients of any variety and includes data on 409,096 patients,

all undergoing primary hip replacements for osteoarthritis. There were 1743 deaths within 90 days of surgery. There was a significant decrease in death during the eight years of the study from 0.56% to 0.29% and this difference remained after adjustment for age, sex, and comorbidity. The authors identified a number of factors associated with lower mortality: posterior surgical approach (hazard ratio [HR] 0.82, 95% CI 0.73 to 0.92), mechanical thromboprophylaxis (HR 0.85, 95% CI 0.74-0.99), chemical thromboprophylaxis (HR 0.79, 95% CI 0.66 to 0.93), and spinal *versus* general anaesthetic (HR 0.85, 95% CI 0.74 to 0.97).[3] While the authors conclude that "several modifiable clinical factors were associated with decreased mortality according to an adjusted model" and that "widespread adoption of four simple clinical management strategies (posterior surgical approach, mechanical and chemical prophylaxis, and spinal anaesthesia) could, if causally related, reduce mortality further", they do seem to have forgotten slightly how the data have been collected. By definition there is selection bias in large registry studies like this. A posterior approach is in general performed by high volume hip surgeons, raising the question: is it the approach or the skill of the surgeon affecting death rates? Similarly, anaesthetists tend to select an anaesthesia method based on patient-related factors. While the authors have adjusted for age and co-morbidity based on HES data, we do know that population-level billing data is not always an accurate method of assessing clinical co-morbidity. We commend the authors for their powerful study here at *360* but we won't be condemning surgeons using differing surgical approaches just yet.

Antibiotics in hip fracture surgery

Hospital-acquired infection has become a political hot potato in recent years, with leaderboards, expected infection rates and high level investigations into hospitals with higher than expected outbreaks of infections such as MRSA and Clostridium difficile. Attempts to combat this have included the reduction in the use of prophylactic antibiotics and the use of differing regimes, particularly in attempts to reduce the incidence of C. difficile outbreaks. There is, however, little evidence to support these changes in prophylaxis. Researchers in **Sunderland (UK)** have added a small but interesting piece to the puzzle. They report the results of 220 patients admitted with a fractured neck of femur using two different antibiotic regimes. A total of 113 were treated with three doses of cefuroxime and 109 with gentamycin and amoxicillin in a matched cohort study. The authors report a significant drop in the incidence of C. difficile, with a fall from 6% to 0% in favour of the amoxicillin/gentamycin regime.[4] While on the face of it compelling evidence, it is important to remember that reported point prevalence like this in selected groups of patients for a condition known to appear in clusters does not really represent much. It would be nice to see a proper longitudinal cohort study investigating the incidence of C. difficile outbreaks with different antibiotic regimes.

Research: Blood supply to the femoral head after dislocation

Fracture dislocation of the femoral head often presents a complex problem, placing the blood supply to the femoral head in danger with the added complexities of open reduction and internal fixation (with or without an acetabular fracture). The femoral head is usually perfused by the medial femoral circumflex artery (MFCA) via the cruciate and trochanteric anastomoses. The forces and displacement involved at the time of posterior fracture dislocation will often tear retinacular vessels, placing the femoral head at risk of avascular necrosis. Surgical approaches and fixation methods are often chosen to maximise the chances of femoral head survival. However, it has not been made clear what the impact of injury and fixation methods is on patients in whom the femoral head has survived post-operatively. A research team in **Otwok (Poland)** built on previous research to establish the changes in blood supply following injury. They assembled a cohort of 35 patients who had suffered a fracture dislocation of the femoral head and compared them with a previous cohort of 16 anatomical specimens and 55 normal individuals in an inventive comparative case cohort. The researchers undertook CT angiograms taken on the 35 patients (mean age 37 years). By twelve months' follow-up, there were ten patients who had developed AVN of the femoral head. All of these patients had a delay to relocation of the femoral head. In all three groups there were three main arteries identified supplying the femoral head; the deep branch of the MFCA, the postero-inferior branch of the MFCA and the piriformis branch of the gluteal artery. In the majority of cases the deep branch of the MFCA was patent (over 90% of cases). At the time of dislocation the authors found that it was the deep branch that was occluded when the hip was dislocated, either at the bifurcation or up to 35 mm distal to this. The authors noted that, surprisingly, the MFCA was not absent or ruptured in those hips undergoing AVN and in fact had a larger diameter suggesting revascularisation. The authors argue that delay to relocation and preservation of the vascular supply with relative hyperaemia in the deep branch of the MFCA supports the hypothesis that AVN is caused by relative hypoperfusion and kinking of the nutrient arteries.[5] Expedient reduction and fixation seems the best strategy to avoid this potentially devastating complication.

A sticky wicket: metal-on-metal resurfacing and THR

Possibly the two most contentious procedures in orthopaedics, courting more controversy than perhaps any other in contemporary orthopaedic surgery, are metal-on-metal resurfacing and total hip replacement. However, this was not always the case and surgeons in **Quebec (Canada)** have reported their six- to nine-year results of a randomised controlled trial of resurfacing *versus* small head arthroplasty. Their randomised controlled trial (Level I evidence) compares 219 hips in 192 patients at a mean follow-up of eight years. Patients were randomised to the two interventions and then followed up over the intervening period. Revision rates were similar to those published in the rest of the orthopaedic literature at around 5% and 6% in the THR and resurfacing groups, respectively. This study was designed to establish the clinical benefit (if any) of resurfacing over THR. The same patient groups have been used to establish the potential benefits of clinical outcomes, biomechanical scores or revision rates. However, when previously reported at two years, there were no differences in any of these outcome measures. At the time of this follow-up, however, there were significantly better UCLA activity scores in the resurfacing group (7.5 *versus* 6.9) when compared with the THR group. These differences were not reflected in the WOMAC scores, although there was a marked difference in osteolysis rates with over a third of THR patients demonstrating osteolytic changes round the proximal

femur.[6] While for many surgeons longer follow-ups of prostheses that other surgeons have abandoned could be deemed somewhat irrelevant, understanding reasons for failure is crucially important. The failure rates presented here for both prostheses are similar to other series, and although higher than those for other types of arthroplasty, are not disastrously high. We will watch this series with interest and hope the authors continue to report their results to longer follow-up where it is possible to distinguish the effects of resurfacing as a concept from that of the bearing surface where the two are often used interchangeably.[7]

Research: Diabetes and hip replacement ✕

■ Total hip replacement (THR) has previously been called the 'operation of the century', with an impressive safety profile and an effect size that dwarfs most interventions, however, the success of THR is both orthopaedics' best success story and its Achilles heel. Comparisons with other interventions are far from fair and the remarkable success of THR has set a bar which is so high it is difficult for other interventions to compete. However, despite this track record, THR is not without its problems. Complications, while rare, can be devastating for both surgeon and patient alike. Diabetes is becoming more common in the arthroplasty age group and is a risk factor for many adverse outcomes in THR (such as infection). Researchers in **Edinburgh (UK)** set out to establish what precisely the interaction between diabetes and poor outcomes in THR was. They conducted a systematic review and meta-analysis of the literature (Level II evidence) to establish the interaction between diabetes and complications associated with THR. The research team conducted a thorough literature search and included papers reporting the complications of interest (thromboembolic events, coronary events, UTI infections, respiratory tract or surgical site infections and revision arthroplasty). The research team used a slightly unusual Bland & Altman method to estimate odds ratios for the various outcomes and the incidence of relation to diabetes in each series. While the authors' Pubmed search yielded 193 articles, only ten articles met the inclusion criteria (although these ten articles did report the outcomes of nearly 592,000 patients), reporting an incidence of 5% of diabetes mellitus. The analysis of this impressive dataset suggests that diabetes is associated with an increased risk of surgical site infection (OR 2.04), urinary tract infection (OR 1.43) and lower respiratory tract infection (OR 1.95), all of which were significant. There was no association with other types of complication.[8] For a common complication, it is surprising how great the increased risk associated with diabetes is. This paper quantifies the risk associated with diabetes and joint replacement, and while there is an increased rate of infection, other complications such as myocardial infarction and failure of the prosthesis were not significantly greater. Increased complications inform risk management but given the satisfactory long-term results THR should not be rationed in patients with diabetes.

Research: Bone remodelling over two decades following hip replacement ✕

■ Much research has been performed on taper slip cemented and the various uncemented stems. However, despite the current fashions for other designs, there are large numbers of successful composite beam prostheses, either historical or contemporary. The natural history of the composite beam is that of stress shielding (particularly proximally) which results in cortical thinning despite the stem usually staying well fixed. Little is understood about the dynamics of cortical thinning. Researchers in **Lund (Sweden)** aimed to examine the dynamics of cortical thinning around well-fixed cemented Muller straight stems. They designed a study involving the hips with a minimum of 15 years' follow-up and no radiological signs of osteolysis. Radiological measures of cortical thinning were undertaken in the 20 hips in the study who were followed for a mean of 20 years. Measures were taken medially and laterally at regular intervals to characterise the rate and type of cortical thinning. A total of 60% of the observed cortical thinning occurred during the first five years of the study and was more evident proximally. Given the rate of slowdown and the lack of loosening of the straight stems over the period of the study, the authors concluded that this is a non-pathological process mainly related to the composite beam type of stems and should not necessarily be viewed as a pathological process.[9]

Do bisphosphonates affect acetabular fixation?

■ The profound effects of bisphosphonates are much studied in orthopaedic surgery. Bisphosphonates are known to slow down bone turnover and have been implicated in pathological femoral fractures. Patients with uncemented acetabular components are susceptible to osteolysis and bone resorption due to a combination of stress shielding and wear debris response. There has been some interest in the potential effect that bisphosphonates may have on implant fixation as bisphosphonates are known to stimulate osteoblasts by upregulation of BMP-2 expression. Researchers in **Mölndal (Sweden)** designed a randomised controlled trial with the aim of establishing the effect of oral bisphosphonates on implant fixation and bone remodelling around the acetabular component after revision arthroplasty. The study design included 53 patients randomised to either 5 mg risedronate or placebo along with calcium and cholecalciferol supplementation. Outcomes were assessed using radiostereometric analysis (RSA). The RSA studies were performed at one week postoperatively and then again at regular intervals to three years. The patients' bone mineral density (BMD) was measured post-operatively, then at six months, one and two years using DEXA. Surprisingly, there were some differences between the two groups, with the risedronate group showing less anterior-posterior rotation at six months but no changes in migration, bone mineral density, graft remodelling or radiolucent line formation between groups. The authors were unable to demonstrate any tangible or clinically meaningful differences between the two groups.[10] It does seem to us here at *360* that such a thorough study should put the issue of risedronate and uncemented components to bed.

■ As a final say, researchers in **Turin (Italy)** report an interesting case of pseudotumour reaction in the hip as a response to fungal joint infection. Pseudotumours are becoming better and better understood and have been described as a sequela of metal-on-metal and metal-on-polyethelyene articulations. The authors flag up that these kinds of granulomatous reactions can also be associated with unusual infections and that particularly in the immuno-compromised patient, infectious causes of pseudotumour should be ruled out.[11]

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