

ROUNDUP³⁶⁰

Hip & Pelvis

X-ref For other Roundups in this issue that cross-reference with Hip & Pelvis see: [Trauma Roundup 3](#); [Knee Roundup 4, 5](#); [Research Roundup 7, 8](#).

Doing badly early – how to tell

■ Given the ever-increasing number of hip replacements being undertaken, any means of pre-operatively identifying those patients at risk of poor clinical and functional outcome is to be welcomed. A study team from [Montreal \(Canada\)](#) set out to do just this.¹ The authors utilised a retrospective analysis of their prospectively recorded arthroplasty database. In what ended up as a rather small study, the results of 265 consecutive unilateral hip arthroplasties/resurfacings, which were all performed for primary osteoarthritis, were collated. Data available included one- to two-year post-operative self-reported PROMS data, as well as WOMAC scores. Although 2963 patients had been entered into their database during the period studied (2004 to 2014), many failed to meet the inclusion criteria or had incomplete data. In this series, around 15% were found to have a suboptimal result on the basis of PROMS outcome measures. The study team's retrospective analysis of independent variables associated with a poorer outcome identified female gender, older age, elevated BMI (> 33.7 kg/m²), severe pain when walking on a flat surface, night pain and difficulty putting on socks. While this all might seem obvious, there is a surprising paucity of previous work in this area, and the authors propose an algorithm based on the above criteria,

which their analysis suggests gives a sensitivity and specificity of around 75%. Although the clinical applications of this may be limited, and this study is certainly inhibited by the small population, it is worth considering that certain patient subgroups are likely to perform more poorly.

Outcomes in avascular necrosis of the hip

■ Treatments for avascular necrosis (AVN) of the hip are hit-and-miss to say the least. Ranging from simple drilling to vascularised fibular grafting and stem cell transplant, it appears almost everything has been tried. Investigators from [Hyderabad \(India\)](#) have taken a fresh look at the venerable 'core decompression'.² Their study concerns the outcomes of 40 such procedures in 24 patients. Outcomes were assessed both clinically (using the Harris Hip Score) and radiologically, pre- and post-operatively. MRI scanning evaluation was used to specifically quantify bone marrow oedema, signal intensity and the extent of necrosis. As perhaps could have been predicted, poor outcomes are associated with a larger area of AVN, location of the lesion within the superior (weight-bearing) portion of the femoral head and higher signal intensity suggestive of bone marrow oedema. Although a sizeable body of previous work has looked at pre-operative predictors of outcome for AVN decompression, the interest of this paper comes from the authors attempting to correlate post-operative MRI and clinical outcomes. Some might argue that once surgery has been undertaken, the die is cast

and the patient's symptomatic and functional result comes to the fore rather than radiologically-assessed findings. Nevertheless, the paper's conclusions include the suggestion that post-operative MRI changes continue for up to six months following core decompression, and this may help to identify a subgroup at high risk of disease progression and further intervention who would perhaps merit close monitoring.

Revision of the Exeter Trauma Stem X-ref

■ Like buses, good quality papers concerning cemented hemiarthroplasty don't appear for ages, and then come two at a time. An original series paper from the [Exeter \(UK\)](#) group addresses the question of 'cement-in-cement' revision for hemiarthroplasty.³ The authors were able to assemble a series of 28 consecutive patients undergoing revision of a cemented hemiarthroplasty to total hip arthroplasty. The majority (16 patients) underwent revision for erosion of the acetabulum. In 21 cases the prosthesis removed was a Thompson, while in the remaining seven it was an Exeter bipolar hemiarthroplasty. The authors specifically describe the importance of burring away the proximal lateral cement mantle in cases where the initial prosthesis was a Thompson, to avoid the revision implant being pushed into a varus position. Four patients died within two years of surgery, with a mean follow-up for the remainder of 70 months. The complication rate here was high, with an overall rate of 36%

which the authors acknowledge. Clearly, serious consideration should always be given before suggesting major revision hip surgery in an elderly frail population, and the paper labours the importance of ensuring pre-operatively that the distal cement mantle is fully intact and well fixed. However, the authors do point out that the cement-in-cement revision technique can potentially substantially reduce surgical time, and the data suggest that this does not come at a cost of increased risk of implant failure. We would agree that the risks should be carefully weighed up in the decision to revise a hemiarthroplasty following hip fracture, however, should revision be required, it would seem that a cement-in-cement revision offers the advantage of a smaller surgical hit with similar outcomes.

The true costs of healthcare provision in joint arthroplasty X-ref

■ As funding models for health care are converging throughout the world towards referenced pricing and 'bundles of care', it is becoming increasingly important for providers and funders to understand what the total costs are, and where the money is spent in health care. While European countries have been working with different varieties of standardised and reference pricing, both in the state and private sectors, this concept is newer in North America and becoming increasingly relevant with the Affordable Care Act. However, if this kind of national referenced billing is to be

effective, providers will need to understand where the costs are in order to improve healthcare delivery. Researchers in **Pittsburgh (USA)** have undertaken a thorough breakdown of processes and staff costs incurred both directly and indirectly when undertaking total joint arthroplasty in an attempt to determine the true costs.⁴ They then aimed to use this to develop a tool to assist providers by protecting and improving patient outcomes and experiences. This 'spend wisely' approach is going to become more widely adopted, we are sure, as changes in health care take hold with a focus on effective spending.

Theatre cost is £16/minute so what are you doing just standing there? X-ref

■ In a refreshing insight into the age-old problem of theatre efficiency, a team led by Professor Fares Haddad focussed on peri-operative care efficiency. Taking a slightly unusual approach to the problem, the study team concentrated on peri-operative care timings. Previously, surgeons have highlighted optimising surgical technique to decrease operative time, whereas these researchers focussed more on the precious time wasted setting up for surgery and transferring the patient out of the room. The surgeons at the University College London Hospitals, (**London UK**)⁵ initially undertook a time and motion study to evaluate the time taken in peri-operative preparation. Their study identified 15 consistent, discretely identifiable peri-operative steps, and the time for each was calculated. The study team then went on to develop an optimised algorithm to reduce the latency time associated with this process. A further study (of admittedly just 20 cases) showed a consistent improvement in timings. In short, the use of their intervention reduced patient preparation time by between 25% and 28% in 20 consecutive patients. While it might not seem much, this translated into between £84 and £93 per case in

efficiencies, and across a whole day's operating, the 25% improvement in peri-operative efficiency could result in an additional small case on each operating list.

A ticking time bomb? How to follow up MoM resurfacings

■ One of the difficulties associated with an asymptomatic disease such as aseptic, lymphocyte-dominated vasculitis-associated lesion (ALVAL) caused by metal-on-metal (MoM) wear debris is knowing how to effectively follow up the patients. Despite the large numbers of patients with MoM hip resurfacings being followed up globally, there is little evidence to support any particular form of follow-up strategy. Investigators from **Oxford (UK)** set out to address the evidence gap with a simple prospective cohort study.⁶ They report the outcomes of 152 asymptomatic patients with MoM resurfacings to assess the sensitivity and specificity of both PROMs and ultrasound as a modality for surveillance. Their patients all underwent interval PROMs and ultrasounds at a mean of 4.3 years apart, and were asymptomatic at the beginning of the study period. The ultrasound was able to detect progression of the pseudotumours in 19% of patients and this was predicted by a large high-grade initial pseudotumour and high blood cobalt and chromium ion levels. Crucially, the authors established that there was no clinically significant benefit to repeated imaging in any of their asymptomatic patients with initially normal metal ion levels and ultrasound results. Based on this study, it would certainly seem reasonable not to repeat imaging investigations within five years in the presence of normal blood metal ion levels.

Imaging for metal-on-metal follow-up X-ref

■ The Pandora's Box that is the metal-on-metal hip resurfacing problem continues to provide ample opportunities for research and publication. There are a number of recommendations published by the MHRA and the British Hip Society for follow-up of these joints, which all include regular clinical reviews with the aim of early revision for aseptic lymphocyte-dominated vasculitis-associated lesion (ALVAL). Early revision is advocated in an attempt to improve outcomes, however, when it comes to detecting ALVAL, there is evidence to support the use of the two commonly used imaging modalities: ultrasound (USS) or metal

artefact reduction sequence magnetic resonance imaging (MARS-MRI). However, there exists little guidance as to which is indicated when. Although USS is cheap, it is operator-dependent and can be difficult in patients with a



high BMI. Whereas MARS-MRI may be easier to interpret for the majority of orthopaedic surgeons, it is expensive, time-consuming to perform and, despite the 'MARS' element, can result in artefacts by distortion of the images by the implants. The group in **Oxford (UK)** who were some of the first to identify the ALVAL problem, set out to conduct a study with the aim of making a comparison of USS alone, MARS-MRI alone or a combination of MARS-MRI and USS for identifying ALVAL.⁷ This study assessed 40 patients, all with histologically confirmed ALVAL associated with metal-on-metal hip resurfacings. The authors report their results in terms of 'agreement with intra-operative findings', with USS performing most poorly (82.5%), followed by MARS-MRI (87.5%) and both in combination (92.5%). The

variations were explained by differences in specificity and negative predictive values. Currently, most regulatory authorities advise the use of either USS or a MARS-MRI as first line imaging. However, this paper would suggest that combined imaging was a more robust method of diagnosing the presence of ALVAL.

Acetabular position and 3D planning X-ref

■ The difficulties of achieving optimal acetabular cup placement are well known and, even in experienced hands, cup positioning can catch out the unwary. Predisposing to dislocation, impingement, edge loading, squeaking in the case of ceramic components, excessive wear and higher revision rates, acetabular malposition should be avoided at all costs. Researchers from **Paris (France)** have reported their prospective randomised study comparing 3D pre-operative planning-assisted cup placement with conventional, freehand cup placement.⁸ Patients in the intervention group underwent a low dose CT scan pre-operatively for 3D planning and surgery simulation to determine the optimal cup position and cup size. Intra-operatively, the cup was inserted into the reamed acetabulum and modified according to the templated 3D images. The surgeon used a flexible ruler to measure the distance between the edge of the cup and the acetabular edge. These distances were then compared with the values that had been determined during the 3D planning. Reference points used were on the anterior wall, posterior wall and one on the roof. Fifty-six patients were randomised to one intervention or another and the accuracy of the acetabular placement assessed using Lewinnek safe zone and Callanan criteria on the post-operative imaging. The authors found that pre-operative 3D planning did achieve greater accuracy than conventional freehand cup placement. The native acetabular anteversion was reproduced with greater accuracy and significantly

reduced the percentage of outliers, from 46% to 21% when using the Lewinnek safe zone (abduction angle 30° - 50°, anteversion angle 5° - 25°), and from 64% to 25% when using the Callanan criteria (abduction angle 30° - 45°, anteversion 5° - 25°). In addition, there was no significant increase in the length of the operative time. While this technique was not as accurate as CT-based navigation, it was quick and relatively cheap. The authors postulated that the use of custom, patient-specific, acetabular alignment guides may improve accuracy further, but this would obviously add to the cost. Conventional

navigation in the hip is expensive and time-consuming. The authors should be applauded for performing a prospectively randomised study looking into the advantages of 3D planning. Increasingly, hip surgeons pre-operatively template total hip arthroplasties on plain radiographs to judge optimal implant size, but why not perform a low dose CT scan so that we can accurately template component position?

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Knee

X-ref For other Roundups in this issue that cross-reference with *Children's orthopaedics* see: [Hip Roundup 5](#); [Research Roundup 8](#).

Bariatric surgery effective pre-TKA **X-ref**

World literature is full of reports on the health economic burden, outcomes and complication rates associated with the obesity epidemic in the Western world. However, there is little data to support decision making surrounding pre-arthroplasty bariatric surgery. Using the now 'gold standard' computer modeling techniques, taking into account health economic data, complications data and outcomes data from other studies, researchers in **New York (USA)** set out to establish the most cost-effective approach to tackling the growing worldwide obesity epidemic, and the associated osteoarthritis.¹ It is well established that obese patients have a high rate of failed non-operative treatment and that these patients are candidates for total knee arthroplasty (TKA). What is not clear, on the other hand, is the impact of greater risks associated with infection, implant failure, and poorer clinical outcomes. Previous studies have evaluated outcomes of bariatric surgery before

TKA, and the results are conflicting. Some studies have shown fewer complications, while other studies have not been able to establish an improvement in outcomes. The use of a Markov modeling approach to study the health economics of pre-arthroplasty bariatric surgery should help to unpick this puzzle. The authors established that morbidly obese patients undergoing bariatric surgery prior to arthroplasty had higher quality-adjusted life year (QALY) improvements, with an incremental cost-effectiveness ratio (ICER) of around \$14 000 per QALY, well below the cost-effectiveness threshold. Given that morbidly obese patients who underwent pre-operative bariatric surgery prior to TKA had, overall, increased savings per QALY, it would seem to make sense that morbidly obese patients should be encouraged to undergo bariatric surgery two years prior to TKA in order to maximise the benefits of their arthroplasty.

Repair of the medial collateral ligament? A safe and effective approach

Like all operations, total knee arthroplasty (TKA) is fraught with its own specific range of complications. The extensive medial release often

required in order to perform TKA can on occasion be associated with iatrogenic injury to the medial collateral ligament (MCL). The traditional teaching for management of this complication is to address the resultant instability with the use of increasing constrained implants – achieving stability with, of course, appropriate balance. However, increasing the constraint in implants, even when performed well, will reduce the longevity with higher surface wear at the articulations and greater transmission of torsional forces to the bone-implant interfaces. Clinically, this results in unwanted increased failures and fewer options for future reconstruction. The group at Rush University Medical Center, **Chicago (USA)**, report their own experience of directly repairing iatrogenic MCL injuries using either end-to-end suture repair (MCL mid-substance tears), or direct repair (with screw-and-washer or other constructs) in the case of MCL avulsions.² In their series of 3922 TKAs, 1.2% (n = 48) were treated this way for an iatrogenic MCL injury. Post-operative rehabilitation included the use of an unlocked hinged knee brace for six weeks, and patients were encouraged to weight-bear as tolerated.

Outcomes here were reported to a minimum of two-year follow-up, and the authors report no findings of secondary instability, with patients reporting the expected post-operative improvement in clinical outcomes. The only complications were stiffness and revision for aseptic loosening. The authors have effectively shown that constrained implants may not be required to address intra-operative MCL injury, and primary repair is possible in the setting of a primary total knee arthroplasty. This is a good clinical pearl when a rare complication occurs.

Minimally invasive approaches to the knee

Minimally invasive surgical approaches are the subject of increasing patient interest. While there are raised expectations from newer minimally invasive knee approaches (conveniently requiring costly equipment), there is very little in the way of objective evidence to support quadriceps-sparing approaches over the traditional medial parapatellar approaches, but on the face of it muscle sparing seems to make sense. A surgical research team in **Seoul (South Korea)** have reported their experience of both approaches in their