

# ROUNDUP<sup>360</sup>

## Hip & Pelvis

**X-ref** For other Roundups in this issue that cross-reference with Hip & Pelvis see: *Knee Roundups 3 & 6; Trauma Roundups 1 & 2; Children's orthopaedics Roundup 7; Research Roundups 1, 3 & 5.*

### Cemented or cementless in the older patient?

■ This cleverly conceived study from **Adelaide (Australia)** and **Montreal (Canada)** attempts to 'drill down' into the data from the Australian Orthopaedic Association National Joint Replacement Registry to generate a more accurate reflection of potential outcome differences between cemented and uncemented stems in patients over the age of 75 years undergoing total hip arthroplasty.<sup>1</sup> There are arguments in both directions, with fans of the cemented stems arguing that they are durable in the older population, that they have a known complication profile, and that they avoid the perceived difficulties in uncemented stems of poorer biological fixation and a higher risk of periprosthetic fracture. The authors argue that one of the reasons this question has yet to be answered is that the evidence base from registry studies, although showing poorer performance by uncemented stems, includes a range of prostheses, which may bias the results. Their premise for this seems justified; if the entire registry data set is analyzed, the large numbers of both cemented and uncemented stems included in the registry may confound any conclusions drawn. The authors of this study therefore

identified the three 'best' cemented and uncemented stems, which they defined somewhat arbitrarily as prostheses used with over 1000 implantations per year. They then reported the lowest ten-year revision rates, and compared early and late revision rates for all patients over the age of 75 years at the time of index surgery. Overall, this large study reported three-month revision rates that were significantly higher in patients treated with uncemented stems (hazard ratio (HR) 3.47). For one-month revisions, the difference was even more marked (HR 8.82 for patients treated for osteoarthritis; HR 27.78 where the indication was neck of femur fracture). Interestingly, the trend did not continue with the benefit of longer follow-up, as there were no differences seen at eight years (neck of femur fracture cohort) and 13 years (osteoarthritis cohort). However, revision rates at all stages were higher in women than in men. In their discussion, the authors of the paper choose to focus largely on this finding of a 'levelling off' after the first three months, which implies a role for uncemented stems in selected older patients. Whilst this is undoubtedly true, many of the world's healthcare systems face increasing cost pressures (and in the United Kingdom, there is also the backdrop of the Getting It Right First Time programme). Accounting for the fact that cemented stems are considerably cheaper, the superior methodology of this study would seem to emphasize the message that cemented stems should be

considered the 'default setting' in the great majority of patients in this age group.

### How much is enough in arthroplasty?

■ This paper from **New York, New York (USA)** aims to dig more deeply than previous studies into the relationship between case volume performed and clinical outcomes/ complication rates following total hip arthroplasty (THA).<sup>2</sup> The question of what case volume is required to reduce complications in major surgery has always been a difficult one. This leads on to the next question, which is: Who should be allowed to perform procedures such as total joint arthroplasty where the complication rates are known to be inversely proportional to volume performed (at low volumes, at least)? These authors undertook a combination of hospital and surgeon risk-based assessments using data from 187 557 unilateral THAs performed in hospitals in New York state between 1997 and 2014. These data were included in a detailed statistical analysis assessing 90-day complication rate, 90-day in-hospital mortality, and two-year revision rates. The authors undertook a categorical type analysis and annual surgeon volumes were subdivided into: 0 to 12, 13 to 25, 26 to 72, 73 to 165, 166 to 279, and  $\geq 280$ . For annual hospital volume, the categories were slightly different: 0 to 11, 12 to 54, 55 to 157, 158 to 526, and  $\geq 527$ . One of the most striking findings of this paper was that over 35% of cases were performed by

surgeons undertaking, on average, less than one per month. Patients treated by these surgeons were associated with a two-fold to 2.5-fold increase in the risk for complications, mortality, and revision. There was a similar effect seen in low-volume units, where 15% of THA cases were undertaken by hospitals performing, on average, one or less THA/week. These were associated with a 50% excess complication rate and up to a six-fold increase in mortality. The authors conclude that, by dividing both surgeon and hospital numbers into smaller subcategories than in previous studies, they demonstrate the correlation between variation in outcomes and case numbers performed to be even more marked than has hitherto been recognized. This is particularly pronounced for overall hospital numbers in respect of 90-day mortality, and for individual surgeon numbers in respect of two-year revision rates. Such findings must be interpreted with a degree of caution, as the authors acknowledge, particularly as they demonstrate fairly wide outcome variation between different centres undertaking similar case volumes. Nonetheless, these data are hard to refute. Whilst this paper relates specifically to the American model of healthcare provision, the fact that, in this series, 35% of cases were undertaken by surgeons performing less than one hip arthroplasty per month is unlikely to be unique to the United States. These findings would certainly not appear to support the continuation of this practice.

## Recovery of gait following total hip arthroplasty

■ Whilst total hip arthroplasty (THA) is an incredibly successful intervention in terms of resolution of pain and restoration of function, patients do not always recover a normal gait pattern following their surgery. The reasons for this somewhat variable recovery of gait are not entirely understood, and this systematic review and meta-analysis from **Adelaide (Australia)** attempts to answer a relevant clinical question: How does preoperative gait pattern impact postoperative gait and functionality after hip arthroplasty surgery?<sup>3</sup> The authors point out that, whilst two other recent reviews have looked at a similar question, both focused solely on comparisons of postoperative THA patients against normal healthy control groups, rather than also assessing pre- versus postoperative gait patterns. A robust search methodology was employed; after application of exclusion criteria, a total of 74 studies (2477 patients) were included in the systematic review, 46 of which were also entered into the meta-analysis. Most patients underwent surgery either through a posterior or direct lateral approach. The key findings were that walking speed, step links, stride length, and single-limb support time continued to improve steadily from six weeks postoperatively up until 12 months following surgery. However, walking speed remains slower following hip arthroplasty, even at 12 months, than is seen in a comparable healthy population. Gait also remains wider-based, and overall range of movement in the hip is less, even at 12 months, than in comparable healthy individuals. The authors conclude that the sequelae of surgery and the long-term impacts of the osteoarthritic process itself on the soft-tissue envelope mean that, following THA, many patients do not reach the same levels as non-osteoarthritic patients in these parameters. This is an important point to convey



to patients during the preoperative counselling process, in order to ensure that the expectations of the long-term results of surgery are realistic.

## Dual mobility cups and dislocation

■ This paper from **Bologna (Italy)** represents the most comprehensive and up-to-date systematic review currently available for the use of dual mobility articulations in both primary and revision hip arthroplasty.<sup>4</sup> The dual mobility articulation promises to improve stability, reduce impingement, and increase jump distance. The disadvantages include an increased sliding distance and the risk that the increased generation of wear debris will result in early osteolysis and loosening. After their initial literature search, the authors employed the following stringent criteria for their review: randomized controlled trials or two-armed controlled studies; clearly separated reports of the outcomes of the two arms; and clearly defined outcome measures for both groups. This approach yielded a respectable 15 papers (2408 THAs) that were suitable to be included in the qualitative review, of which 14 also formed part of the statistical analysis. The key finding was that, whether analyzed separately as primary and revision cohorts, or grouping all cases together, dislocation rates were significantly lower with a dual mobility articulation. This applied both for patients perceived

preoperatively to be at high dislocation risk, and for 'normal' patients. The authors acknowledge that concerns have previously been expressed regarding both the wear implications of an extra articulation and the risk of intraprostatic dislocation of the inner and outer components. They recognize that, although their systematic review did not reveal these complications, the relatively short follow-up that was reported limits the robustness of this conclusion. Nevertheless, these data do suggest significant potential benefits to the use of dual mobility cup articulations, and certainly the point made by the authors that the slightly higher cost is possibly more than offset by the reduction in potential need for revision surgery is pertinent in the present healthcare environment.

## The tricky problem of leg lengths

■ Leg-length discrepancy (LLD) is one of the chief causes of dissatisfaction, and litigation, following total hip arthroplasty. However, the causes are not entirely clear. There is little agreement between measurement methods, and cited causes include genuine leg-length differences, fixed pelvic obliquity, muscle tightness, and changes in hip centre. This paper from **Khon Kaen (Thailand)** attempts to add to the existing body of literature investigating the accuracy of patient perception of LLD following total hip arthroplasty, when compared with objective radiological measurements.<sup>5</sup> In their study, 68 patients who had previously undergone hip arthroplasty were enrolled, and LLD was assessed using three different methods. To give the patient perception of length difference, a series of incremental (Coleman-type) blocks were placed under whichever limb the patient perceived to be shorter until they felt subjectively that the LLD had been corrected. Plain pelvic radiographs and orthoroentgenograms were then also undertaken.

The former was used to generate a measurement between the teardrop and most medial aspect of the lesser trochanter, perhaps the most widely clinically used measure of LLD. The latter was used to measure the distance between the centre of the femoral head and the centre of the tibial spines. Statistical analysis was then used to compare the three data sets. A key finding was that a very strong correlation was demonstrated between the two radiological modalities, supporting a take-home message that plain radiographs are appropriate tools for measuring LLD after hip arthroplasty. The correlation between patient perception and radiological measurement, however, was poor, which aligns with previously published work on the same topic. Younger patients (subgroup analysis divided the series into two cohorts aged < 50 years and ≥ 50 years) were more likely to perceive a LLD. The prevalence of looking for discrepancy was fairly high: 60% according to orthoroentgenogram, 52.94% on radiograph, and 57.35% according to patient perception. Overall, this certainly adds useful understanding to this area, highlighting the importance of appropriate provision of information during the consent process, supporting the use of plain radiographs as the key postoperative imaging modality, and also emphasizing the benefits of meticulous surgical planning, especially in the younger patient cohort.

## Postoperative precautions: are they needed?

■ Hip dislocation remains of concern to patients and surgeons alike following total hip arthroplasty (THA), with some papers reporting up to 10% of patients suffering this complication after primary THA. Accurate component positioning with restoration of both offset and leg length, as well as meticulous soft-tissue handling and repair, are the mainstays of achieving a stable construct. Traditionally, patients have also been advised to restrict

their activities in the early postoperative period, usually for six weeks, to allow soft-tissue healing and muscle strengthening to occur. With surgical techniques such as the direct anterior approach (DAA), larger head sizes, and an increasing focus on fast-track recovery with early mobilization, these precautions begin to look a bit outdated and are worth a further review. The literature is replete with reports of poor compliance with hip precautions and increased patient satisfaction when hip precautions are not followed, without any increase in dislocation rate. This study from **Ottawa (Canada)** was essentially a survey of the members of the American Association of Hip and Knee Surgeons (AAHKS) and the Canadian Arthroplasty Society (CAS) to determine whether postoperative hip precautions are being used, for how long they are maintained, and what equipment is needed.<sup>6</sup> This paper focused on a total of 764 respondents to the survey. Amongst participants, the posterolateral approach was the most common surgical approach (50%), followed by the DAA (36%) and the direct lateral approach (14%). A third of respondents did not provide hip precautions for their patients, whilst almost half reported providing precautions to all of their patients. For those who were recommending hip precautions, the most common duration was five to six weeks, although a significant number recommended eight weeks. Those surgeons who performed the posterolateral approach were more likely to recommend hip precautions and were also more likely to use a larger femoral head size. Posterolateral approach surgeons who recommended hip precautions advised restrictions to flexion, internal rotation, and adduction, whilst DAA surgeons who recommended precautions restricted extension and external rotation. Equipment was also prescribed, which most commonly included a raised toilet seat, a pillow

between the legs when sleeping, and a 'grabber' to pick up objects off the ground. Equipment was more commonly requested by those surgeons who did the direct lateral and posterolateral approaches, and the DAA was significantly associated with no equipment. Interestingly, more experienced surgeons tended to use the posterolateral approach rather than the DAA, and also tended to recommend hip precautions. Less experienced surgeons were more likely to perform the DAA and tended not to recommend hip precautions as much as their senior colleagues. The authors cited the huge heterogeneity in the duration of hip precautions when utilized, from one week to over eight weeks, reflecting the relatively poor evidence supporting precaution use. This paper highlights questionable justification of hip precautions post-THA, whatever approach is utilized. Historically, posterolateral approach surgeons recommended their patients use hip precautions. Previous evidence suggests that by abandoning hip precautions in patients who have undergone a posterolateral approach, the early functional improvement is similar to that achieved following DAA. In addition, considerable resources are consumed in instructing patients on hip precautions and providing equipment, and this may also delay and impact the patient's satisfaction post-surgery. Are more studies really needed or is it time to abandon hip precautions?

### Trabecular metal and revision arthroplasty

■ There has been a lot of interest in the potential of trabecular metal (TM) in addressing bone loss, particularly on the acetabular side of hip arthroplasty. The potential advantages of TM include the ability of bone to grow through the prosthesis, offering a long-term robust integration with the acetabular bone stock. With the advent of better ingrowth surfaces on porous

metal, re-revision after total joint arthroplasty revision due to aseptic loosening has decreased; however, there is still an evidence gap as to exactly how good this is. This study from **Oxford (UK)** compared TM with non-trabecular metal (non-TM), with the aim of establishing if TM does indeed offer a robust benefit in patients with revision surgery for acetabular loosening.<sup>7</sup> The authors report a retrospective observational study that included all revision total hip arthroplasties (THAs) performed with cementless acetabular components either with or without a TM surface coating. The authors used a series of 3862 matched revision THAs to establish that the overall prevalence of acetabular re-revision was 2.7%, which consisted of re-revision for aseptic acetabular loosening (0.96%) and infection (1.4%). The revision rate for all causes and subgroup analysis were similar between revision THAs with TM and non-TM coatings. Thus, roughened porous surfaces should be used in revision THA, and surgeons should feel comfortable using any system available to them.

### Exercise and corticosteroid for gluteal tendinopathy

■ Gluteal tendinopathy is a difficult condition to treat and, although it is seen across orthopaedic clinics and sports medicine clinics with relative frequency, there is a paucity of decent evidence to support its treatment. Treatment itself is almost universally conservative, with a range of physiotherapy and steroid interventions available. In one of the few randomized studies on the topic, authors from across **Australia** set out to establish what the benefit, or otherwise, is of exercise versus corticosteroid injection in a global outcome scale of pain and function.<sup>8</sup> The study was a prospective, three-arm, single-blinded, randomized clinical trial. The authors included adult patients (aged 35 to 70 years) with lateral hip pain for three months.

Inclusion was confirmed by clinical examination. The interventions consisted of a physiotherapy-led education and exercise programme of 14 sessions over eight weeks, one corticosteroid injection, or a wait-and-see approach. Outcomes were assessed using a global rating of change in hip condition and pain intensity with patients in the study being followed up to a year. The study involved 204 patients randomized to one of the three interventions. Compared with no treatment, education plus exercise and corticosteroid injection both resulted in better global improvement scores and lower pain intensity at eight weeks. Throughout the study, education plus exercise performed better than corticosteroid injection use; at 52 weeks of follow-up, education plus exercise led to better global improvement than corticosteroid injection use, but no difference in pain intensity. These results support education plus exercise as an effective management approach for gluteal tendinopathy.

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## Knee

**X-ref** For other Roundups in this issue that cross-reference with *Knee* see: *Hip & Pelvis Roundups 2 & 7; Research Roundups 1, 3 & 5.*

### Fixed- versus mobile-bearing total knee arthroplasty

■ The mobile-bearing total knee arthroplasty (TKA) is an attractive prospect that offers the combination of lower wear rates, by decoupling sliding and rotating bearings, and the potential benefit of a more anatomical flexion arc. The promise of improved functional scores and lower revision rates in the longer term has been a draw for surgeons the world over, with many of these prostheses implanted. Whilst the early indications from joint simulator studies were of lower wear rates, to date these indications have not translated to a clear clinical research base supporting either fixed- or mobile-bearing TKA in routine use. We were delighted to read this randomized trial from **Rochester, Minnesota (USA)**, which reports the outcomes of fixed- and mobile-bearing knee arthroplasties out to ten years of follow-up.<sup>1</sup> The authors recruited 240 patients to their randomized controlled trial and patients were randomized to one of three tibial component designs: an all-polyethylene fixed-bearing component, a modular metal-backed fixed-bearing component, or a mobile-bearing tibial component. Patients were reviewed at a median follow-up of ten years, and outcomes were assessed based on longevity, apparent range of movement, and

functional scores at ten years of follow-up. There was no difference in durability of the knee arthroplasties, as measured by survivorship free of revision for any reason, nor in mean measured maximal range of movement at ten years. From the clinical outcomes perspective, there was also no difference in functional scores, as measured by Knee Society (KS) function scores, nor the prevalence of radiologically observed patellar tilt, which is a surrogate marker for rotational abnormality.

### Robot-assisted total knee arthroplasty

■ There is perhaps nothing more fashionable and unproven in our discipline at present than robot-assisted surgery. The potential benefits of robot-assisted surgery are obvious, with its facility for fine precision, access in tight spaces, and high-level investment from major medical device companies. Thus far, robotic-assisted surgery has found its niche mostly in low rectal surgery and urology. There are, however, a range of potential applications in orthopaedics, and most research and clinical focus in this area has been on joint arthroplasty. The current study from **London (UK)** aimed to assess the early postoperative period in patients who undertook conventional jig-based total knee arthroplasty (TKA) and those who had a robotic-arm assisted TKA.<sup>2</sup> The authors of this study report on the outcomes of 40 consecutive patients undergoing conventional jig-based TKA followed by 40 consecutive patients receiving

robotic-arm assisted TKA. This single-surgeon series had a standardized medial parapatellar approach with use of identical implant designs and postoperative inpatient rehabilitation. The robotic-arm assisted TKA group had reduced postoperative pain, decreased analgesia requirements, reduction in postoperative haemoglobin levels, shorter time to straight leg raise, decreased physiotherapy requirement, and improved maximum knee flexion at discharge. There was a marked difference in time to discharge (77 hours vs 105 hours), which carries with it associated capacity and cost benefits. Although this is a short-term follow-up of a small number of patients, there are clearly some exciting data presented here. Whilst this series does not prove any long-term benefits, a larger series with longer follow-up could assess the apparent hospital benefits and the potential for a sustained longer-term improvement.

### How fast should a total knee arthroplasty be performed?

■ In this day and age, in which the costs of health care are subjected to ever greater scrutiny, there has been much focus on increasing the productivity of expensive resources such as theatres. Some strategies revolve around parallel lists, several anaesthetists, or simply cutting the operative time itself. While a shorter operative time reduces the risks of infection and blood loss, reducing care taken at critical points will not help maintain safety or optimize the

patient's result. Using the example of knee arthroplasty in a large sample of patients, this paper from **Cleveland, Ohio (USA)** set out to examine a very large number of cases.<sup>3</sup> The authors used registry data to analyze the outcomes of 140 199 total knee arthroplasties. Their data revolved around the National Surgical Quality Improvement Program (NSQIP) data and attempted to relate the effect of operative time (skin-to-skin) on various medical and surgical complications within 30 days of surgery. The authors utilized a multivariable logistic regression model with spline regression models to attempt to adjust for the effects of any covariates. The authors report that, in their study, longer operative times were associated with higher risks of readmission, reoperation, surgical site infection, wound dehiscence, and transfusion. There was a steady increase in the likelihood of complications; however, the authors established a slightly pronounced increase when the operative time was longer than 80 minutes. Whilst this is an interesting observational study, there are some dangers in taking the result truly at face value. Although the increased operative time is associated with these complications due to the way the data were collected, it is not possible to say if the increased time was as a result of slow surgery or whether it was due to more complex surgery (such as bone loss or fixed flexion deformity), which in itself is associated with a higher complication rate.