ROUNDUP360

Hip & Pelvis

X-ref ***For other Roundups in this issue that cross-reference with Hip & Pelvis see: Trauma Roundup 5; Children's orthopaedics Roundup 4; Research Roundups 1, 5 and 6.***

Bisphosphonates to stop the hip loosening?

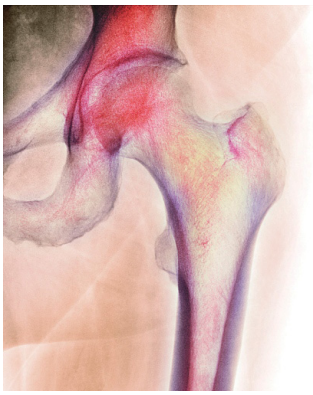
There seems to be a slight trend back towards greater use of cemented acetabular components, especially in the older patient population. The evidence from registries suggests that they probably have a slightly better longevity, and come with less in the way of costs and intra-operative complications. The technique, however, is somewhat more demanding. Post-operative radiolucency around cemented cups is a recognised phenomenon, and although this is by no means pathognomonic of loosening, there is a recognised association with loosening and component migration. This Swedish paper from **Linköping (Sweden)** reports on the outcomes of an interesting potential intervention investigated in the form of a randomised controlled trial (RCT).[1] The investigators have examined the application of local bisphosphonate to plain saline-soaked gauze against the bone bed prior to cementation in cemented hip replacement. These investigators enrolled 60 participants in the randomised double-blinded controlled trial, with outcomes assessed using radiostereometric analysis at three, six, 12 and 24 months. The intervention was saline containing ibandronate. Other potential confounding variables (such as implant design and surgical approach) were appropriately standardised, and the randomisation was undertaken outside theatre to blind surgeons and theatre staff to which solution was used in each case. Perhaps surprisingly, once the RSA has been undertaken serially between three days and 24 months, in the intervention group component migration was roughly halved *versus* that in the bisphosphonate cohort. There were also substantial differences seen in the detection of radiolucent lines (over four times as likely with saline only). Although there was no difference in clinical outcomes at two-year follow-up, this would not be expected given the very low failure rate of the intervention. It could certainly be postulated that there may be longer-term implications to this finding. Bisphosphonates work both through inclusion in the hydroxyapatite crystal and as a direct effect on the osteoclasts through action on the FPPS pathway, affecting the ability of the osteoclasts to resorb bone. Happily, the half-life of bisphosphonates is in the order of years and so the effect could be expected to be long-lasting. Without a more firmly established correlation between early lucency and failure, extrapolation of these early results to long-term failure rate would be rash, however, it will undoubtedly be interesting to see the longer-term follow-up results from this cohort.

Transient osteoporosis of the hip

Most surgeons running hip or general orthopaedic clinics will encounter transient osteoporosis of the hip (TOH) from time to time. Although well described, there is a relatively low incidence and, as such, this review of the existing literature from **New York, New York (USA)** is welcome.[2] Unfortunately, no detailed information is provided regarding the methodology used to identify the studies included, and therefore the reviewers have potentially missed a number of papers. Again, perhaps unsurprisingly, the paper is discursive rather than scientifically analytical, the conclusions drawn by the authors are certainly supported by the published work they cite, and provide a valid overview of this important but perhaps rarely discussed topic. Broadly speaking, the authors conclude that TOH likely comprises part of the same spectrum as avascular necrosis (AVN) of the hip, and, indeed, many of the risk factors listed (trauma, alcohol, steroids, and so on) are the same as those known to be predisposing to AVN. The key difference here, of course, is that TOH resolves spontaneously in the vast majority of cases, whereas with AVN progression is a far more likely outcome. The authors observe that TOH may itself carry on to overt AVN in rare instances. The course of the disease is relatively short and a good body of evidence supports the spontaneous TOH resolution to be expected ordinarily within months of onset. Although the evidence itself was limited, that which was presented and available suggests that existing literature does not support either short- or long-term clinical benefit to core decompression in TOH; the management is medical. As far as medical management is concerned, although there were no RCTs available, there was some evidence that the use of calcitonin, teriparatide or bisphosphonates can expedite the resolution of symptoms, and that this should be accompanied by a period of restricted weight-bearing. Fracture is most likely to occur in pregnant women. This is a well written overview with appropriate conclusions drawn, and serves as a helpful update to those managing or diagnosing TOH in clinic.

Extending the anterior approach

One of the criticisms widely levelled at proponents of the direct anterior approach (DAA) to the hip is that it does not offer the same extensibility as either the lateral approach or, more particularly, the posterior approach. Despite this, the DAA is undoubtedly gaining popularity among hip surgeons. The lack of extensibility to this approach has been perceived by many as a significant limitation in the revision context and even in primary cases, where, should intra-operative complications occur, having limited access can be a substantial problem. In this, a fascinating paper from **Leuven (Belgium)**, the authors first describe prosthesis implantation into a cadaveric specimen through a DAA, with subsequent deliberate creation of a periprosthetic fracture, which was fixed by extending the same approach distally.[3] The surgical technique, which is discussed in detail, is



based around understanding of the anatomy of the neurovascular bundles encountered, and the importance of preserving them to maintain function in both vastus lateralis and vastus intermedius. The main body of the paper then describes five patients undergoing femoral component hip revision through the described extensible DAA – four following periprosthetic fracture, and one with component loosening requiring extended trochanteric osteotomy to allow cement removal. In all five clinical cases, the fractures healed within six months, and all showed normal strength in all portions of quadriceps clinically (despite one patient having EMG evidence of denervation). This study is of undoubted interest both to surgeons already regularly undertaking primary hip replacement through the DAA and to those hitherto reluctant to do so due to concerns about extensibility. While it is again likely, as with primary DAA hips, that there will be a reasonably extended learning curve, the authors of this paper are potentially enabling a broader application of the DAA than perhaps previously recognised.

Not all dual mobility cups are equivalent

The dual mobility cup certainly appears to have a role in reducing the rate and incidence of dislocation following hip revision surgery, and we have previously reported on papers here at *360* that have purported to reduce dislocation rates. The National Joint Registry (NJR) clearly demonstrates that the use of such devices is on the increase, and surgeons should perhaps be cognisant of these types of implants as options. This nicely written review article from **Genay (France)** evaluates the literature on the design variations seen between different brands, and clarifies the way that design concepts have evolved.[4] This is essential reading for any surgeon planning to undertake surgery using these implants. The author identifies four key factors in improving outcomes, the material of the outer shell, fixation strategy, polyethylene design and linkage.The wear rates are known to be lower when the outer metal shell has a cobalt-chrome liner and, hand in hand with this, uncemented acetabular fixation has superior longevity to cemented, with porous coating outperforming grit-blasted shells. The new intraprosthetic dislocation risk can be minimised by employing particular polyethylene design features (which specifically include bevelling of the polyethylene edge and overcovering the upper portion of the femoral neck). Perhaps less surprisingly, given the head diameters employed in these dual mobility designs, higher levels of polyethylene cross-linkage confer better wear properties. Although at first glance this paper might seem somewhat esoteric, the fact that there are remarkably wide variations in the design and manufacture details of the different dual mobility products currently on the market is clearly important. Since most surgeons are only 'occasional' users of these implants, understanding the design implications of dual mobility prosthesis is imperative. It is not enough simply to think of 'dual mobility' as a design feature in itself, and surgeons using these implants would do well to acquaint themselves with the findings of this paper.

Proximal femoral replacement for severe femoral bone loss

There are a number of reconstructive options available for failed total hip arthroplasties (THAs) with extensive femoral bone loss. These include the use of a modular fluted tapered stem, porous-coated stem, impaction allograft techniques, allograft/prosthetic composite, resection arthroplasty and proximal femoral replacements (PFRs). In comparison with other techniques, one of the main advantages of a PFR is the rehabilitation, with early full weight-bearing a possibility. However, on the flip side, the main disadvantage is an increased risk of dislocation due to the loss of the proximal femoral soft-tissue attachments. The authors of this paper from **Rochester, Minnesota (USA)** reviewed a total of 44 patients who underwent revision THA with a PFR (Stryker Global Modular Restoration System (GMRS); Stryker, Kalamazoo, Michigan).[5] The mean age at the time of surgery was 79 years (53 to 97), with the indications for revision including aseptic loosening, periprosthetic fracture, prosthetic joint infection and instability. The mean number of operations prior to the PFR was three and, as would be expected, all patients had significant proximal femoral bone loss. A constrained liner was used in 23 patients and a dual mobility construct was used in one to reduce the risk of dislocation. In the remainder of patients, femoral head size ranged from 22 mm to 44 mm. At a mean follow-up of six years, 22 patients had died due to reasons unrelated to the PFR, and five patients were lost to follow-up. The mean five- and ten-year survivorships, free from re-operation, were 81.7% and 62.4%, respectively. The two PFRs revised were converted to resections (one each for infection and loosening). Twelve patients had a complication, with six (13.6%) suffering dislocation. Of the dislocations, one was treated with a closed reduction, one required a revision with an elevated liner, and four required revision to a constrained liner. This study highlights the difficulty of managing patients with extensive femoral bone loss, with 14% of patients reviewed suffering a dislocation. Nonetheless, clinical results were relatively good, with the Harris Hip score improving significantly post-operatively, despite very poor pre-operative function and the poor general health of the patients. This series is one of the biggest of its kind and the findings are in keeping with other studies. The most significant factor responsible for re-operation was dislocation, with patients requiring an acetabular revision or liner exchange. Reassuringly, the rate of aseptic loosening was low but this can be explained by the fact that these elderly patients had relatively low functional demands, and the lack of a viable further revision option. There are various techniques to try and reduce the risk of dislocation of a PFR including bivalving the bone proximal to the femoral osteotomy and 'clam-shelling' the proximal bone around the PFR, so preserving the abductor mechanism. However, if the proximal bone fails to bond to the PFR, the component can move within the proximal bone, causing considerable pain to the patient. Alternative strategies include a large head with an elevated liner or a dual mobility cup or constrained liner. At present, there is no obvious consensus as to which technique in the context of a PFR is the most successful at reducing dislocation. While uncemented modular fluted tapered stems are becoming increasingly popular, they are not always the best option in elderly patients. These patients usually have very poor bone quality, placing them at risk of intra-operative fracture and complications from restricted weight bearing post-operatively. This is one of the largest contemporary studies reviewing patients who have undergone a PFR and, although the sample size is small as this procedure is relatively uncommon, it has some important take home messages for the revision hip surgeon.

THA in patients with cerebral palsy X-ref

Hip arthritis is not an uncommon sequela in patients with cerebral palsy. Arthritis can develop due to hip subluxation secondary to flexion and adduction contractures, coxa valga and increased femoral anteversion.

This is disabling, making walking, standing for prolonged periods or sitting extremely difficult, and adversely affecting the patients' quality of life and even resulting in a loss of their independence. Total hip arthroplasty (THA) in cerebral palsy has had mixed results, with studies reporting an increased risk of dislocation and aseptic loosening, as well as infection. The second study from **Rochester, Minnesota (USA)** in this month's *360* sets out to compare primary THA in patients with cerebral palsy with a matched cohort of patients with uncomplicated osteoarthritis.[6] The focus of this paper is a series of 39 patients with cerebral palsy who underwent a THA and are retrospectively compared with a group of patients with uncomplicated arthritis. All patients were treated with an uncemented acetabular component, however, there was a major difference in cemented femoral components in patients with cerebral palsy (44%) compared with those patients without (8%). Both groups were reported to a mean follow-up of seven years. Revision surgery was required in five patients with cerebral palsy; two for acetabular aseptic loosening, two for recurrent instability and one for deep infection. The mean implant survival was 92% at two years, 88% at five years, and 81% at ten years and also at 15 years. There were no differences in overall implant survival and there was no increased risk of re-operation or increased risk of complications. Of particular note, there was no increased risk of dislocation, infection or acetabular loosening. Patients with cerebral palsy who underwent a THA for arthritis with severe or moderate pain pre-operatively reported a significant reduction in their pain post-operatively, with the majority also reporting an improvement in their ability to walk independently, with some not requiring a walking aid. This study is not without its limitations, however, it does highlight this very important patient group which sadly often gets neglected. This study underlines the potential for good results, and emphasises the fact that denying patients an improved quality of life, not only in terms of their pain but also potentially mobility, would seem unreasonable. Although the risks of THA are high, perhaps we should re-evaluate the threshold for THA in patients with cerebral palsy.

Health-related quality-of-life outcomes using the SF-6D

In the era of bundled payments, it is vital to obtain patient-reported outcomes. With the majority of healthcare systems moving towards this approach, both in the USA and in other Westernised healthcare systems, 'payers' are requiring objective evidence of what they are paying for. The two options, of course, in general terms are diagnosis- or domain-specific scores (such as the Oxford Hip score used in the UK as part of the NJR follow-up) or more general quality-of-life measures such as the EuroQol-5D, Short-Form (SF)-36 and SF-6D. In the USA, the bundled payment models do not specify which outcomes are necessary to determine performance of the intervention and unit. A range of qualitative and scoring-based research for more contemporary randomised controlled trials has suggested that, in orthopaedic patients at least, generalised quality-of-life measures can be as discriminatory, specific and responsive as other measures, with the advantage that health-related quality of life can also be calculated. This paper from the **USA** sets out to validate the SF-6D as a simple score in order to establish whether it can be used to determine outcomes following total hip arthroplasty.[7] This study is based on the outcomes of 188 patients undergoing arthroplasty at seven institutions. The patients all returned SF-36 scores from which the SF-6D scores were derived. The authors defined effect sizes as small between 0.2 and 0.5, moderate between 0.6 and 0.8, and large at > 0.8, and the results were compared with Lower-Extremity Activity Scale and Harris hip scores for clinical correlation. Quality of life is a key outcome after total joint arthroplasty, and this study nicely demonstrated that the SF-6D is adequate for determining quality-of-life outcomes, reflecting expected effect sizes and correlating with clinical scores. As the 'age of data' continues and clinicians continue to be judged not just by their complications but by their reportable outcomes, we would all do well to have quality-of-life information at our fingertips, and certainly for hip replacement the SF-6D would provide that.

Assessment of the equivalence of a generic to a branded femoral stem

In the push for more and more cost savings, the concept of 'generic' arthroplasty components has raised its head. With the potential to save costs on the one hand, the huge problems associated with the Capitol hip (a 'generic' Charnley stem manufactured as a copy by 3M) spring to mind. We were delighted, here at *360*, to read this article from **Stanmore (United Kingdom)**.[8] In this hugely important article from the group at the London retrieval centre, generic copies of the established Exeter femoral stem (OptiStem XTR) were tested for the claims of equivalence to the 10A* Exeter. The paper concerns a series of detailed material science testing of ten stems (five Exeter and five OptiStem XTR). The examiners were blinded to the implant design and manufacturer, and independently tested the mass, volume, trunnion surface topography, trunnion roughness, trunnion cone angle, caput-collum-diaphyseal (CCD) angle, femoral offset, stem length, neck length, and the width and roughness of the polished stem shaft using well established and validated techniques. Rather surprisingly, the differences were marked. The OptiStems were lighter, had a rougher trunnion surface, greater trunnion cone angles, and a smaller radius at the top of the trunnion. There were no significant differences in stem volume, CCD angle, offset, neck length, stem length, shaft width or surface roughness of the polished surface. Although these stems are superficially similar on testing of just five examples, there are marked differences in the components in terms of mass, and trunnion geometry. In the recent past, hip resurfacings have taught us that apparently subtle changes can sometimes lead to disastrous consequences. Shortcuts for cost savings may not actually save money in the long run. We would counsel caution with these 'me too' copies. Although the patents may have run out on a range of established implants, a lack of copyright protection does not mean that claimed equivalent implants are manufactured or finished in the same way.

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