

ROUNDUP³⁶⁰

Children's orthopaedics

ABC treated with suction and curettage only

■ The treatment of an aneurysmal bone cyst (ABC) varies dramatically between units and surgeons. Described treatments include everything from aspiration to excision and grafting. While there is little evidence comparing different treatment strategies, the less extensive surgical options are tempting because they carry lower surgical morbidity. Surgeons in **Toronto (Canada)** reported a retrospective comparative series (Level III evidence) to establish whether open debridement and intralesional curettage was required in every case or if a percutaneous approach with decompression and percutaneous curettage was just as effective. The investigators used the Neer/Cole classification of radiographic healing, and follow-up was to a minimum of two years. The study population consisted of 17 children: nine treated with percutaneous surgery and eight with open intralesional curettage. At time of presentation patients had a mean age of 11.7 (1.7 to 17.5). There were no significant differences in age, gender, ABC type or re-interventions between the two groups. All children except three (two percutaneous and one open) had successful treatment with the primary procedure and satisfactory healing. Those failing primary treatment were successfully treated with a second percutaneous curettage.¹ It seems to us at 360 that while this is only a small case series, as the literature stands, this may represent the gold standard treatment of these benign aggressive

lesions. Next time you are treating an ABC perhaps you should reach for the angled curette.

Peri-acetabular osteotomy: the determinants of success

■ Assessing the efficacy of the treatment of hip dysplasia is incredibly difficult. It is also relatively uncommon, and results are measured in decades rather than years. Recently the more complex multiplanar osteotomies such as the peri-acetabular osteotomy have become more commonplace in paediatric orthopaedics, but the treatment (as ever) has galloped away from the evidence supporting its use. Perhaps a more important question to answer than the outcomes of a particular intervention is: what are the predictors of the patient doing well? Researchers in **Aarhus (Denmark)** designed a prognostic study (Level II evidence) to establish what the determinants of poor outcome were in patients undergoing peri-acetabular osteotomy (PAO) for prevention of subsequent degenerate change. They designed a retrospective review of 401 hips (316 patients) who underwent a peri-acetabular osteotomy over a nine-year-period. The study was designed to establish survival rates, function after PAO and identify the predictors of failure following PAO. Outcomes were assessed clinically (WOMAC score) and radiologically at a mean of eight years follow-up. Failure rate was 25% at 12 years, with 13% of patients having WOMAC scores suggestive of clinical failure at final follow-up. Significant factors

predisposing to failure included age > 40 years, a post-operative centre-edge angle of < 30 or > 40, an acetabular index of > 10, joint space width of < 3 mm, a pre-operative Tonnis grading of 2 or more and post-operative incongruence.² The research team have established that PAO is able to preserve 75% of hips by 12 years, and that those hips with greater congruity and centre-edge angles perform better in the long run. Here at 360 it seems to us that the underlying message, from what is likely the largest prognostic series treated in this way, is not rocket science: don't operate on older patients with arthritic hips and if you do operate, perform the surgery well.

Small details matter most: cast index revisited

■ While large deformities will remodel in younger children and even when they don't, residual deformity is often surprisingly well tolerated; occasionally some children are symptomatic with surprisingly small deformities. The bread and butter of paediatric trauma practice is manipulation under general anaesthesia, typically of the forearm, but often other fractures as well. The success (or otherwise) of such a treatment is not just reliant on the quality of the reduction but on the quality of the cast holding the reduction. The cast index was first introduced as a concept by John Charnley, calculated as the ratio of the sagittal to coronal width of the cast and is a method of assessing the quality of cast moulding. A research team from **Well-**

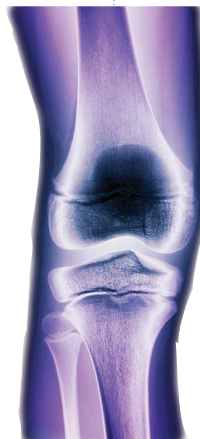
lington (New Zealand) designed a retrospective study (Level IV evidence) to establish the relationship between cast index (CI) and maintenance of reduction. They included 1001 children who had undergone manipulation of a forearm fracture under anaesthesia. Re-displacement, together with the CI, was assessed at two weeks following manipulation and defined as > 15° of angulation or > 80% translation. Fracture re-displacement (slippage) was found in 10.7% of cases (107/1001). The researchers established that fracture re-displacement was seen in 5.58% of patients with a cast index of < 0.8 and 26% of those with a cast index of > 0.8. There were no differences seen between the two groups for other demographics (age, gender), fracture characteristics (initial deformity, displacement or adequacy of reduction) or surgeon seniority.³ Attention to detail is essential in all branches of surgery, and this paper serves to highlight that this includes casting and splinting. The authors have effectively illustrated the need to perform adequate moulding after manipulation and established the utility of CI in assessing this. It is a little disappointing to us here at 360, however, at such a missed opportunity for a refined analysis. Given the volume of data and work that has gone into this investigation we would have loved to see a more refined exploration of the CI and its relationship to displacement; selecting arbitrary cutoffs really doesn't quite cut the mustard these days.

Chicken or egg? Perthes' disease associated with accidental injury

■ Although the true cause of Legg-Calvé-Perthes' (LCP) disease is not known, and is in all likelihood multifactorial, we are not short in the orthopaedic literature of theories and supposition as to how it may occur and what the predisposing factors are, occasionally (but not always) backed up by some reasonable evidence. One such theory is that patients/people/we may be predisposed to LCP by repetitive trauma. A combined research team from **Stockholm (Sweden)** and **Gorgan (Iran)** took a very novel approach to attempt to shed some light on the situation. Reasoning that if people/patients really are predisposed to LCP by repetitive trauma, it follows that patients with this condition will have a higher incidence of injuries requiring hospitalisation and treatment. They used a population registry approach to study 2579 patients with LCP in Sweden over a 31-year-period. These were matched by age, gender and geographic location to 13 748 controls, and a Cox proportional hazards model was used to perform risk analysis. The results were surprising, to say the least. The research team established that the risk of injury requiring hospitalisation for soft-tissue damage or fracture was significantly higher in the LCP group (Hazard ratios of 1.3 and 1.1, respectively), but this only applied to lower limb injuries.⁴ While the research team have demonstrated an association, the boffins here at 360 feel they have not yet established causation. Although a fascinating observation, this could be explained in many ways. Perhaps, as the authors suppose, patients with LCP also have hyperactivity and a higher rate of injury. Or, perhaps due to their hip pain, they are clumsier, or using crutches and fall more frequently. This study isn't able to tell us the answer, but it does irrefutably establish that LCP is associated with higher rates of injury. The explanation, however, is currently elusive.

New hope for brachial plexus birth palsy

■ Although a rare condition, brachial plexus birth palsy associated with glenohumeral dysplasia is catastrophic. The most currently used surgical technique is to perform an external rotation osteotomy of the humerus. This acts to transpose the existing arc of shoulder movement to a more functional position, but comes at the cost of loss of external rotation. Surgeons in **New York (USA)** have developed a new surgical technique that combines glenoid anteversion osteotomy and tendon transfers with the aim of maintaining active external rotation. The authors designed a cohort study (Level IV evidence) to evaluate the efficacy of this technique. Their cohort consisted of 32 children (median age 6.8 years), all with birth-related plexus palsy and subsequent glenohumeral dysplasia. All patients had developed a Waters type-III, IV, or V glenohumeral dysplasia and underwent a combined surgical approach of glenoid anteversion osteotomy and tendon transfers over a three-year period. Outcomes were assessed using the Mallet Score, Active Movement Scale, radiographic outcomes and measurement of range of movement. Patients were followed up to a mean of 20 months. Post-operatively, patients achieved an improvement in active and passive range of external rotation (43° and 82° , respectively) at the cost of a loss of 26° of internal rotation. Patient's Mallet score improved by four points and both glenoid orientation and humeral head position improved in all cases.⁵ This series represents a new joint-preserving alternative to the traditional external rotation osteotomy of the humerus. The increase in active range of movement is enough in itself to convince us here at 360, but with the



radiographic improvements in joint orientation it may be that the long-term outcomes for these patients, by reducing subsequent degenerative disease, make this surgical option a no brainer. Time will tell.

MRI assessment of DDH

■ The radiographic assessment of patients with developmental dysplasia of the hip (DDH) still relies, for the most part, on the acetabular index, which is the angle formed between the roof of the acetabulum and Hilgenreiner's line. Reasoning that this only takes into account the orientation of the bony acetabulum and with MRI it should be possible to further refine this into bone and cartilage, a research team in **Shenyang City (China)** set about determining the value of MRI in assessing acetabular development in normal patients and those with DDH. The research team undertook MRI scanning of 85 children with DDH as the study group, and 241 normal children as a control.

All children received a single MRI examination of their hips. The authors defined the Osseous Acetabular Index (OAI) and the newly described Cartilagenous Acetabular Index (CAI), which were measured on the coronal images and defined in the same way as the bony cartilagenous index. In the first stage of the study they documented the age-related changes of both OAI and CAI. The OAI was found to have a high correlation with the acetabular index on plain radiographs. They showed a decrease in the CAI from a mean of 10.17 to 8.25 in the first two years of life, after which time it stabilised at a mean of 8.04. CAI seemed to match OAI in the quantification of acetabular dysplasia, but to a lesser degree. The authors established that the CAI was more sensitive for mild dysplasia in children with contralateral hip involvement.⁶ Time will tell if this slightly more involved method will yield enough

additional data to warrant the use of an MRI scan in patients with DDH. We are certain that as more and more patients receive more complex investigations the transition of traditional plain film measures like acetabular index to 3D imaging will happen. At 360, we are undecided whether the additional information provided is of any clinical use.

Total meniscectomy: as bad as we thought

■ Total and subtotal meniscectomy have about as bad a name as any procedure in orthopaedics, with many patients presenting for early TKR with a familiar story of a football injury in their youth and the classic scarring of an open meniscectomy. It's easy to condemn historic treatments, but without arthroscopic surgery and in the presence of a bucket handle tear there was no other option. The question, however, remains: how bad is bad? Researchers from **London (UK)** thought it was about time that the very long-term results of total meniscectomy were reported, and consequently conducted a study into the sequelae of total meniscectomy in a cohort of 53 adolescent patients. At the time of their injury the patients had a mean age of 15.6 years and follow-up was to a mean of 40 years (33 to 50). At the time of final follow-up, 13.2% had undergone TKR and 81% of operated knees (compared with 18% of contralateral knees) had signs of osteoarthritis. This represents a more than 100-fold increase in expected rates of TKR when compared with geographically and age-matched peers.⁷ While this paper is really only a curio, as the practice of total meniscectomy has, for good reason, almost completely ceased, it did set us thinking at 360. We wondered how much of the observed OA rate was due to the original injury, and how much was to do with the meniscectomy. Perhaps as cohorts of arthroscopically-treated patients start to reach similar time points we will be able to find out the answer to this vital question: is it the injury or the treatment that was the problem?

Paediatric septic arthritis: a fickle diagnosis

■ Generally speaking, in most cases in traumatology and orthopaedics, reaching the diagnosis is not the tricky part; it's making the correct treatment decision. Nothing could be further from the truth of this statement than in suspected septic arthritis of the hip. The treatment decision is straightforward, it's reaching the diagnosis that can be difficult. Surgeons in **Pokfulam (Hong Kong)** have shared their experience of a retrospective series (Level IV evidence) collected over a ten-year period. They have designed their study to pay particular attention to physiological and clinical parameters known to be associated with septic arthritis. Over the ten-year period

there were 31 confirmed cases of septic arthritis of the hip treated in the investigating centre. The authors note that, of the diagnostic criteria widely used throughout the world, in their centre only 52% had a fever and 71% had a raised white cell count. Blood cultures were similarly unhelpful and provided no positive findings. While the majority (42%) were caused by *Staphylococcus aureus*, 24% were caused by a group A streptococcus infection. Interestingly in the streptococcal group, 71% suffered complications including further surgery and organ failure.⁸ This paper emphasises the need for comprehensive evaluation of patients on admission, including senior clinical review, as simple investigations do not have a high diagnostic

accuracy. It was disappointing that the research team were unable to shed light on the value of acute ultrasound- and ultrasound-guided aspiration in this report, something we at 360 have all found highly valuable in the evaluation of these patients, particularly when they present as a bit of a diagnostic conundrum.

REFERENCES

1. **Ibrahim T, Howard AW, Murnaghan ML, Hopyan S.** Percutaneous curettage and suction for pediatric extremity aneurysmal bone cysts: is it adequate? *J Pediatr Orthop* 2012;32:842-847.
2. **Hartig-Andreasen C, Troelsen A, Thillemann TM, Søballe K.** What factors predict failure 4 to 12 years after periacetabular osteotomy? *Clin Orthop Relat Res* 2012;470:2978-2987.
3. **Kamat AS, Piersie N, Devane P, Mutimer J, Home G.** Redefining the cast index: the optimum technique to reduce redisplacement in pediatric distal forearm fractures. *J Pediatr Orthop* 2012;32:787-791.
4. **Hailer YD, Montgomery S, Ekblom A, Nilsson O, Bahmanyar S.** Legg-Calvé-Perthes disease and the risk of injuries requiring hospitalization. *Acta Orthop* 2012;83:572-576.
5. **Dodwell E, O'Callaghan J, Anthony A, et al.** Combined glenoid anteversion osteotomy and tendon transfers for brachial plexus birth palsy: early outcomes. *J Bone Joint Surg [Am]* 2012;94-A:2145-2152.
6. **Li LY, Zhang LJ, Li QW, et al.** Development of the osseous and cartilaginous acetabular index in normal children and those with developmental dysplasia of the hip: a cross-sectional study using MRI. *J Bone Joint Surg [Br]* 2012;94-B:1625-1631.
7. **McNicholas MJ, Pengas IP, Assiotis A, et al.** Total meniscectomy in adolescents: a 40-year follow-up. *J Bone Joint Surg [Br]* 2012;94-B:1649-1654.
8. **Kuonng EE, To M, Yuen MH, et al.** Pitfalls in diagnosing septic arthritis in Hong Kong children: ten years' experience. *Hong Kong Med J* 2012;18:482-487.