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Children's orthopaedics

X-ref ***For other Roundups in this issue that cross-reference with Children's orthopaedics see: Knee Roundup 7; Trauma Roundups 3 and 7.***

Supracondylar fractures and lateral wires X-ref

Two worthwhile papers take another look at the topic of lateral wire fixation compared with the more traditional 'crossed' wire configuration in supracondylar fractures. In the first of this brace of reports, clinical results from **Cairo (Egypt)**[1] are reported of an investigation into wire configuration and stability in supracondylar fractures. This original paper reports a randomised (allocation concealed), unblinded, controlled trial with six months' follow-up at a Level I trauma centre. It involved 60 children (mean age 5.1 years; 70% boys) and was designed to establish if there is a difference between dual lateral and crossed wires. Patients were assessed six months after closed reduction and K-wiring, and the main outcome measures were radiological evidence of fracture stability, range of motion, ulnar nerve injury, and pin-track infection. Undisplaced Gartland type I fractures, open fractures and fractures associated with vascular injury, compartment syndrome, or pre-operative ulnar nerve injury were excluded from this study. The initial findings of this paper suggest that a medial and lateral pin configuration improved stability of supracondylar humeral fractures when compared with two lateral-entry pins in children managed with closed reduction and percutaneous pinning by junior trainees. The commentary suggests that things aren't always as they seem. To the casual reader, the original paper legitimises the use of medial wires, and superficial analysis of the data tends to support this prejudice. However, there are some significant methodological deficiencies which are ably discussed in the commentary.[2] There is a particular criticism about the role of junior trainees assisting junior trainees, and important confounding factors including time to procedure, swelling, and time of procedure were not mentioned in the initial paper. We would tend to agree with the commentary in that the original paper lacks a clear definition of outcome and the findings of this trial have limited implications for the treatment of supracondylar humeral fractures in the general clinical setting. This paper does, however, make a start in terms of subjecting what is an increasingly divergent view between surgeons to the rigours of randomised methodology – we look forwards to the inevitable larger trial with perhaps more tightly defined outcome measures.

Femoral head revascularisation can be monitored with perfusion MRI

Monitoring the clinical outcome of patients with Legg-Calvé-Perthes disease can be somewhat difficult, with patients generally monitored based on their symptoms and serial radiographs. Investigators in **Dallas, Texas (USA)**[3] have put the relatively new modality of perfusion MRI scanning to the test in the evaluation of disease progression in Legg-Calvé-Perthes. Perfusion MRI scanning was performed on 29 patients (30 hips) with a mean age of 8.4 years, all presenting with Waldenström stage I/II of the disease. The scanning was undertaken as part of a prospective study and, as such, all patients had two or more scans and 21 patients (22 hips) had three or more. Perfusion percentages of the femoral epiphyses were measured by two independent observers and perfusion on initial scan ranged from 5% to 70%. Serial assessment demonstrated a pattern of revascularisation from the periphery of the posterior, lateral and medial aspects of the femoral epiphysis and converging towards the anterocentral region. The average rate of revascularisation was 4.9% per month (± 2.3) within a wide range (0.6% to 10.4%). This paper introduces the tantalising concept of perfusion MRI as a useful imaging modality in the assessment of revascularisation in Legg-Calvé-Perthes. Use of this method will likely become the benchmark for evaluation of this condition and is therefore important from a methodological perspective, as further studies are undertaken.

Microfracture an option for osteochondritis dissecans of the capitellum X-ref

Osteochondritis dissecans of the capitellum can be a tricky condition to treat. It is not always self-limiting and in more severe cases it can be functionally limiting. Perhaps clouding decision making further, it is relatively poorly studied and occurs in active adolescents, thus decision making is often difficult. Loose body removal with drilling or microfracture is a viable treatment option in the young athlete. The majority of patients with grade IV elbow osteochondritis dissecans had resolution of pain and capitellar tenderness, improved movement and elbow function and improvement of radiographic abnormalities at two-year follow-up. The authors from **Boston, Massachusetts (USA)**[4] were able to report the results of an impressive 21 adolescents, all with grade IV elbow osteochondritis dissecans. The surgical team undertook loose body removal and microfracture of the denuded capitellar cartilage. This study reported clinical and MRI follow-up at over two years following this procedure. Patients with additional elbow pathology, prior elbow surgery, or shorter follow-up were excluded. Fifteen of the patients (71.4%) had either clinical or radiographic resolution at the most recent follow-up, and perhaps most impressively, nine (50%) had complete resolution on MRI, with 13 reporting no clinical tenderness at final follow-up. Functionally, the majority (18/21) of patients had returned to sport. The authors also attempted to identify predictors of clinical outcome and it appears that a shorter duration of symptoms correlated with smaller lesions and with improved clinical or radiographic outcome. Clearly, for the more significant grades of osteochondritis the use of foreign body removal and microfracture yields a more than acceptable clinical result, and it is heartening not only to see some research in what can be a

difficult condition to treat, but also the potential for good outcomes for many patients.

Obesity in distal forearm fractures X-ref

■ Paediatric obesity is an unfortunate, but increasing problem. As the world 'expands', the sequelae of obesity becomes relevant, even in the treatment of children and children's fractures. A study team in **Louisville, Kentucky (USA)**[5] set out to determine whether the increasing prevalence of obesity had any impact on the care of the common both-bone forearm fracture in the paediatric population. The study reports a retrospective case note review of 157 consecutive patients, all with distal radial fractures managed with closed reduction. All patients completed the treatment and all fractures eventually healed. Perhaps surprisingly, the population was, for the most part, overweight (66 children, 42%) or obese (46 children, 29%). During the period of study, there were 27 patients requiring further reduction in the operating room following initial treatment. Of these, 14 (12%) were non-obese and 13 (28%) were obese. Obese children were significantly less likely to have an initial perfect reduction in the emergency room. This study identifies obesity as a negative risk factor in the treatment of distal forearm fractures. Orthopaedic surgeons who treat these fractures should be aware of the increased risk of displacement in children who are obese and counsel the parents appropriately. This paper has a simple message for surgeons managing overweight children, and highlights the need for vigilance in the reduction and surveillance of distal radial fractures in this age group.

Hypertension and paediatric bone diseases

■ As public health and health promotion move to the fore with the recognition of increasing health problems in later life from childhood disease, it is heartening to see this report from **Kentucky (USA)**[6] of a newly recognised association between hypertension and obesity-related paediatric bone diseases including slipped capital femoral epiphysis (SCFE) and tibia vara. The authors make the suggestion that there may be a corollary and that anti-hypertensive treatment may reduce the risk of developing these conditions. Blood pressure measurements were obtained from 44 patients with tibia vara and 127 with SCFE, and were compared with age- and sex-matched controls from an obesity clinic. Body mass index and blood pressure were adjusted for age, sex, and height percentiles using normative distribution data. The prevalence of pre-hypertension and hypertension was significantly higher in the tibia vara (64%) and SCFE groups (64%) compared with controls (43%), suggesting a potential causative association. Patients diagnosed with either SCFE or tibia vara were 2.5 times more likely to have high blood pressure compared with age-matched and sex-matched obese patients without bone disease. Sex, age, and race did not appear to have a significant effect on blood pressure. There is increasing interest in the aetiology of developmental conditions including SCFE and tibia vara. This study provides further evidence of an, as yet, unappreciated and potentially reversible association that may explain the changing demographics of this condition.

Botulinum toxin and femoral lengthening

■ This paper reports a single-centre, double-blind, randomised placebo-controlled trial from **Seoul (South Korea)**[7] designed to evaluate the benefit, or otherwise, of botulinum toxin in controlling pain associated with femoral lengthening. The authors report the results of 44 patients (88 femurs) undergoing bilateral femoral lengthening. All procedures were undertaken for a diagnosis of familial short stature. All patients were administered Botox-A (200 IU)

which was injected intra-operatively into the quadriceps muscles of one randomly selected thigh. An equal volume of sterile normal saline was injected in the other thigh as a control. Outcomes were evaluated using a VAS score for pain measurement, ROM evaluation of the hips and knees, and measurement of thigh circumference. Side-to-side differences were analysed throughout the entire consolidation phase and patient outcomes were reported at a mean follow-up of 26 months (14 to 40). There were no differences in elicited range of hip or knee movement, or maximal thigh circumference, between the two lower extremities at any time during the study period. VAS scores were also no different between the patients who received Botox-A and those who received saline. This is a well conducted, suitably powered clinical trial and although there are some methodological curiosities, this study should be read by the generalist. The clinical message is very interesting – there is no demonstrable benefit in the use of botox injections during femoral lengthening. This should dispel a treatment myth and is therefore also useful to specialists involved in limb reconstruction surgery. Local injection of botulinum toxin A in the quadriceps muscles does not appear to reduce distraction-induced pain or increase the range of movement in the hip or knee during femoral lengthening.

Open psoas and adductor releases in the closed management of DDH

■ There are a number of competing schools of thought surrounding the management of developmental dysplasia of the hip (DDH). The team in **Stanmore, London (UK)**[8] have not only popularised their own protocol using open psoas and adductor release with the addition of a short-leg cast, but they have also published the results of over 130 cases to back up their point of view. This series of 133 hips in 120 children all underwent closed reduction before the age of five years. The authors helpfully define an acceptable reduction in their hands and succinctly describe a protocol for concomitant soft-tissue releases. All of their patients were followed up until they either required further surgery or they reached five years of follow-up. The authors report their series and outcomes in terms of Tönnis grade, acetabular index, Severin grade and incidence of osteonecrosis at six weeks, one year, two years and five years. Around 50% were Tönnis grade 3/4 hips, and the authors managed to maintain 85% of reductions at 12 months, with the remainder requiring an open reduction. Of the 113 patients who were successfully managed using closed reduction, 87% were Severin grade 1, and although osteonecrosis was seen in 32 hips, it was transient in all but four. The authors are frank about their results with the higher grade hips and comment that most Tönnis 4 hips failed and that they wouldn't recommend use of this closed reduction protocol for these hips. Overall, this is a nicely defined protocol with some significant supporting mid-term follow-up to reinforce its use in the treatment of DDH with good outcomes.

Iliac crest or tricortical allograft?

■ Bone substitute technology seems to be moving faster than many other areas of surgery, and the option of avoiding donor site morbidity

has some real attractions in the vast majority of patients. Surgeons in **Aarhus (Denmark)**[9] published their interim results of structural grafts used in calcaneal lengthening osteotomies. They designed a radiostereometic analysis-driven study comparing tricortical graft with hydroxyapatite-tricalcium phosphate (HATCP). However, the report only details the first 11 patients, with six months of follow-up, as the study was stopped due to poorer outcomes with the hydroxyapatite graft. At six months' follow-up, the osteotomy had been compressed by 2 mm more in the HATCP group than in the autograft group and for this reason the study was stopped. One could question whether 2 mm of migration outweighs donor site morbidity, however, the more worrying factor was the ongoing migration of hydroxyapatite graft. The authors conclude that they would not recommend the use of this graft for calcaneal osteotomies in this form.

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Research

X-ref ***For other Roundups in this issue that cross-reference with Research see: Knee Roundups 5 and 8; Foot & Ankle Roundup 2; Trauma Roundup 8; Oncology 1.***

Prevention of surgical infection

■ We would draw the attention of all readers to the first ever publication of the WHO guidelines on the prevention of surgical infection. The rather extensive document draws together all of the evidence that currently exists on the best strategies to prevent peri-operative infection and where the best place is to concentrate effort. The author team based in **Geneva (Switzerland)**[1] has aimed to distil all of the evidence in a similar way to that in which national guidance is produced. The most interesting thing for us here at 360 is the emphasis. The guidance emphasises the importance of simple steps, and clearly underlines the evidence to support this approach: "*For many years, environmental contamination was considered to be less important than many other factors in contributing to HAI. However, recent evidence shows that a contaminated health care environment plays a significant role in the transmission of microorganisms.*"

Crossover analysis in meniscal tear: physiotherapy to surgery X-ref

■ There has been much in the academic press in recent times concerning the potential benefits (or usually, otherwise) of arthroscopic debridement of the knee, particularly in degenerative meniscal tears. The evidence would currently suggest that, at least in the setting of degenerative meniscal tears, arthroscopy has little benefit over physiotherapy. Of course, the caveat to this, and perhaps the saviour of the arthroscopic knee surgeon, is the high crossover rate in all published studies which, when undertaking an intention-to-treat analysis, could be said to skew the results somewhat. The academic team in **Boston, Massachusetts (USA)**[2] have undertaken a re-analysis with an attempt to quantify which patients are more likely to cross over from one to the other, i.e. which patients are most likely to benefit from surgery. The study is based around the MeTeOR study and includes 341 patients, of whom 177 were initially randomised to physiotherapy. There was an appreciable crossover rate of 27% (n = 48) who, although randomised to receive physiotherapy, went on to have surgery because their treatment failed. The authors undertook a secondary analysis whose aims were two-fold: to establish which factors were predictive of a crossover to the operative group; and what the six-month pain relief outcomes were on an 'as treated' basis, rather than on an intention-to-treat basis. The factors that appeared to be associated with a reported crossover (within 140 days of starting the trial) on multivariable analysis were a high Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) knee score (a score of > = 40 gave double the risk of crossover) and symptom duration of less than one year (relative risk 1.74). There were similar rates of success in all three groups, with an improvement of 10 points on the pain score in 73% of conservatively treated patients compared with around 80% of those treated either with primary debridement or crossover. This paper suggests that many patients may still benefit from arthroscopy after failed non-operative treatment, and specifically that these patients do just as well as those who were allocated straight to surgery. Putting this all together, a trial of physiotherapy with a three-month review and then proceeding to arthroscopic debridement, if things have not started to improve, seems a reasonable option.

Vitamin D and osteoarthritis of the knee X-ref

■ The literature appears to be full of references to vitamin D, with large numbers of patients admitted for fragility fractures found to have depleted vitamin D levels. There are plenty of studies demonstrating its effect on combatting osteomalacia and osteoporosis. However, although low serum vitamin D levels have been linked to radiological progression of osteoarthritis (OA), there are few studies, and no large scale RCTs, to test the hypothesis that vitamin D supplementation may benefit these patients. A study team based in **Oxford (UK)**[3] set out to establish if vitamin D may indeed have a role