

ROUNDUP³⁶⁰

Children's orthopaedics

For other Roundups in this issue that cross-reference with Children's orthopaedics see: [Spine Roundup 2](#); [Oncology Roundup 4](#); and [Research Roundups 4, 5 and 6](#).

Predicting drift in supracondylar fractures x-ref [Shoulder & Elbow](#)

■ The paediatric supracondylar fracture is one of the most talked about and written about topics in paediatric orthopaedic trauma. Associated in the short term with neurovascular injuries and in the longer term with deformity and tardy ulnar nerve palsy, these are injuries that should not be underestimated. Researchers in [San Diego \(USA\)](#) have recently published their experience of 192 patients treated for a displaced supracondylar fracture.¹ In this large series, the research team focused particularly on the potential for loss of reduction and what the potential predictors of loss of reduction were. The authors defined loss of reduction as a change in position of more than 10° in either the anteroposterior or lateral plane compared with the intra-operative position. In order to assess for predictors of slip, the authors undertook an assessment of the intra-operative films including the number and location of pins, cortical purchase, pin spread at the fracture site and apparent divergence. As would be expected, as all patients had undergone pinning, the majority of the fractures were type II (94) and type III (98). The overriding message of this paper

was that reduction was lost in a very small number of cases (4.2%), and that this incidence was independent of age or gender. There were no fracture characteristics including the type, comminution or location which the authors could identify that were predictive of loss of reduction. In their series, the technical details of fixation were, for the most part, irrelevant and fracture drift was not predicted by the method of fixation including lateral or medial entry or the number of pins. However, the only predictive feature was the pin spread at the fracture site and the recommendation was that pins should be spaced at least one third of the width of the humerus apart at the level of the fracture. This study is elegant in its simple construction with a clearly stated and simple but sensible message. Although this does not represent a definitive work, it does also suggest that controversies regarding medial or lateral entry and type of pin may not be as significant as attention to simple biomechanical details during fixation of these injuries.

Do normal hips dislocate?

■ This paper considers a question that is commonly asked in clinical and medical negligence practice – but one to which the answer is far from clear. It is generally considered in expert circles that once a hip is either ultrasonically or radiologically normal, it will not dislocate. This has been conventional wisdom until a series of recent case reports were published suggesting that this may

not indeed be the case. While not a large robust clinical trial, we feel here at 360 that this paper from [Cambridge \(UK\)](#) considers all of the relevant previous references to the structural deterioration of a previously normal hip, and highlights potential confounding factors in the interpretation of each case.² As good an effort as this is, perhaps a review of this nature should form the basis for a separate research paper and it is somewhat troubling in that this should have been attended to by the reviewers of the journals involved. The authors present a case report in which a child with a previously 'normal' ultrasound represented at the age of one year with an established dislocation. The clear and shocking review of the radiology in their case highlighted important abnormalities in the ultrasound scan which was initially reported as normal. Although controversial, the most important observation in this article is their critique of a case report published in the *Journal of Bone and Joint Surgery* by Jiswal and Kiley.³ They report that the clinical examination in this case was conducted by a practitioner who may not have been experienced in the examination of the neonatal hip and, most importantly, that the ultrasound was not normal and this case should have been kept under surveillance leading to a more prompt diagnosis. This potentially contentious paper is important in that it questions the recent suggestion that a clinically and ultrasonically normal hip can subsequently dislocate. This

is somewhat counterintuitive and the fact that the available literature amounts to no more than a single series suggests that if this were to occur, it would be phenomenally uncommon. This paper goes some way to inform the discussion and questions whether the previous observations are legitimate. This is a simple but thoughtful manuscript which suggests that this phenomenon is an urban myth without any basis in fact.

The burden of trampoline fractures looms large

■ Trampoline injuries are often talked about and there is ample evidence that the increasing popularity of home trampolines has had a detrimental impact on fracture incidence. They are a very common cause for admission in children and generally involve supracondylar or wrist fractures. There has been a recognised upward trend in the United Kingdom and this paper quantifies a similar trend in the North American population. These authors from [Indianapolis \(USA\)](#) have conducted an impressive nationwide estimation of the problem using a database review of the National Electronic Injury Surveillance System.⁴ They queried the dataset for all patients sustaining a trampoline injury, and used the results to establish the demographics of injury and patterns of presentation. In the nine years of records covered by the study, there were just over a million emergency department visits for trampoline injuries, in whom 29% (288 876)

sustained fractures. The average age was 9.5 years and the majority (92.7%) were younger than 16 years. There was a strong preponderance towards upper limb injuries, with 60% occurring in the upper extremity, 36% in the lower extremity and, surprisingly, nearly 5% of injuries occurred in the spine. Upper limb injuries were most commonly the forearm (37%) and elbow (19%), with the tibia and fibula in 40% and ankle 31% of lower limb injuries. While this paper is not earth-shatteringly novel, it provides a large and even evidence base to confirm what is already known, with a much better representation of the demographics of injury. The authors of this paper use this to inform the debate on injury prevention and, in the United States, the estimated emergency expense for all trampoline injuries is 1 billion US dollars and 480 million for fractures. Although there will be subtle population and demographic differences, the effect will be similar and in a socialised health service that is under considerable financial pressure. In an ideal world, these figures would be used to move toward recreational safety in children.

Muscle eversion activity is strongly predictive of outcome in CTEV

■ Congenital talipes equinovarus is a common but eminently treatable condition. The Ponseti method of serial casting and selective intervention has been such a success for the majority of patients that surgical release is now rare in units with well-established Ponseti programmes. However, predicting those patients that will fail surgical release can be troublesome and although there are a number of predictive factors that have been previously identified, the role or otherwise of evertor muscle activity in predicting outcomes for idiopathic and non-idiopathic clubfoot surgery has never been proven. The research team from **London (UK)** documented the outcomes of 103 children with CTEV, of whom 67 had completed follow-up at

two years.⁵ This group included 38 patients with idiopathic and 39 with non-idiopathic deformities. Recurrence was seen in six children in the idiopathic and 14 in the non-idiopathic groups. Evertor activity was documented following clinical examination using a somewhat subjective score, with zero for normal activity, 0.5 for a flicker under skin or toe, flaring without eversion and 1 for no activity. This activity was measured as a response to manual stimulation over the lateral border, with the foot, leg or plantar surface of the foot. In older children this was tested with the child's co-operation when they were instructed to evert against resistance. The authors report the observation of a significant correlation between poor evertor activity and recurrence in both groups of deformity. There was, however, no significant relationship between the initial rate of recurrence, severity of initial deformity, age at time of treatment, number of casts or compliance with subsequent bracing. The explanation for this observation postulated is that inactivity of the everters is the culprit and that inverter transfer could be used as a practical solution. This is at slight odds with the generally accepted explanation that recurrence is a consequence of overactivity of tibialis anterior. This novel and very simple observation has not previously been recorded and is elegantly demonstrated and discussed. It seems to us here at 360 that not only is this observation of interest to surgeons involved in the surgical and non-surgical treatment of CTEV, but it also provides a much more straightforward clinical tool than those currently advocated.

Complication or success? The modified Dunn osteotomy

■ There are few centres that are large enough to be able to provide

any real insight into rare conditions such as operatively treated slipped upper femoral epiphysis. There are even fewer centres that have enough of a reputation to allow the unit to report poor results and be above reproach. One such unit is the Boston Children's Hospital, **Boston (USA)**.⁶ Although the Dunn osteotomy has gained in popularity over the past decade, there is little in the way of evidence to support the increase in popularity of this surgical approach. The researchers from Boston Children's Hospital share their unit's experience with the modified Dunn



osteotomy as a treatment for moderate to severe adolescent slipped upper femoral epiphysis (SUFE). Over an 11-year period, surgeons at the centre treated 43 adolescents (18 boys and 25 girls) with a modified Dunn osteotomy. Patients were followed for two and a half years and their outcomes assessed, particularly with regard to complications. The cohort consisted of a mixture of unstable (60%)

and stable (40%) injuries. The majority of the patients had a severe slip (Southwick slip angle > 50°). The overall complication rate was more than a third, with 22 complications occurring in 16 patients (37%). These included an AVN rate of nearly one in four, with 15 patients requiring revision surgery. The overall complication rates are higher in this cohort than would be expected in the general disease population or those reported in other large series treated with alternative measures. Despite the presence of a senior and experienced surgeon at the procedures, one does have to ask questions about the benefit of this technique. We wonder if the days of the Dunn osteotomy are increasingly short – perhaps with such high complication rates, even in expert hands, the widespread use of this operation should be carefully re-evaluated.

The old ways are still the best ways: plaster and moulded casts

■ Perhaps the most common procedure performed in the paediatric trauma setting is manipulation under anaesthesia and application of a moulded plaster. There is plenty of evidence to suggest that the type of plaster and method of application can profoundly affect the ability of the cast to 'hold' a reduction. Application of moulded plaster, however, is not restricted to the trauma setting and is also widely applied in the treatment of CTEV and with hip spica casts in the post-operative management of patients with developmental dysplasia of the hip. Researchers in **Burlington (USA)** have set out to establish the biomechanical properties of the most common types of plaster cast in use in paediatric orthopaedics; the plaster cast, fibreglass plaster and soft cast.⁷ The study team designed an experimental model using standardised strips of plaster (12.7 cm wide), five layers thick, prepared over two layers of cotton padding and applied round a foam cylinder (to simulate the soft-tissue envelope around the bone). A standardised 'experimental moulding' model was developed using a loading device and simulation of thumb and palm moulding for clubfoot (50 N load on 5.1 cm model), DDH (100 N load on 15.2 cm model), forearm fracture (palm-shaped 50 N load on 5.1 cm model), and femoral fracture (palm-shaped 100 N load on 15.2 cm model). After seven minutes of standardised moulding, the model was removed from the jig, photographed and the maximal deformation calculated and compared between materials. The results of this experimental setup suggest that more precise moulding can be achieved in all of the experimental conditions using plaster cast, with fibreglass cast outperforming soft cast. We have to say we were somewhat disappointed with this paper, here at 360. Although this is a clinically relevant question (and

we are heartened to read that the investigators still recommend the use of plaster cast for precise moulding), we can't help thinking that the aim with moulded plaster is to hold a reduction, not the precision of the divot. This experimental setup leaves a lot to be desired; if the investigators had only looked at the control of simulated fractures or bone models following the application of the moulded plaster, the results of this experimental model would have been so much more useful.

Psychology and fractures

■ Although perhaps on the face of it a little obscure, a research team in **Nanjing (China)** set out to establish if there is any link between psychological-behavioural characteristics and fracture risk in children.⁸ To us here at 360 the question is perhaps not as obscure as it first seems – it is well known that the risk

of fracture is greater in boys than in girls and this is commonly associated with a greater propensity for risk taking behaviour (climbing trees, skateboarding, etc). This research team took these suppositions a little further and decided to study the relationships between psychological-behavioural characteristics and ongoing risk of fractures in children. Their study design included 84 children hospitalised with fractures and 78 without fractures. To these they administered a number of personality and behaviour scores including the temperament questionnaire, Eysenck Personality Questionnaire and the Achenbach Child Behaviour Checklist (CBCL). Using these scores there were some substantial differences between groups. The fracture group were found to have higher psychotic scores, extroversion and neuroticism, as well as higher activity

levels and attention dispersion than the control groups. This is an interesting paper that demonstrates that the risk of fracture is higher when associated with certain psychological characteristics in children. This supports the theory that the personality of children who sustain multiple age-appropriate non-pathological fractures may be a risk factor. Perhaps we should be consulting the psychologist as well as recommending vitamin D supplementation in more northerly latitudes in our paediatric fracture patients!

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