

ROUNDUP³⁶⁰

Children's orthopaedics

For other Roundups in this issue that cross-reference with Children's Orthopaedics see: Trauma Roundup 1.

Spondylolisthesis management strategies x-ref Spine

■ Operative intervention in spondylolisthesis in the growing child is certainly not without its pitfalls. The decision to operate can be one complicated by angst for patients, parents and surgeons alike. To put this decision in context, it is important to understand what the outcomes in the long- and short-term are following non-operative management. Surgeons in **Toronto (Canada)** shed some light on the best treatment for growing children with high grade spondylolisthesis. Reasoning that complication rates are reported to be in excess of 10% and that neurological injury is more common in procedures performed with slip reduction manoeuvres, the study team set out to address what they perceived to be a paucity of literature regarding the benefits of non-operative management in these patients.¹ This retrospective review, like all others, is beset with the risks of selection bias, but none-the-less the authors set out to perform a comprehensive chart review including current quality of life measures (assessed with the Scoliosis Research Society (SRS)-30 questionnaire). Patients were identified from an institutional database and all had Meyerding grade III to V spondylolisthesis. The research team were able

to include a cohort of 53 patients in the study of whom successful follow-up was achieved in 92%. As would be expected, there was a disparate range of treatment strategies, with 25 patients undergoing non-operative treatments (of whom ten subsequently underwent operative fixation for progressive disease). Patients were on average just over 12 years old at initial presentation and were followed-up to just after their 20th birthday. None of the evaluated outcome measures (including SRS score) found any differences between the two groups. The predictors of progression were a higher kyphotic slip angle and poorer SRS-30 scores. The authors recommend a strategy of non-operative 'watchful waiting' in those patients who are minimally symptomatic in an effort to avoid the complications of surgery. This should be undertaken on the understanding that just over 1/3 of patients managed in this manner will eventually end up with a lumbar spine fusion.

Not all cervical collars are even

■ The cervical collar is a stalwart of adult trauma management with patients throughout the world enjoying a helicopter ride to their nearest trauma centre only able to see a 12ft square patch of helicopter ceiling. Tried and tested in the adult, the newest generation of cervical collars are able to provide excellent cervical immobilisation. In the child the situation is somewhat different. Although a number of paediatric specific collars exist, there

is no evidence to support the use of one model or design over another. Worried there may be large variation in the effectiveness of a number of cervical collars, researchers in **Beirut (Lebanon)** set out to establish the primary and coupled angle restrictions imposed by specific paediatric neck collars.² The study team performed a health volunteer study and recruited 30 asymptomatic children and used a motion analysis machine to evaluate the restriction in range of movement of flexion, extension, lateral bending, and axial rotation. The research team evaluated the benefits of four specific paediatric cervical collars (Philadelphia, Miami Jr, Necloc, and the Hard Collar). In all cases the range of movement was controlled by the collars as compared with the unbraced condition. Range of movement obtained in Necloc and Miami Jr showed a significant improvement over that achieved with the Philadelphia and conventional Hard Collars. Based on this study and in the absence of any other data it is reasonable to postulate that the use of the Miami Jr and Necloc collars provides superior control over cervical spine motion and is currently 'gold standard'.

Quality of life with Legg-Calvé-Perthe's disease x-ref Hip

■ While the precise cause of Legg-Calvé-Perthe's disease (LCPD) remains unclear, there have been great strides in understanding of the natural history and behavioural sequelae of the condition recently.

In particular the strong association between LCPD and hyperactivity disorders have been documented as a strong association. Another piece of the jigsaw of the long-term sequelae and impact of these behavioural changes has been contributed by researchers in **Orebro (Sweden)**. They identified 145 patients diagnosed and treated for LCPD at Uppsala University Hospital between 1978 and 1995.³ The research team were able to collate data on 116 patients regarding health-related quality of life (EQ-5D-3L) in addition to physical activity International Physical Activity Questionnaire (IPAQ) and hyperactive/inattentive behaviour pattern scores (ADHD self-reporting symptom checklist (ASRS v1.1)). In addition, a chart review was undertaken for treatment received and patients completed a questionnaire reporting on fractures or soft-tissue injuries that required medical care. The results are quite marked. There is a clear adverse effect on quality of life scores associated with a diagnosis of LCPD with significantly lower EQ-5D-3L scores than the population norms for Sweden in all age groups. In addition, there was an association between LCPD and ADHD (28% of patients' responses on the ASRS suggestive of ADHD) and an association between those patients with ADHD, LCPD and lower quality of life scores. Despite these lower quality of life scores and high rates of ADHD, the authors reassuringly reported that over 90% of their patient group were physically active at a moderate

or high level although almost half experienced pain with activity.

Femoral shaft fractures in children

■ The Cochrane Collaboration has recently published a major updated review concerning the range of interventions available to treat femoral shaft fractures in children.⁴ The review aims to evaluate and compare the commonly prescribed treatments of intra-medullary nailing, external fixation and conservative management. There were ten trials (six randomised and four quasi-randomised) reporting the outcomes of treatment of 531 fractures in 527 children suitable for inclusion in the review. Sadly there were high rates of heterogeneity and all trials were graded 'low quality'. From the evidence presented in the review it is hard to estimate effect sizes accurately or perform any meaningful comparisons, however, surgery did result in lower rates of mal-union at the risk of increasing the frequency of complications. There is some evidence that the use of percutaneous techniques such as elastic stable intramedullary nailing may reduce recovery time. Sadly there was insufficient evidence to draw any conclusions from comparisons of different methods of surgical or conservative treatment about the relative effects of the treatments compared in the included trials. Certainly an area where perhaps another look is justified with a larger multicentre randomised controlled trial.

Congenital Talipes Equinovarus detection not altered by national screening guidelines

■ Prenatal screening with a foetal anomaly scan is commonplace and in most healthcare systems is provided blanket to all expectant mothers. The UK introduced national guidance in the form of the Foetal Anomaly Screening Programme guidelines in 2010 to standardise this process. Researchers in **Norwich (UK)** set out to establish how much

the institution of national guidance affected the detection of Congenital Talipes Equinovarus (CTEV); one of the most common congenital limb deformities in their institution.⁵ The research team reviewed records of all infants receiving treatment for structural CTEV between 1 January 2007 and 30 November 2012. They then cross referenced these patients with the prenatal scans to establish the sensitivity, specificity and negative predictive values of the foetal anomaly scan for the detection of CTEV. Their study covered an impressive number of 95 532 prenatal scans and 34 373 live births. Of these, just 37 fetuses with findings suggestive of CTEV were included in the study of whom 30 had structural CTEV at birth. The study demonstrated a sensitivity of screening for CTEV was 71.4% with a positive predictive value of over 80%. There were no differences in the accuracy of detection before and after publication of the recent national guidelines ($p = 0.5$). It does appear that ultrasound is an excellent method for screening for pre-natal CTEV.

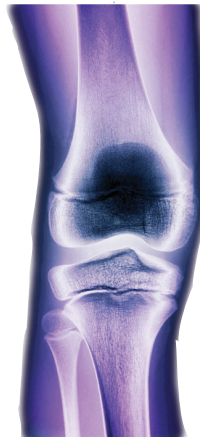
Percutaneous trigger thumb release – avoid at all costs in children

x-ref Wrist & Hand

■ Trigger thumb is a common condition in children and neonates and often requires surgical release. Open surgical release for trigger thumb is a safe and effective way of releasing the nodule in children and adults although can run the risk of damage to the neurovascular structures. Despite the small incisions and excellent outcomes associated with traditional open release in adults, there has been a recent vogue for 'percutaneous' release. This has caught on in some quarters and is reported to be safe and effective but there is no data surrounding its use in children.

Surgeons in Mexico City (México)

have studied the efficacy and safety of percutaneous trigger thumb release in the paediatric population.⁶ They studied a cohort of 20 thumbs in 15 patients, all requiring trigger thumb release. In a slightly odd study design, the surgeons performed first an A1 pulley percutaneous release then an open release on the same side using the patient as their own control group. Outcomes assessed were thumb extension both before release, after percutaneous release and then finally after open release. The surgical team assessed the extent of the open A1 pulley release *versus* the percutaneous release and measured the distance between the release and the digital nerve. The patient cohort had a pre-operative loss of around 45° of extension which clinically was corrected to just 4° after percutaneous release and to 0° after open. Clinical examination suggested the release was complete in 70% of cases and partial in the remain-



ing 30%. Following open release, the A1 pulley was found to be divided in all cases although only 30% of cases had a > 75% release. While the surgical team did not find any neurovascular injuries they found that the nerve lay just 2.4 mm from the release. Aside from the potentially sticky ethical issues associated with performing two procedures (one experimental) on a large series of patients, we would agree with the authors that this procedure is likely unsafe, results in an incomplete release and therefore should not be used.

Predicting repeat surgical intervention in acute osteomyelitis

■ Osteomyelitis is a relatively common diagnosis in paediatric practice and relatively recent large studies have demonstrated that particularly for paediatric acute haematogenous

osteomyelitis antibiotic therapy, either oral or parenteral, is equally effective. With the increasing rise in antibiotic resistant bacteria there is concern that the need for surgical intervention may become increasingly common. Researchers in **Dallas (USA)**, concerned that more and more patients are requiring adjunctive surgical treatments set out to quantify the problem and identify any objective clinical and laboratory parameters associated with repeated surgical treatment.⁷ They designed and conducted a cohort study evaluating 57 consecutive patients treated for paediatric haematogenous osteomyelitis during a single year. The research team undertook a notes review and recorded objective clinical and laboratory parameters that may be predictive of length of stay and repeated intervention. Within their cohort, 16 patients could be treated with antibiotics alone although 41 children also required at least a single surgical intervention, while a subgroup of 16 children underwent more than one surgical procedure. The researchers undertook a multiple logistic regression analysis which demonstrated that predictors of the need for a single surgical procedure include a swollen extremity, initial C-reactive protein > 9.9 mg/dL and respiratory rate > 27 breaths/min. Following the initial surgical debridement, the best predictors of the requirement for a second procedure were; ≥ 4 febrile days while on antibiotics, and CRP readings above a range of threshold values. Those thresholds were > 19.8 mg/dL at admission, > 21.5 mg/dL 48 hours after initial surgery, and > 15.3 mg/dL 96 hours after initial surgery. Marked elevation of the CRP is the strongest predictor of the need for initial surgical debridement and a persistent elevation the requirement for further surgical procedures.

C-Arm position inconsequential in radiation exposure

■ There are certain procedures where it is extremely difficult to

avoid unintended radiation to the surgeon, even when following best practice guidelines. One of the times this often occurs is with pinning of supracondylar fractures which often require screening of the reduction as fixation is achieved. The 'handed down' wisdom is that operating near the source results in higher radiation doses and so the use of the 'inverted' C-Arm using the intensifier as a table would result in greater doses. Surgeons in **Rhode Island (USA)** set out to establish if one configuration had lower radiation exposure than another using a cadaveric specimen to measure radiation exposure to patient and surgeon during a proce-

dure with the two competing configurations.⁸ Use of the intensifier as an operating surface did reduce the unwanted scatter radiation by 16% as compared with the other method, however, it has the unintended effect of increasing the neck level scatter radiation by 53%. From the patient's perspective, using the intensifier as the operating increased radiation exposure by 21% as compared with the more traditional configuration. The image intensifier used as an operating surface is not as safe for paediatric supracondylar fracture fixation as the hand table which is in contrast to accepted wisdom.

REFERENCES

1. **Lundine KM, Lewis SJ, Al-Aubaidi Z, Alman B, Howard AW.** Patient outcomes in the operative and nonoperative management of high-grade spondylolisthesis in children. *J Pediatr Orthop* 2014;34:483-489.
2. **Assi A, Yazbeck P, Massaad A, Skalli W, Ghanem I.** Kinematic evaluation of 4 pediatric collars and distribution of cervical movement between primary and coupled angles. *J Pediatr Orthop* 2014;34:496-502.
3. **Hailer YD, Haag AC, Nilsson O.** Legg-Calvé-Perthes disease: quality of life, physical activity, and behavior pattern. *J Pediatr Orthop* 2014;34:514-521.
4. **Madhuri V, Dutt V, Gahukamble AD, Tharyan P.** Interventions for treating femoral shaft fractures in children and adolescents. *Cochrane Database Syst Rev* 2014;7:CD009076.
5. **Pullinger M, Southorn T, Easton V, et al.** An evaluation of prenatal ultrasound screening for CTEV: accuracy data from a single NHS University Teaching Hospital. *Bone Joint J* 2014;96-B:984-988.
6. **Masquijo JJ, Ferreyra A, Lanfranchi L, Torres-Gomez A, Allende V.** Percutaneous trigger thumb release in children: neither effective nor safe. *J Pediatr Orthop* 2014;34:534-536.
7. **Tuason DA, Gheen T, Sun D, Huang R, Copley L.** Clinical and laboratory parameters associated with multiple surgeries in children with acute hematogenous osteomyelitis. *J Pediatr Orthop* 2014;34:565-570.
8. **Hsu RY, Lareau CR, Kim JS, et al.** The effect of c-arm position on radiation exposure during fixation of pediatric supracondylar fractures of the humerus. *J Bone Joint Surg [Am]* 2014;96-A:e129.