X-ref ***For other Roundups in this issue that cross-reference with Children's orthopaedics see: Oncology Roundup 8.***

Arthroscopy suitable in young children X-ref

Historically, the standard of care for treatment of septic arthritis in the child has been an open washout with joints as diverse as ankles, hips, knees and elbows all being treated in a remarkably similar way. Hot on the heels of a paper in last month's *360* suggestive of successful treatment of septic arthritis in the paediatric hip arthroscopically, comes this clinical paper from paediatric surgeons in **Oak Lawn, Illinois (USA)** which presents a single-surgeon series of paediatric large-joint septic arthritis managed arthroscopically.[1] The authors present the clinical results of 24 children aged between three weeks and six years, all treated for septic arthritis of large joints. There was a mix of hip, knee, ankle and shoulder, all treated successfully with just a single femoral nerve palsy. This retrospective cohort study assessed the use of arthroscopic lavage in 24 children over a four-year period. Nine hips, nine knees, four ankles and two shoulders were treated in patients aged between three weeks and six years. Patients were assessed between two and 49 months (mean 16 months) after the index procedure and there was no recurrence of infection or decreased range of motion. Two patients required repeat arthroscopic lavage and one patient required open irrigation following arthroscopic lavage. There was one transient femoral nerve palsy but no other arthroscopy-associated complications. Arthroscopy offers some well known advantages over open surgery, but is not a method of choice in treating this pathology in this age group. The authors argue that this might be due to the lack of arthroscopy training in paediatric orthopaedic fellowships. With no recurrence of infection at the 16-month follow-up, this really does make arthroscopy a viable option for treating septic arthritis of large joints in even the youngest children. Perhaps if there is a wider uptake of the technique it will be possible to put some larger series together; clearly we wouldn't recommend changing practice without monitoring the results based on a series with just four cases of some joints treated. That said, this does raise a very interesting proposition – perhaps children with septic arthritis of the larger joints should just be treated like little adults.

Low vitamin D levels give more significant fractures X-ref

This study compares vitamin D (25(OH)D) levels and lifestyle of children with fractures with those of non-fracture controls. The clinical interest in vitamin D and fracture has yielded some remarkable results – there is a surprising propensity for children and adults with fracture to be vitamin D-deficient, even those without the traditional risk factors and no formal diagnoses. This study from **New York New York, (USA)** sets out to establish whether vitamin D levels are associated with fractures and, if so, is there a fragility fracture threshold that can be applied to children?[2] The study includes and reports the outcomes of 369 fracture patients and 662 non-fracture controls, all in children younger than 18 years old. The study design includes prospective collection of vitamin D levels in a fracture population and prospective and retrospective data collection from age-matched controls. The authors also undertook a structured bone health survey for all fracture patients. There were in fact no observable differences between fracture and non-fracture groups in terms of vitamin D levels. However, patients with more severe fractures had significantly lower vitamin D levels (AIS = 3 24.6 vs AIS = 1 30.0). While this study did not demonstrate an association between vitamin D levels and the occurrence of a fracture in the paediatric population, there is some useful information to glean here. Children with lower vitamin D levels were at higher risk of more severe fractures and the study identified a potential threshold for supplementation and recommended that the serum level for vitamin D should be at least 40 ng/mL in patients of less than 18 years old.

Lateral condylar fractures X-ref

The lateral condylar fracture can be a tricky paediatric fracture to treat. There are few large series reporting the operative and radiological outcomes and their impact on clinical outcomes. This study identified residual displacement after reduction, and difficulty in attaining reduction, as defined by fluoroscopy time, as risk factors for delayed healing of lateral condylar fractures after surgical fixation. In this retrospective cohort study, researchers from both **San Juan (Puerto Rico)** and **San Diego, California (USA)** evaluated the outcomes of over 200 patients with lateral condylar fractures.[3] All patients were treated surgically at a single institution over a seven-year period and evaluated a wide range of follow-ups (mean 25; 4 to 260). Outcomes included radiographic evaluation, with measurement of displacement at presentation and after surgical fixation. In addition, the fracture classification and pin configuration were also recorded. The authors identified a relatively high rate of 16% (n = 33) in delayed unions, of which 3% (n = 7) required further surgery. Patients with > 1 mm displacement of the lateral cortex after fixation had an increased risk of delayed healing (OR = 4.78). This study also clearly demonstrates that delayed union of lateral condylar fractures appears to be higher than previously reported, and occurred in 16% of surgically treated patients in this large series. The risks for delayed healing include residual displacement after reduction and surgical difficulty suggested by fluoroscopy screening time.

Tranexamic acid and scoliosis

It seems that there isn't a diagnosis these days that doesn't benefit from tranexamic acid (TXA), and as the relative benefits of the clot stabiliser are worked out there are more and more studies being published with slightly differing protocols extolling the virtues or otherwise of TXA in peri-operative management. In a new systematic review from **Tianjin (China)**, a team set out to establish what the current state is with evidence to support the use of TXA in scoliosis surgery.[4] The review team trawled the usual repositories of indexed literature and sought to evaluate the efficacy and safety of TXA in scoliosis surgery. An extensive review identified ten potentially eligible studies (four randomised control trials (RCT) and six non-randomised studies). These were all suitable for inclusion in the final analysis. The study reports on a total of 685 patients, of whom 347 received TXA and 338 standard care. All patients underwent scoliosis surgery. Although there was some study heterogeneity, the pooled results reveal that TXA administration can reduce the total blood loss after scoliosis surgery and this is reflected in a smaller change in haemoglobin concentration following surgery. There was, however, no significant difference in the incidence of post-operative transfusion. The results clearly show that, based on the available evidence, administering TXA reduced total and intra-operative blood loss and also raised post-operative haemoglobin levels. Due to the varying dosage of TXA used in the respective studies, the authors carried out a subgroup analysis, which determined that a higher

TXA dose (> 20 mg/kg) works better than a lower dose TXA (< 20 mg/kg). There are (as always) some evidence gaps, and in this case they do seem to be genuine. We would agree with the authors that some further, better designed RCTs would be appropriate in this case.

The bigger the child, the bigger the curve X-ref

■ Authors from **Philadelphia, Pennsylvania (USA)** raise the suspicion that scoliosis may, to a certain extent, be driven by higher than average body mass index (BMI).[5] The authors postulate that children with a higher BMI tend to present with larger curves when initially diagnosed with scoliosis. In their retrospective cohort study, they investigate this potential link between presenting BMI and curve magnitude. They categorised a total of 150 patients into groups based on percentile (normal < 85%, overweight 85% to 95%, obese > 95%) according to the presenting BMI at the initial clinic visit. In addition, curve magnitude, curve location, Risser stage, and presenting details were noted. Each group contained around 50 patients, and the results corroborated the authors' and others' suspicions. Children in the "normal" weight group presented earlier and with smaller curve sizes, making those who required treatment good candidates for conservative management. Those in the overweight and obese groups presented later, had larger curve sizes and often (14% for the overweight, 16% for the obese group) presented in the surgical range.

Effect of casting material on the cast pressure X-ref

■ Despite the large number of studies undertaken on casting, ranging from predictors of slip through to the most effective ways to manipulate, it is curious that little has been done to examine the effects of the various different casting materials. Investigators in **Fort Gordon, Georgia (USA)** have published a simple but elegant study that aims to establish what (if anything) is the bearing of casting material on cast pressure after 'splitting'.[6] The investigators applied 75 long arm casts to healthy volunteers. These were divided into five experimental groups. To simulate 'swelling' and measure the effect of release on cast pressure, a paediatric blood pressure cuff bladder was placed within the cast and inflated to 100 mmHg prior to splitting the cast. The experimental groups included a plaster short arm cast with fibreglass re-inforcement extended to a long arm with either cotton or synthetic cast padding. The three remaining groups consisted of fibreglass long arm casts with cotton, synthetic, or waterproof cast padding. The casts were then sequentially bivalved followed by splitting of the cast padding and then stockinet. Differences in pressure readings were noted and compared based upon cast material. Cast padding had the lowest pressure readings at all points. This study suggests that in the acute setting, cotton cast padding is safer than either synthetic or waterproof.

Glenoid bone loss and adolescent shoulder instability X-ref

■ Shoulder instability in the paediatric population can be a real problem. Both multidirectional functional instability and unidirectional post-traumatic dislocation have their own nuances for treatment. In the adult population, glenoid bone loss is known to be a significant predisposing factor to ongoing recalcitrant instability. Although there are large epidemiological studies in the adult population quantifying the problem and its effects, there is very little known about the paediatric population. In one of the largest (although admittedly retrospective) studies on the topic, investigators in **Dallas, Texas (USA)** sought to evaluate the effects of glenoid bone loss on the shoulders of 114 adolescent patients with recurrent traumatic glenohumeral instability.[7] The authors quantified glenoid bone loss using a mixture of plain radiographs, CT (2D and/or 3D), MRI and/or arthroscopy. Nearly half of the patients (48%) exhibited some form of glenoid bone loss, and what was defined as critical bone loss was seen in 27% of this group (or 13.1% of the total). Evaluating the accuracy of the investigations, the authors determined that 45% of the glenoid bony architecture loss was not seen on plain radiographs. In terms of risk factors, the authors report that males, older age, tall stature, sports injuries and the presence of the apprehension sign on physical exam were associated with glenoid bone loss. Given the high incidence of bony destruction, and the known link between glenoid bone loss and chronic instability, this is a further reason to undertake MRI or MRI arthrograms in the high-risk groups of patients prior to engaging in surgical management.

Lawnmower injuries in children X-ref

■ One of the most devastating injuries to face children is the lawnmower injury. Not only do lawnmowers cause mutilating maceration-type injuries to children, but they also have psychosocial connotations, as often the operator of the lawnmower in question is a parent. A paediatric orthopaedic team in **Hershey, Pennsylvania (USA)** report on the incidence and patterns of injury seen in the Pennsylvania state trauma system.[8] The study reports on lawnmower injuries in the state over an 11-year period between 2002 and 2014. The data were collated from the statewide trauma registry and, as such, data on demographic information and ISS and ICD codes were available, and narratives submitted to the trauma registry were also reviewed. Only information about the index admission was available and therefore no data surrounding subsequent admissions could be ascertained. The incidence was surprisingly high, with 5/100,000 children suffering a lawnmower injury, with a massive range of ISS (1 to 75) but a median of four. Overall, 199 injuries were recorded, of which 53% underwent at least one amputation, most commonly of the whole or part of the foot. The overwhelming majority of injuries were from ride-on lawnmowers (92%). There still appears to be a major public health issue with lawnmowers. The authors sensibly comment that "if children younger than 6 years had not been near the lawnmower and those younger than 12 years had not been operating one, at least 69% of the accidents might have been prevented" so perhaps, all in all, it would better to tackle this issue through public health publicity measures.

REFERENCES

1. **Thompson RM, Gourineni P.** Arthroscopic Treatment of Septic Arthritis in Very Young Children. *J Pediatr Orthop* 2017;37:e53–e57.
2. **Minkowitz B, Cerame B, Poletick E, et al.** Low Vitamin D Levels are Associated with Need for Surgical Correction of Pediatric Fractures. *J Pediatr Orthop* 2017;37:23–29.
3. **Salgueiro L, Roocroft JH, Bastrom TP, et al.** Rate and Risk Factors for Delayed Healing Following Surgical Treatment of Lateral Condyle Humerus Fractures in Children. *J Pediatr Orthop* 2017;37:1–6.
4. **Yuan QM, Zhao ZH, Xu BS.** Efficacy and safety of tranexamic acid in reducing blood loss in scoliosis surgery: a systematic review and meta-analysis. *Eur Spine J* 2017;26:131–139.
5. **Goodbody CM, Sankar WN, Flynn JM.** Presentation of Adolescent Idiopathic Scoliosis: The Bigger the Kid, the Bigger the Curve. *J Pediatr Orthop* 2017;37:41-46.
6. **Roberts A, Shaw KA, Boomsma SE, Cameron CD.** Effect of Casting Material on the Cast Pressure after Sequential Cast Splitting. *J Pediatr Orthop* 2017;37:74-77.
7. **Ellis HB Jr, Seiter M, Wise K, Wilson P.** Glenoid Bone Loss in Traumatic Glenohumeral Instability in the adolescent Population. *J Pediatr Orthop* 2017;37:30-35.
8. **Garay M, Hennrikus WL, Hess J, Lehman EB, Armstrong DG.** Lawnmowers Versus Children: The Devastation Continues. *Clin Orthop Relat Res* 2016. (Epub ahead of print) PMID: 27785676.