'live' and should be resilient and long-lasting, at the trade-off of potentially high initial complication rates and technically demanding surgery. This study from **Leiden (The Netherlands)** describes the outcomes of 74 consecutive patients from four tertiary centres for orthopaedic oncology, all of whom underwent reconstruction using a VFG after resection of a tumour between 1996 and 2011. There were 52 primary and 22 secondary reconstructions, with an impressive 93% (n = 69/74) of patients having successful limb salvage; all of these united and 65 (88%) showed hypertrophy of the graft. In around half of patients (n = 35/74), at least one complication arose, with a greater proportion in lower limb reconstructions, non-bridging osteosynthesis, and in children. Union was not markedly influenced by the need for chemo or radiotherapy, but should not be expected during chemotherapy.[6] The important lessons from this detailed study include that the use of bridging plate osteosynthesis is associated with a reduction in the risk of fracture and the need to restrict weight-bearing for at least 12 weeks post-operatively, especially in children and in the presence of neo-adjuvant treatment.

Radiotherapy and survival

■ There is a global consensus that external beam radiation therapy (RT) is indicated for all large, deep, high-grade soft-tissue sarcomas (STS). The vast majority of studies have investigated the impact of radiation using local control as an end point, rather than overall survival. An epidemiology team from **Taipei (Taiwan)** utilised data from the National Cancer Database (NCDB) to establish what proportion of patients with STS undergo external beam RT.[7] They were able to include the results of 10 290 patients and found that a total of 3982 (37.8%) did not receive RT. This large database review reveals a striking lack of utilisation of RT to treat high-grade STS, which correlated with poorer survival. Lower education and income levels and diminished access to medical care (insurance and distance to the facility) were also associated with failing to receive RT. Unfortunately, the NCDB did not include information regarding local recurrence rates. Therefore, the authors were not able to assess whether the group with increased RT use had higher rates of local control, which may have led to a small, but statistically significant, improved survival (1.2% *vs* 0.2%) in such a large sample size. They have, however, suggested that it was conceivable that RT may have led to improved survival independent of its defined role in improving local control, as there are emerging data that radiation therapy can stimulate the immune system, which could theoretically attack distant disease. A study with more data on outcomes is clearly needed here to establish exactly what's going on.

Musculoskeletal tumours in pregnancy

■ We would finally draw the attention of the *360* readership to a good overview from **Munich (Germany)** of what is an uncommon situation that clinicians may face, that of musculoskeletal tumours in pregnancy, where it is a challenge to make the right decisions at the right time.[8] The main message of the review is the diagnostic difficulties facing surgeons in the diagnosis of a growing painful mass in the pregnant woman. Early diagnosis and careful follow-up at a specialist tertiary referral centre is a necessary doctrine in the management of this complex problem.

REFERENCES

1. Outani H, Hamada K, Imura Y, et al. Comparison of clinical and functional outcome between surgical treatment and carbon ion radiotherapy for pelvic chondrosarcoma. *Int J Clin Oncol* 2015;(Epub ahead of print)PMID: 26150259.

2. Czajka CM, DiCaprio MR. What is the proportion of patients with multiple hereditary exostoses who undergo malignant degeneration? *Clin Orthop Relat Res* 2015;473:2355-2361.

3. Sevelda F, Schuh R, Hofstaetter JG, et al. Total femur replacement after tumor resection: limb salvage usually achieved but complications and failures are common. *Clin Orthop Relat Res* 2015;473:2079-2087.

4. Ogura K, Fujiwara T, Yasunaga H, et al. Development and external validation of nomograms predicting distant metastases and overall survival after neoadjuvant chemotherapy and surgery for patients with nonmetastatic osteosarcoma: A multi-institutional study. *Cancer* 2015;(Epub ahead of print)PMID:26194185.

5. Kim HS, Bindiganavile SS, Han I. Oncologic outcome after local recurrence of chondrosarcoma: Analysis of prognostic factors. *J Surg Oncol* 2015;111:957-961.

6. Hilven PH, Bayliss L, Cosker T, et al. The vascularised fibular graft for limb salvage after bone tumour surgery: a multicentre study. *Bone Joint J* 2015;97-B:853-861.

7. Hou CH, Lazarides AL, Speicher PJ, et al. The use of radiation therapy in localized high-grade soft tissue sarcoma and potential impact on survival. *Ann Surg Oncol* 2015;22:2831-2838.

8. Postl LK, Gradl G, von Eisenhart-Rothe R, et al. Management of musculoskeletal tumors during pregnancy: a retrospective study. *BMC Womens Health* 2015;15:48.

Children's orthopaedics

For other Roundups in this issue that cross-reference with Children's orthopaedics see: *Trauma Roundup 5, 6; Research Roundup 3, 4.*

Radiographic follow-up of DDH

■ It is common practice in many institutions to undertake at least some follow-up of patients with a previous history of developmental dysplasia of the hip (DDH), even if the patient has returned to 'normal' on ultrasound scan. The authors of this study in **Philadelphia (USA)** examine whether this is really strictly necessary. They report a consecutive series of 115 patients with idiopathic DDH presenting to their institution over four years. All of these patients had undergone a clinical and ultrasonic examination within normal limits at a mean follow-up of 3.1 months. Perhaps surprisingly in their series, by age six months, 17% demonstrated radiographic signs of acetabular dysplasia. No significant differences were evident in the six- or 12-month rate of dysplasia between the infants successfully treated with a Pavlik harness and those infants normalising without treatment, but with a history of risk factors.[1] The conclusions that can be drawn from this paper are very important, in that the paper demonstrates that there is a notable incidence of radiographic dysplasia after apparent normalisation at three months. The study suggests that the risk of radiation exposure is outweighed by the risk of silent and unrecognised dysplasia. The recommendation made by the authors is that radiographic follow-up in this population should continue at least until walking age, to allow the timely diagnosis of residual acetabular dysplasia. This is a very simple message that has been elegantly demonstrated in a single-centre review, with clear entry and exclusion criteria.

When the supracondylar goes wrong

x-ref Trauma, Shoulder & Elbow

■ Even experienced orthopaedic surgeons will admit to a slight personal tachycardia when a pulseless supracondylar fracture is admitted through the emergency department.

While the debate continues to rage surrounding crossed wires, divergent wires, angles and sizes of wires, very few authors have paid attention to the consequences if it goes wrong (and let's face it, at some point, no matter who you are, it will!). In a fascinating retrospective study from **Madrid (Spain),** a group of authors considered the medical records and radiographs of 448 children with supracondylar humeral fracture. They paid particular attention to the 29 (6.5%) children in whom injury and surgery resulted in an associated neurological injury. The authors undertook a prospective follow-up of this essentially retrospective study, and were able to review 16 patients for measures of grip strength and objective upper limb function.[2] In this series, all fractures with a neurological injury were treated surgically with closed reduction and percutaneous pinning. Open reduction was undertaken where a closed reduction was not possible. Perhaps the most interesting detail of this paper is the scattering of nerves injured, with the median nerve injured in 13 patients (44.8%), radial in 14 (48.3%), and ulnar in nine (31%), with more than one nerve in six injured (20.6%). The veracity of the study is somewhat limited by the loss to follow-up rates, but in the group that was reviewed there were no statistically significant differences in the ranges of motion. What did vary was the prognosis, with all radial nerves recovering, and the majority of median nerves (87.5 %), but just a quarter of ulnar nerves. Functional results were good or excellent in all cases according to the QuickDASH questionnaire or Mayo Elbow Performance score despite significantly weaker grip strength on the affected side.

Apophyseal avulsion fractures

x-ref Trauma

■ The apophyseal avulsion fracture is something of an anathema, with few in agreement regarding appropriate treatment, including the requirement for surgery. This study must be one of the largest reports of these injuries in the literature, with 228 cases of pelvic apophyseal avulsion fractures reported by colleagues in **San Diego (USA)**. Their retrospective study established a predominance of males in their mid-teens (76% of the study group were male, with a mean age of 14 and a half years). Football of various types was responsible for around half of the injuries. Scarcely any nonunions were seen, despite the almost universal non-operative approach, although patients with AIIS avulsions were most likely to have future hip pain, and perhaps should be followed up more carefully.[3]

The 'pulled elbow'

x-ref Trauma, Shoulder & Elbow

■ The humble 'pulled elbow' is the focus of a case series from **Bolu (Turkey)** describing the treatment and outcomes of 66 serial children referred to a single unit. The authors carefully documented the patient demographics and injury pattern of what is a relatively common condition. In their series, there was no sex preponderance the mean age was 28 months at the time of presentation, and the injury typically involved an accidental, sudden pull of the pronated upper limb while the child was playing, walking or running.[4] The authors comment that although the diagnosis was primarily made in their series by clinical examination, radiographs were often required to exclude more significant injury. In all cases, reduction was achieved following a maximum of two attempts with a supination– flexion manoeuvre. However, a delay from injury to hospital admission reduced the success rate of reduction at the first attempt. While this paper hardly adds any major insight into the presentation and management of this condition, it is a well conducted, single-institution series and has some merit in describing the nature of this common injury.

Surgical treatment of active or aggressive aneurysmal bone cysts in children

x-ref Oncology

■ Aneurysmal bone cysts (ABC), while not malignant, can present like tumours and run a significant risk of local symptoms, recurrence and fracture. In one of the largest single-surgeon series, the paediatric group in **Istanbul (Turkey)** reviewed the results of 64 patients (38 males) treated over a decade. Like many of these large series of rare conditions, this paper is essentially derived from a tumour registry and includes demographic and complications data, details of imaging and histopathological studies. All patients had an initial cortical window and frozen section histology following confirmation of diagnosis; burr and cauterisation was performed in the majority of patients. Secondary grafting was undertaken and patients with either actual or impending fractures also underwent internal fixation with a variety of hardware, depending on the anatomical site. Complete clinical recovery was achieved in the majority of patients within three to six months of surgery and the median MSTS score at the most recent follow-up was 95%. In what is one of the largest and most complete series to date, the investigators found the proximity of the lesion to the growth plate to be the only predictor of outcome.[5] We would wholeheartedly agree with the authors' own conclusions, here at *360*, that "extended curettage using a mechanical burr and cauterisation, grafting and internal fixation in specific locations can promote healing in most cases of ABC with low recurrence and complication rates".

Improving stability in supracondylar fractures

x-Ref Trauma

■ A favourite topic of biomechanical studies is the humble supracondylar fracture, probably due to the slight controversy over the best wire configuration. Researchers in **Guangdong (China),** confusingly based at the University of Traditional Chinese Medicine, undertook a systematic review of paediatric biomechanical studies to try and unpick the complex mess that is the biomechanics of supracondylar fractures. The research team included only studies that reported stiffness measurements in all directions of deforming force and so were able to pool the results of 11 studies. The first, and perhaps most important, message is that there is no demonstrable difference in stability between the crossed pins and two lateral pins methods.[6] A few simple take-home messages are elegantly conveyed to the reader of this review: given the comparable stability, lateral pins may be preferable to avoid ulnar nerve injury; in medial comminution, add a pin! Perhaps the sawbones can now be given a rest. It seems to us here at *360* that the message is, in fact, perfectly clear.

Biological reconstruction may be preferable in children's osteosarcoma

x-ref Oncology

■ Those regular readers of the oncology section of *360* will be aware that in adults, at least, there is little to choose between the various varieties of limb salvage for osteosarcoma. However, it may be in this case that children 'aren't just little adults'. In a small but impressive series, a surgical team from **Sakarya (Turkey)** report excellent functional scores, using the Musculoskeletal Tumour Society Score, and radiographic results in a paediatric population of patients with osteosarcoma of bone. The paper reports on just 18 patients, all treated with varieties of biological reconstruction in children aged, on

average, 12 and a half years. In what is often a complication-ridden procedure, the team reports favourable results for primary bone sarcomas treated with surgical resection and intercalary (14), osteoarticular (3), and fusion (1) operations with vascularised fibular autograft augmented with a massive allograft in seven cases. Graft union and hypertrophy were seen in 17 out of 18 patients at 12 months. Four complications were seen: nonunion, infection, implant failure and skin necrosis.[7] While we are always naturally cautious, here at *360*, when we see stand-out results that are significantly better than those previously reported (especially in small heterogeneous series such as these), we are interested in these results. Given the differing biology of the growing patient, it is certainly more than possible that results of biological reconstructions could well be better in the growing child than in the adult.

The paediatric hip fracture

x-ref Trauma, Hip

■ Few injuries have such significant long-term disability potential as a subcapital hip fracture within a growing hip. Due to the rarity of the condition, little is known in detail about the longer-term prognosis, and specifically the effects on the vascularity of the head. This interesting (although low patient-volume study) brings into question whether prognostication based on the results of bone scintigraphy following trauma to the hip joint in children is valuable. In a study in **Lund (Sweden)**, bone scintigraphy was performed post-operatively in eight patients with femoral neck fractures to establish if there was any measurable femoral head vascularity. Two patients who had normal scans post-operatively had femoral heads of normal appearance on radiographs in follow-up. In two patients who had complete femoral head avascularity, one had radiographic findings of subchondral sclerosis and flattening, one had normal radiographs, and in those who had partial femoral head perfusion, three out of four had normal radiographs in follow-up.[8] Perhaps advances with perfusion MRI may give more information from which to prognosticate and possibly intervene in this population, however, its use will be limited by metallic fixation devices causing artifact around the area of interest. All that can really be drawn from this paper is that normal femoral head perfusion appears to be reassuring!

REFERENCES

1. Sarkissian EJ, Sankar WN, Zhu X, Wu CH, Flynn JM. Radiographic follow-up of DDH in infants: are X-rays necessary after a normalized ultrasound? *J Pediatr Orthop* 2015;35:551-555.

2. Valencia M, Moraleda L, Díez-Sebastián J. Long-term functional results of neurological complications of pediatric humeral supracondylar fractures. *J Pediatr Orthop* 2015;35:606-610.

3. Schuett DJ, Bomar JD, Pennock AT. Pelvic apophyseal avulsion fractures: a retrospective review of 228 cases. *J Pediatr Orthop* 2015;35:617-623.

4. Sevencan A, Aygün Ü, İnan U, Ömeroğlu H. Pulled elbow in children: a case series including 66 patients. *J Pediatr Orthop B* 2015;24:385-388.

5. Erol B, Topkar MO, Caliskan E, Erbolukbas R. Surgical treatment of active or aggressive aneurysmal bone cysts in children. *J Pediatr Orthop B* 2015;24:461-468.

6. Chen TL, He CQ, Zheng TQ, et al. Stiffness of various pin configurations for pediatric supracondylar humeral fracture: a systematic review on biomechanical studies. *J Pediatr Orthop B* 2015;24:389-399.

7. Erol B, Basci O, Topkar MO, et al. Mid-term radiological and functional results of biological reconstructions of extremity-located bone sarcomas in children and young adults. *J Pediatr Orthop B* 2015;24:469-478.

8. Juréus J, Geijer M, Tiderius CJ, Tägil M. Vascular evaluation after cervical hip fractures in children: a case series of eight children examined by scintigraphy after surgery for cervical hip fracture and evaluated for development of secondary radiological changes. *J Pediatr Orthop B* 2015;(Epub ahead of print)PMID:26288375.

Research

For other Roundups in this issue that cross-reference with Children's orthopaedics see: *Hip Roundup 7, 8, 9; Knee Roundup 5, 7; Wrist & Hand Roundup 5; Shoulder & Elbow Roundup 1, 2; Trauma Roundup 1, 9.*

Wasted implants

x-ref Hip, Knee, Shoulder

■ In a brief report from **Akron (USA),** the management of a surgeon-owned hospital tried a novel method for reducing wasted implants. The study team identified that a 1.5% implant wastage rate was occurring in their institution during arthroplasty surgery. The (arguably slightly aggressive) response was the publication of an open 'league table' of surgeons' implant wastage rates. Roll on one year, and the authors repeated their audit with, it appears, little effect. A statistically insignificant improvement in implant 1.1% was seen.[1] It does beg the question as to whether, with apparent 'mistake' rates of over 1% in implant selection in theatre, the labelling is good enough on implant boxes. Surely with the public naming and shaming approach taken by these authors, surgeons will have done their utmost to reduce implant wastage?

Biofilms revisited

x-ref Hip, Knee, Shoulder, Ankle, Trauma

■ One explanation for the difficulties facing revision surgeons in eradiating infection is the persistence of biofilms. Bacteria arranged in a semi-dormant state under a protective layer of glycocalyx on the surface of an implant are often surprisingly resistant to antibiotics, lavage and even aggressive debridement. A pair of papers shed some light on potential, more direct physical attacks during revision surgery to address this problem. Researchers in **Surrey (UK)**[2] (and we admit, here at *360*, that we are likening the biofilm effect to that seen commonly in dental plaque) have used an experimental model to test the value of sodium bicarbonate (thought in dentistry to be effective) on disrupting biofilms. Their model consisted of some fermenter-grown human dental biofilms. Each was subjected to a different concentration of sodium bicarbonate and the efficacy assessed using colony viability counts on microscopy. In short, these investigative dentists established that sodium bicarbonate is most effective in older, more established biofilm models. In a similarly experimental paper, researchers in **Copenhagen (Denmark)** evaluated the potential for acetic acid (vinegar) to effectively disrupt biofilm-established bacteria. These authors present a comprehensive look at the potential for acetic acid to be used as an anti-biofilm agent. Their rather general article covers both gram-positive and gram-negative bacteria, along with some anecdotal clinical evidence.[3] While we are not supposing for a minute that either of these two articles holds the key to dealing with infected biofilm-colonised joints, it is clear that new and inventive approaches are required, and examining the mechanism of action of topical non-toxic agents may yield some novel treatments in the future.

Peri-operative anticoagulation not required in atrial fibrillation

x-ref Hip, Knee, Foot, Hand, Shoulder, Spine, Trauma, Oncology, Paeds, Research

■ In a game-changing paper for peri-operative management, researchers in **Copenhagen (Denmark)** have debunked