

# ROUNDUP<sup>360</sup>

## Children's orthopaedics

### Magnetic growing rods and scoliosis correction

■ Some fascinating work has recently appeared from **Hong Kong (China)** that aims to reduce the amount of surgery required for children undergoing correction of a scoliosis. As the authors highlight, scoliosis in skeletally immature children is often treated by implantation of a rod to straighten the spine. Rods can be distracted (lengthened) as the spine grows, but patients need many invasive operations under general anaesthetic. Such operations are costly and associated with negative psychosocial outcomes. Consequently, the authors assessed the effectiveness and safety of a new magnetically controlled growing rod (MCGR) for non-invasive outpatient distractions. They implanted the device in five patients, of whom two had reached 24 months' follow-up by the time of their analysis. Each patient underwent monthly outpatient distractions. The team used radiography to measure the magnitude of the spinal curvature, rod distraction length, and spinal length. Meanwhile, they assessed clinical outcome by measuring the degree of pain, function, mental health, satisfaction with treatment, and procedure-related complications. In the two patients with 24 months' follow-up, the mean degree of scoliosis, measured by Cobb angle, was 67° before implantation and 29° at 24 months. Each individual distraction lengthened the instrumented segment of the spine by a mean of 1.9 mm. Mean predicted *versus* actual

rod distraction lengths were 2.3 mm *versus* 1.4 mm for patient 1, and 2.0 mm and 2.1 mm *versus* 1.9 mm and 1.7 mm for patient 2's right and left rods, respectively. Throughout follow-up, both patients were free of pain, had a good functional outcome, and were satisfied with the procedure. No MCGR-related complications were noted. It thus appears that the MCGR procedure can be safely and effectively used in outpatient settings, and minimises surgical scarring and psychological distress, improves quality of life, and is more cost-effective than the traditional growing-rod procedure. The technique could be used for non-invasive correction of abnormalities in other disorders.<sup>1</sup> Totally fascinating, we think at 360.

### Maintaining alignment after manipulation of a radial shaft fracture

■ Loss of position after reduction of a paediatric fracture of the radial shaft is a common and perhaps justifiable concern for orthopaedic and trauma surgeons. However, what are the factors that predispose to this? Surgeons from **Madrid (Spain)** have looked into this by studying the factors that contribute to loss of reduction. The authors thus reviewed the outpatient records and initial, post-reduction and follow-up radiographs of patients with a distal radial metaphyseal fracture. These were assessed in order to determine demographic factors; fracture characteristics (obliquity, comminution, intact ulna); three-point cast index; and initial, post-reduction, and follow-up displacement (angula-

tion and translation in the sagittal and coronal planes). Univariate and multivariate regression were used to identify significant risk factors for loss of reduction. The authors included a total of 161 patients in their series (119 boys and 42 girls). Of these, 57 (35%) patients met the criteria for loss of reduction. Multivariate logistic regression revealed that those over 14 years of age were 4.8 times more likely to lose reduction, and those with more than 10% post-reduction translation in the sagittal plane were four times more likely to lose reduction. In younger patients, initial coronal translation and post-reduction sagittal translation were independent risk factors. Patients with over 10% initial translation in the coronal plane were 2.4 times more likely to lose reduction, and those with over 10% post-reduction translation in the sagittal plane were 2.7 times more likely to lose reduction. The three-point cast index was not a significant risk factor. This study, which the authors say is the largest dedicated series of distal radial metaphyseal fractures, indicates that loss of reduction is common. Their analysis suggests that an anatomical reduction, which minimises residual translation, is the most important variable in preventing a loss of reduction.<sup>2</sup> In 360's view the message is clear. It is worth going that extra mile to ensure an anatomical reduction for the paediatric radial shaft fracture.

### Glaswegian children and swellings of obscure origin

■ The children of 360 staff appear

to be permanently breaking their bones, but how common actually are paediatric fractures? Surgeons from **Glasgow (UK)** have looked into this by focusing on forearm fractures. Their study aimed to describe the epidemiology and treatment of these fractures in the urban population of Glasgow. To do this they reviewed all forearm fractures treated by the orthopaedic service in Yorkhill Children's Hospital in 2008 up to the age of 13 years. Data were gathered from case notes and radiographs using a prospective orthopaedic database to identify patients with forearm fractures. The age, gender, side and type of fracture, the timing and mechanism of the injury and treatment were documented for the 439 fractures that were found. Census data were then used to derive absolute age-specific incidences. Distinction was made between torus and other types of fractures. Torus fractures require no specific orthopaedic treatment and were segregated out. For the remaining 314 fractures, the age and gender distribution, seasonal variation of fractures and treatments for each type of fracture were examined. The incidence of forearm fractures in the study population was found to be 411 fractures per 100 000 population per year and 294 fractures per 100 000 population per year for non-torus fractures. An increased number of fractures occurred between May and August and a fall from less than one metre was the most common mechanism of injury. Sporting injuries were the second most common. This study identifies

some features that agree with studies from elsewhere in the UK. However, there are also interesting differences, such as the Glasgow peak incidence for forearm fractures being at the age of eight years, with a marked decline by the age of 12.<sup>3</sup> At 360, we enjoyed reading this paper in part because of the epidemiological findings but also because it gave us an opportunity to confess our ignorance and look up the origin of the word *torus*. All 360 readers will, of course, know the answer immediately but in case your classical education has disappeared in the mists of time, *torus* is Latin for a swelling of obscure origin.

### Long-term outcome of femoral derotation osteotomy in cerebral palsy

■ One option for an internally rotated gait in cerebral palsy is a femoral derotation osteotomy (FDO). However, for how long does the effect of this last? Surgeons from **Heidelberg (Germany)** have investigated this, acknowledging that various authors have already reported satisfactory short-term results after FDO. However, there are only a few longer-term studies reporting results at five years after the procedure and these are not in agreement. There are no reports on the clinical course beyond the pubertal growth spurt. Consequently, the team studied 33 children (59 legs; mean age 10.5 years) with diplegia and an internally rotated gait pre- (E0), one year (E1), three years (E2) and nine years (E3) after distal (27 legs) or proximal (32 legs) FDO as part of multilevel surgery. The authors used a standardised clinical examination and 3D gait analysis on each occasion. The mean amount of intra-operative derotation was 25°. The mean degree of internal rotation of the hip in stance at E0 of 17.3° was significantly changed to 1.0° of external rotation at E1 and was maintained at 4.2° at E3. The same clinical course was found for foot progression angle. The mid-point of passive hip rotation at E0 was 21°. This was significantly decreased to 6° at E1 and showed a small but signifi-

cant increase to 12° at E3.<sup>4</sup> 360 was pleased to see the authors' conclusion that FDO shows a good overall correction of an internally rotated gait. The improvement is maintained beyond the pubertal growth spurt. There were some recurrences that led to severe deterioration. However, the authors recommend that the factors leading to recurrence should be further investigated. Let us see what these further enquiries show.

### Lower-leg fractures and compartment syndrome in children

■ From **Graz (Austria)** comes an interesting paper on acute compartment syndrome after lower-leg fractures in children. Although this is a rare complication it is certainly a serious one. An acute intervention consisting of fasciotomy is indicated as acute compartment syndrome may cause muscle and nerve damage. The aim of this Austrian study was to investigate the cause, incidence, time to fasciotomy and outcome of acute compartment syndrome of the lower leg after fractures in a paediatric population. The team undertook a retrospective analysis of all patients with acute compartment syndrome after a fracture of the lower leg treated over a 13-year period. The time from admission to occurrence of the acute compartment syndrome, the kind of fracture and surgical treatment were evaluated. Accident mechanisms were also recorded. A total of 1028 fractures of the lower leg were treated. Of these, the authors found 31 patients (3%) with a median age of 14.6 years who had developed an acute compartment syndrome. In a group of patients aged less than 12 years the incidence was even lower (1.3%). However, 81% of injuries leading to acute compartment syndrome were caused by high-

energy trauma, with motorcycle accidents being the most common (45%). External fixation was used in 45%, including all open fractures. The diagnosis of an acute compartment syndrome was primarily based on clinical symptoms. In 23 cases a median intracompartmental pressure of 55 mmHg was measured, an acute compartment syndrome being diagnosed after a mean of 19 hours. However, the maximum period was 65 hours. There was a tendency for an acute compartment syndrome to occur earlier after high-energy than after low-energy trauma (mean 16.9 hours *versus* 28 hours, respectively). No complications linked to the compartment syndrome were observed.<sup>5</sup> Worryingly, thinks 360, an acute compartment syndrome can occur up to 65 hours after an accident. Consequently, and as the authors advise, clinical monitoring is fundamental in order to allow surgical intervention as soon as possible. With early decompression, complications can be prevented.



### Fractures of the radial neck in children

■ Surgeons from **Lublin (Poland)** have looked at fractures of the radial neck in children, highlighting that these are common problems and that a number of different treatment methods exist. The aim of their paper was to present the types and treatment results of fractures of the proximal radius in children. Their study comprised data obtained from the medical histories of 28 patients treated over a five-year period. The clinical parameters analysed included the degree of displacement of the bone fragment, age and gender of the patient, and the type and result of operative treatment. There was a post-operative clinical follow-up of two to five years. From this work 360 notes that authors conclude

that fractures of the radial neck in children occur primarily either in adolescents or children of early school age, and the fracture line extends into the growth plate area. The treatment results demonstrated that closed reduction of a fractured radial neck with intramedullary stabilisation eliminates complications and provides for earlier restoration of the range of movement.<sup>6</sup>

### Management of the paediatric Monteggia fracture

■ There seems to be continuing debate as to how best to handle the paediatric Monteggia fracture, so a paper from **Athens (Greece)** has proved most helpful. The authors acknowledge that early identification and conservative management of these fractures correlate with good results. Nevertheless, there are others who advocate more aggressive management with open reduction and internal fixation for unstable fractures. The Athens researchers thus present their experience in a tertiary paediatric hospital in the management of Monteggia fractures. There were 40 patients with Monteggia fractures (26 male and 14 female) who were admitted and treated over a period of 20 years. The mean age of the patients was 7.5 years. On the basis of the Bado classification, 28 fractures were type I, three were type II, eight type III, and one type IV. Of the 40 patients, 32 were managed with manipulation under anaesthetic (MUA) and above-elbow plaster, while eight underwent open reduction and internal fixation of the ulna. To assess outcomes, the Bruce, Harvey, and Wilson scoring system was used. Range of movement, pain, and deformity were assessed in order to grade the outcome as excellent, good, fair, or poor. Patients were followed up for a mean of 4.6 years. All patients in the MUA group had excellent results. In the internal fixation group, all but one also had good results. It thus appears that in the authors' experience, conservative management of Monteggia fractures, when indicated, results in

excellent outcomes. In cases where emergency manipulation fails to achieve or maintain reduction, then open reduction and internal fixation also offers good results.<sup>7</sup> At 360 we note the authors' warning, however, that early diagnosis and management are essential as mismanaged cases demonstrate less satisfactory results.

### Missing the dislocated hip in Western Australia

■ We all struggle long and hard to avoid missing the dislocated paediatric hip. 360 feels it is reasonable to assume we would all by now be better at it. A delay in the diagnosis of developmental dislocation of the hip has many long-term consequences. Surgeons from **Perth (Australia)** have undertaken a retrospective study in order to establish the incidence of late-presenting developmental dislocation of the hip in Western

Australia, and investigate possible causes for missed diagnoses. Data were collected retrospectively over a 12-month period. Theatre records were searched for operative descriptions including the words 'arthrogram hip', 'EUA hip', 'closed reduction hip', 'open reduction hip' and 'spica'. Medical records were then checked to establish the demographic details and background history of cases identified. Delayed diagnosis of DDH was defined as a dislocated hip requiring operative reduction, diagnosed at age greater than three months. From this investigation, the authors identified 17 children (21 dislocated hips). The age at diagnosis ranged from six months to five years. Girls accounted for 88.2% (15/17) and the left hip was involved two-thirds of the time (14/21). Bilateral dislocations were found in four children.<sup>8</sup> Sadly,

in 360's view, this study has shown that the incidence of late-presenting developmental hip dislocation is now approximately three times the previously established rate. So we have not improved at all. Indeed, we are clearly worse than we were. 360 is pleased to see some mitigation as changes are already in place in the authors' practice to ensure that infants with DDH born in Western Australia are identified and treated as early as possible.

### REFERENCES

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