

# ROUNDUP<sup>360</sup>

## Children's orthopaedics

### Osteonecrosis of the femoral head and surgery for dysplasia

■ A feared complication of treating developmental dysplasia of the hip (DDH) is osteonecrosis of the femoral head. Reported rates vary between 6% and 48% but, as highlighted by researchers from **Vienna (Austria)**, this wide variation suggests that different risk factors may be involved. Indeed, some studies imply that open reduction combined with femoral shortening actually protects against osteonecrosis. To investigate this further, the researchers retrospectively reviewed 64 children (74 hips) hospitalised with DDH over a nine-year period. Patients under the age of one year were treated with closed or open reduction. Once past walking age, patients were treated with open reduction combined with concomitant pelvic and femoral osteotomies. The mean follow-up was 6.8 years. The team found that their overall rate of osteonecrosis was 40%. Those patients who underwent open reduction with concomitant osteotomies, or who required secondary reconstructive procedures after initial reduction were at higher risk of developing osteonecrosis.<sup>1</sup> 360 feels, as do the authors, that these results suggest early reduction of a dislocated hip should be undertaken in the first year of life if at all possible.

### Femoral head blood flow during surgery

■ If you do have to operate on a paediatric hip, how good it would be

to have a clinically reliable and simple technique to monitor blood flow in the femoral head during surgery. Researchers in **Dallas (USA)** have looked at this using ten immature pigs. They exposed the femoral head to what they called total ischaemia by ligating the femoral neck and transecting the ligamentum teres. Blood flow was assessed before and after ischaemia by one of four techniques: fibre optic pressure, piezoelectric pressure, partial pressure of oxygen and laser Doppler flowmetry. The time taken to observe a 50% reduction of the pre-ischaemia level was then determined. Although each of the techniques demonstrated a reduction in their respective measurements, laser Doppler flowmetry, which could detect change within two minutes, showed the fastest response time. The slowest was the measurement of the partial pressure of oxygen, which took over 30 minutes to show any change. Fibre optic pressure measurement was also good, showing change after three minutes while piezoelectric pressure measurement was fairly slow at 15 minutes.<sup>2</sup> 360's conclusion? This is useful work but more remains to be done. Meanwhile, if you intend to dislocate a paediatric hip, perhaps keep that Doppler handy?

### Femoroacetabular impingement and sport in adolescence

■ From **Bern (Switzerland)** comes some fascinating work on the development of the cam-type deformity of the upper femur. The

researchers wished to establish the prevalence of this deformity in athletes and its association with vigorous sporting activity during and after the growth period. They did this by retrospectively reviewing 72 hips in 37 male basketball players with a mean age of 17.6 years and comparing these with 76 asymptomatic hips in 38 age-matched volunteers who had not taken part in sport at a high level. The maximum value of the alpha angle was greater in the athletes than the non-athletes (mean 60.5° versus 47.4°, respectively), a difference that became more obvious after epiphyseal closure. These findings strongly suggest that a high intensity of sports during adolescence is associated with a substantial increase in the risk of cam-type impingement.<sup>3</sup> 360 notes the authors' final conclusion that this finding also implies that athletic patients may be at increased risk of developing osteoarthritis of the hip.

### The Drehmann sign

■ The Drehmann sign is a characteristic feature of a slipped capital femoral epiphysis (SCFE). This is the obligatory external rotation of the hip that occurs as the joint flexes. Meanwhile, a cam-type femoroacetabular impingement (FAI) can occur as a result of an earlier SCFE. Researchers from **Chiba (Japan)** have thus attempted to clarify the relationship between the Drehmann sign and radiologically evident FAI. They looked at 92 hips in 80 SCFE patients, each of whom had been treated with *in situ* fixation. They analysed the

occurrence rate of the Drehmann sign according to the degree of remodelling, using the Jones classification. Of the 92 hips, 60 had remodelled well (Jones type A), 24 were type B and eight were type C. For Jones type A hips, 25% of the patients demonstrated a positive Drehmann sign. For type B this was 75% and for type C, 100%. No patient with a negative Drehmann sign reported hip pain or limp.<sup>4</sup> From 360's viewpoint this is good work and very helpful for the outpatient setting. Any patient with a positive Drehmann sign is highly likely to have FAI. Any patient with a negative Drehmann may have escaped.

### Predictive algorithm for septic arthritis

■ It can sometimes be difficult to differentiate septic arthritis from transient synovitis in children, so work from **Liverpool (UK)** has been helpful. Here, researchers evaluated the use of the CRP level within a predictive algorithm. They reviewed the records of 311 children (mean age 5.3 years) with an effusion of the hip. Of these, 282 had a transient synovitis and 29 had septic arthritis. A CRP level of > 20 mg/l was the strongest independent risk factor for septic arthritis. Using a multivariable prediction model revealed that only two determinants differentiated septic arthritis from transient synovitis. These were weight-bearing status and a CRP > 20 mg/l. Individuals with neither predictor had a < 1% chance of septic arthritis. Those with both had a 74% chance of the condition.<sup>5</sup>

## Anterior cruciate reconstruction and arthrofibrosis in children

■ Reconstruction of the anterior cruciate ligament (ACL) appears to be increasingly performed in children. However, the complications of this procedure in children are perhaps less well understood. Arthrofibrosis is one such complication, so 360 was pleased to read the paper from **Boston (USA)** about this. The authors reviewed the medical records of 1016 consecutive ACL reconstructions in patients aged seven to 18 years in order to identify cases of post-operative arthrofibrosis. The overall prevalence of this complication was 8.3%. However there were certain risk factors: female gender, age between 16 and 18 years, patellar tendon autograft, and concomitant meniscal repair. Previous knee surgery or an ACL reconstruction within one month of injury were not significantly associated with arthrofibrosis after ACL reconstruction.<sup>6</sup> 360 was in part relieved to learn that surgical treatment for arthrofibrosis after ACL reconstruction in these patients can satisfactorily restore movement of the knee, although unfortunately functional outcome may be compromised.

## Spinal cord monitoring for those less than four years old

■ Paediatric spinal surgery is demanding for both patient and surgeon, so a paper from **Marseille (France)** on the use of intra-operative monitoring for children undergoing this type of surgery is valuable. Researchers have analysed a prospective series of 300 consecutive patients receiving paediatric spinal surgery; 10% of the children were aged less than four years. It was on this latter group that they focussed in order to determine the feasibility of using monitoring at all. Values for sensitivity and specificity of the monitoring showed slight differences between patients younger than four years of age and those older than

this. However, there were no false-negative outcomes. In some cases of kyphoscoliosis, during a posterior-based vertebral column resection, positioning a rod to allow correction of the spine in the sagittal plane rectified monitoring changes.<sup>7</sup> It thus appears that intraoperative spinal cord monitoring can be performed in children younger than four years of age, which 360 considers to be good news indeed.

## Arthroereisis for the flexible flat foot

■ The procedure of arthroereisis was a new one to 360 until a publication from **Manchester (UK)** appeared. In essence, arthroereisis is performed for the paediatric flexible flat foot by inserting a prosthesis into the sinus tarsi. It divides opinion, the authors say, in respect of efficacy and safety. They thus undertook a large database search and identified 76 studies into the technique. The bulk of radiographic parameters improved after arthroereisis, although the calcaneal inclination angle showed the least change. The technique was associated with a number of complications, including sinus tarsi pain, extrusion of the device and undercorrection. Complication rates varied from 4.8% to 18.6% and unplanned removal rates from 7.1% to 19.3%. Despite this, however, patient satisfaction rates vary between 79% and 100%,<sup>8</sup> so this is an operation, it appears, with a future.

## Fixing the displaced lateral humeral fracture – K-wires or screws?

■ A displaced fracture of the lateral humeral condyle in a child is perhaps best fixed, but how? Surgeons from **Beijing (China)** undertook a retrospective study to compare the use of K-wires with cannulated

screws. The mean age of patient was 6.9 years with the mean follow-up being 39.4 months. Unsurprisingly perhaps, there was no significant difference in clinical outcome between the two techniques although five patients (16.7%) developed a skin infection around the K-wires while no infection occurred with the screws. There were nine patients (30%) with K-wires and two (6.3%) with screws who demonstrated a 10° lack of elbow extension at review. It thus appears that although both techniques can adequately secure a fractured lateral humeral condyle,



K-wires can pass through the ossific nucleus of the capitulum (capitulum) without damaging it although local skin care will be needed. Meanwhile, screws can reduce the possibility of a lateral prominence and promote the function of elbow by continuously stabilising the fracture. However, a second operation is needed for screw removal.<sup>9</sup> 360's

view? Either will do. Opt for the most comfortable but screws appeal, as skin care in children can be a problem.

## Mobile phones and inclinometer applications

■ The Cobb angle is a universally accepted way of measuring the severity of spinal deformities. Yet how about measuring it with an iPhone rather than a more traditional protractor and pencil on a hard copy radiograph? A team has done it, from **Brisbane (Australia)**, where seven observers measured major Cobb angles on 20 pre-operative posteroanterior radiographs with both a standard protractor and using an Apple iPhone (Apple Inc., California, USA). Five of the observers repeated the measurements at least a week after their first attempt. There was a very slight bias towards Cobb angles

being slightly undermeasured with an iPhone although measurement times were approximately 15% less.<sup>10</sup> The widespread availability of inclinometer-equipped mobile phones and the ability to store measurements in later versions of the software may make this an attractive technique for a multitude of clinical measurements, not just the Cobb angle. Now where did we leave that 360 iPhone?

## REFERENCES

1. Pospischill R, Weninger J, Ganger R, Altenhuber J, Grill F. Does open reduction of the developmental dislocated hip increase the risk of osteonecrosis? *Clin Orthop Relat Res* 2012;470:250-260.
2. Standefer KD, Pierce WA, Sucato DJ, Kim HK. Detecting a disruption of blood flow to the femoral head after ischemic injury using 4 different techniques: a preliminary study. *J Pediatr Orthop* 2012;32:75-80.
3. Siebenrock KA, Ferner F, Noble PC, et al. The cam-type deformity of the proximal femur arises in childhood in response to vigorous sporting activity. *Clin Orthop Relat Res* 2011;469:3229-3240.
4. Kamegaya M, Saisu T, Nakamura J, et al. Drehmann sign and femoro-acetabular impingement in SCFE. *J Pediatr Orthop* 2011;31:853-857.
5. Singhal R, Perry DC, Khan FN, et al. The use of CRP within a clinical prediction algorithm for the differentiation of septic arthritis and transient synovitis in children. *J Bone Joint Surg [Br]* 2011;93-B:1556-1561.
6. Nwachukwu BU, McFeely ED, Nasreddine A, et al. Arthrofibrosis after anterior cruciate ligament reconstruction in children and adolescents. *J Pediatr Orthop* 2011;31:811-817.
7. Gavaret M, Trébuchon A, Aubert S, et al. Intraoperative monitoring in pediatric orthopedic spinal surgery: three hundred consecutive monitoring cases of which 10% of patients were younger than 4 years of age. *Spine (Phila Pa 1976)* 2011;36:1855-1863.
8. Metcalfe SA, Bowling FL, Reeves ND. Subtalar joint arthrodesis in the management of the pediatric flexible flatfoot: a critical review of the literature. *Foot & Ankle Int* 2011;32:1127-1139.
9. Li WC, Xu RJ. Comparison of Kirschner wires and AO cannulated screw internal fixation for displaced lateral humeral condyle fracture in children. *Int Orthop* 2011;(Epub ahead of print) PMID: 22179811.
10. Shaw M, Adam CJ, Izatt MT, Licina P, Askin GN. Use of the iPhone for Cobb angle measurement in scoliosis. *Eur Spine J* 2011;(Epub ahead of print) PMID: 22065167.