ROUNDUP360

Children's orthopaedics

Arthrodistraction is not the answer to Perthes' disease

■ It seems from the current literature that the only certainty in Legg–Calve–Perthes' disease is that we are not entirely certain how to treat it. There is a lack of good comparative studies of different treatment modalities, and hence selecting the appropriate treatment for the appropriate child is fraught with difficulty. We were delighted to see researchers from **Sao Paulo (Brazil)** attempting to clarify at least one treatment dilemma. They used a prospective comparative series (Level II evidence) of 54 children aged six or older, who all had severe forms of Perthes' disease, to evaluate two different treatment strategies; containment and arthrodistraction. None of the children had received any previous treatment. Intervention was undertaken at the necrosis or revascularisation stage; 28 children underwent a Salter osteotomy (containment) and 26 underwent arthrodistraction, achieved with an external fixator for a period of more than four months. The authors evaluated the results using the Mose index, and Wiberg and Stulberg classifications. Although not a randomised controlled trial there were no significant differences in the age, lateral pillar involvement or gender between the two groups. The authors' results conclusively demonstrate a containment strategy (in this case achieved with a Salter osteotomy) to be superior to the newer arthrodistraction technique. The authors found an unacceptably higher rate of complication (stiffness, pin-site infection, femoral head subluxation and pain) in the arthrodistraction group, coupled with better containment of the femoral head and no difference in Mose or Stulberg index.[1] We always find it heartening at *360* to read well constructed papers such as this, which conclusively answer the question they address. Our compliments to the authors!

Deformity correction in tarsal coalitions

■ The traditional treatment for tarsal coalition of the talocalcaneal joint is resection of the coalition. When associated with deformity of the hindfoot (normally excessive valgus), this may not relieve the patient's symptoms. An alternate approach is to correct the deformity with a calcaneal osteotomy in addition to, or instead of, resection of the coalition. Researchers in **Seattle (USA)** report their experience over 15 years in a small case series of 13 feet (eight patients) presenting with painful coalition in combination with excessive hindfoot valgus. The authors present a retrospective case series of their results (Level IV evidence) after conducting a case notes review including clinical, radiographic and CT records. In the series, the lengthening osteotomy fully corrected the valgus deformity in nine feet (five patients) in whom the coalition was unresectable. This provided intermediate pain relief. In the remaining patients, calcaneal lengthening was combined with resection of the coalition. The authors reported that excellent corrections of deformity and pain were achieved in the latter group. The authors also commented that they always performed an Achilles tendon or gastrocnemius lengthening in combination with the calcaneal osteotomy, which helps achieve the desired correction.[2] The research group conclude that their take-home message is that triple fusion is not always required in talocalcaneal coalition with hindfoot valgus deformity. Despite the heterogeneous group and small numbers of patients this seems a very reasonable conclusion to *360*.

Ultrasound can be used to predict pain in Osgood-Schlatter's disease

■ It is not quite clear what the exact pathogenesis or pathophysiology of Osgood-Schlatter's (OS) disease is, although the natural history is known to be a relapsing but eventually resolving one. The significance or otherwise of fragmentation of the anterior tibial tubercle is unclear, with some surgeons believing this to be a normal stage in the development of the tibial tubercle. A study team from **Pau (France)** aimed to identify changes in the tibial tubercle on Doppler ultrasound, and assess their significance as a prognostic indicator for the disease. They designed a prospective prognostic study (Level II evidence), including 20 consecutive male athletes presenting with symptoms and signs of OS. The study team designed a structured comparative clinical assessment including pain scoring, provocative testing, clinical examination and ultrasound assessment. The research team identified that a positive Doppler ultrasound was associated with higher pain on palpation and isometric contraction. This was statistically significant compared with Doppler negative patients. The investigators also included a normal comparison group without symptoms who did not demonstrate any Doppler positive individuals. The Doppler finding of neo-vascularisation was, in this study, associated with increased pain levels and compromised function.[3] Whilst this study has a number of limitations, here at *360* it has raised our curiosity; we wonder what the natural history of the disease is, and whether changes in the neo-vascularisation of the tubercle could be used to predict the end of the painful phase of the condition. Perhaps further work on this topic is justified?

Acetabular tilt – important in hip dysplasia

■ Here at *360* we like to be made to think about things in a different way, and are never more excited when a new way of thinking about a disease or evaluating a patient is proposed. It's even better if this proposal comes in the form of a study with some clinical data to support the authors' opinions. It was therefore with some

excitement, mixed with trepidation, that we came across an investigation from researchers in **Fukuoka (Japan)** inviting us to re-examine how we had perceived hip dysplasia. The research team postulated that acetabular tilt (the rotation of the acetabulum to the pelvis) may influence, or describe, the pathology of hip dysplasia. The researchers designed a diagnostic study to establish the effects of acetabular tilt with relation to the more commonly measured version and coverage. They measured all three variables on 40 CT scans of 72 dysplastic hips and compared these with a control group of 40 normal hips. The researchers used 3D reconstructions and volume renders to measure the parameters accurately. The researchers established that the acetabular tilt was increased in dysplastic hips when compared with the controls. In dysplastic hips the acetabular tilt angle is increased (posteriorly rotated), which results in increased anteversion and consequently decreased superior and anterior coverage. In dysplastic hips with decreased acetabular tilt the counter was true with reduced posterior coverage.[4] The authors eloquently described the deformities in hip dysplasia in a new way with regards to acetabular tilt, which appears able to explain the linked changes seen with version and coverage. We were not disappointed with this paper, and having re-examined how we think about dysplasia we will be considering acetabular tilt in future.

Hip replacement not such a bad option for juvenile arthritis sufferers

■ Juvenile arthritis (JA) of the hip remains one of the most difficult conditions to treat in orthopaedics. Adult rheumatoid arthritis (RA) sufferers have, in general, lower activity scores than their older osteoarthritic counterparts, bucking the trend for younger patients to do poorly with arthroplasty. The same is not true in JA. The consensus in the literature is of JA patients having lower hip outcome scores and this, coupled with concerns about longevity and multiple revisions, makes many orthopaedic surgeons feel extremely apprehensive about performing arthroplasty on young patients with JA. Researchers from **Lausanne (Switzerland)**, reasoning that the standard outcome scores for hip arthroplasty may not be applicable in this case, decided to revisit the issue. They designed a prospective cohort study to evaluate patients with JA who had undergone hip arthroplasty with traditional hip outcome scores and satisfaction scores. The research group enrolled 29 patients (49 hips) aged between 16 and 43 years into the study. The cohort scored well on their satisfaction scores with 95% satisfied with pain relief, and 92% satisfied with their functional level. However, the WOMAC, SF36, Eq5D and Harris hip scores were significantly lower in the JA group with particularly low domains for mobility, physical function and social function.[5] The researchers have raised an interesting question, which is not often discussed: in the very disabled or those with whole body involvement, are the joint specific and general health state questionnaires we administer to assess surgical outcomes suitable? As health care moves relentlessly towards an evidence-based approach more inclusive satisfaction-based scores may need to be developed for these difficult to assess populations.

Radiographs are not required post-operatively in supracondylar fractures

■ Researchers in **Wilmington (USA)** set out to establish the value of separate post-operative radiographs following closed reduction and percutaneous pinning of supracondylar fractures of the humerus. The researchers designed a retrospective cohort study (Level IV evidence) to establish whether post-operative radiographs revealed a change in position from intra-operative radiographs, and if they did, whether the second radiograph changed management in any way. The study consisted of a cohort of 643 Gartland grade II and above fractures managed over an eight-year period with closed reduction and percutaneous pinning. The investigators reviewed the radiographs of all patients (43% Gartland type II, 43% Gartland type III). The overall complication rate was 8.8% in their series. Pin back-out or loss of reduction was seen in 4.9% (32 patients) at their post-operative visit. All patients with these complications had an initial diagnosis of Gartland type III fracture, and only a single patient required revision surgery. The research team found there were no changes in post-operative follow-up visits, days to pin removal or average follow-up time. The authors concluded that as they did not alter management, no follow-up radiographs were required.[6] We at *360* are a little less daring than the authors of this fascinating article. It is certainly true that we orthopods and our trainees are guilty of more than the occasional needless radiograph, but a pickup rate of 5% is enough for us. Perhaps a more sensible interpretation of their results may be that follow-up radiographs are not required in Gartland type II fractures as no loss of reduction or pin fixation was noted. A little less daring, but still saving a large number of needless investigations.

Intra-articular local anaesthetic reduces pain following supracondylar fracture fixation

■ Supracondylar fractures are commonly treated, if displaced, with closed reduction and percutaneous pinning, a procedure that can result in significant post-operative pain. Analgesia can be tricky in the age group concerned, and local anaesthetic infiltration may provide an alternative to opioid analgesia. Researchers from **Aurora (USA)** have undertaken a randomised, single-blinded, controlled trial (Level I evidence) to confirm if this is true. The study population consisted of 124 patients randomised to intra-articular treatment with bupivacaine (n = 24), ropivacaine (n = 39) or no local anaesthetic (n = 43). Outcomes included child- and parent-reported pain scores as well as analgesic use. The study reported significantly lower use of opioid analgesia in the bupivacaine group (10%) when compared with ropivacaine (36%) and no treatment (44%). The opioid-free survival rates were also significantly better in the bupivacaine group when compared with the others, as was total opioid consumption. Strikingly, not only was opioid use lower, but pain appeared better controlled with significantly lower parent-reported pain scores in patients receiving bupivacaine, although there were no differences in patient-reported pain scores. There was no significant advantage to administering ropivacaine over no treatment for any measured outcome.[7] The authors have conclusively shown that an intra-articular bupivacaine injection provides adequate safe post-operative analgesia, thus reducing the need for opioids in paediatric patients undergoing surgery for supracondylar fractures of the distal humerus.

Limb deformity work made safer

■ One of the most distressing complications in paediatric orthopaedic surgery is that of neurological compromise following any procedure. In scoliosis correction, spinal cord monitoring has become commonplace to reduce the incidence and severity of neurological compromise following corrective surgery. There are, however, sparse reports of similar technology applied to limb deformity correction.

Surgeons in **Dallas (USA)** have been using somatosensory evoked potentials (SSEP) to reduce the risk of neurological compromise following limb deformity correction. The study team reviewed 306 procedures in 233 patients, which had been undertaken using SSEP to detect neurological compromise during application of an external fixator. The authors found SSEP changes of a significant magnitude in 19% of cases, the majority of which were transient (55% 32/58). The authors further evaluated the outcomes in those patients in which the SSEPs had not returned to normal spontaneously (26 patients). In 16 cases no remedial action was taken, and this resulted in 13 cases of post-operative neuropraxia, six of which were permanent. In the patients in whom remedial action was taken there were no permanent deficits. The authors calculated SSEP monitoring to be 100% sensitive and 91% specific for the detection of neurological injury during external fixation.[8] We were impressed with the high pickup rate of neurological disturbance suggesting neurological injury, although the SSEPs may be slightly oversensitive.

REFERENCES

1. Volpon JB. Comparison between innominate osteotomy and arthrodistraction as a primary treatment for Legg-Calvé-Perthes disease: a prospective controlled trial. *Int Orthop* 2012;36:1899-1905.

2. Mosca VS, Bevan WP. Talocalcaneal tarsal coalitions and the calcaneal lengthening osteotomy: the role of deformity correction. *J Bone Joint Surg [Am]* 2012;94-A:1584-1594.

3. Sailly M, Whiteley R, Johnson A. Doppler ultrasound and tibial tuberosity maturation status predicts pain in adolescent male athletes with Osgood-Schlatter's disease: a case series with comparison group and clinical interpretation. *Br J Sports Med* 2012;(Epub ahead of print) PMID: 22952406.

4. Fujii M, Nakashima Y, Sato T, Akiyama M, Iwamoto Y. Acetabular tilt correlates with acetabular version and coverage in hip dysplasia. *Clin Orthop Relat Res* 2012;470:2827-2835.

5. Jolles BM, Bogoch ER. Juvenile arthritis patients report favorable subjective outcomes of hip arthroplasty despite poor standard outcome scores. *J Arthroplasty* 2012;27:1622-1628.

6. Karamitopoulos MS, Dean E, Littleton AG, Kruse R. Postoperative radiographs after pinning of supracondylar humerus fractures: are they necessary? *J Pediatr Orthop* 2012;32:672-674.

7. Georgopoulos G, Carry P, Pan Z, et al. The efficacy of intra-articular injections for pain control following the closed reduction and percutaneous pinning of pediatric supracondylar humeral fractures: a randomized controlled trial. *J Bone Joint Surg [Am]* 2012;(Epub ahead of print) PMID: 22878686.

8. Makarov MR, Samchukov ML, Birch JG, et al. Somatosensory evoked potential monitoring of peripheral nerves during external fixation for limb lengthening and correction of deformity in children. *J Bone Joint Surg [Br]* 2012;94-B:1421-1426.