ROUNDUP360

Children's orthopaedics

Reaching the diagnosis more difficult than we thought?

■ We tend to assume, as orthopaedic surgeons, that reaching the diagnosis for relatively common conditions is easy. For the most part we don't share the difficulty our colleagues in neurology or endocrinology do in distinguishing one syndrome from another. It was with great interest then that we read an extremely insightful article from the paediatric orthopaedic surgeons in **London (UK)**. Noting a wide variation in the reported prevalence and intervention rates of DDH in infancy, the investigators wondered if this variation is not in fact due to differences in patient demographics, but more due to variations in the surgeons. The research team identified 37 factors in four domains that had previously been identified as associated with DDH in infancy. Surgeons across 37 nations, treating children with DDH, were identified via the European and British Societies of Children's Orthopaedic Surgery, and 297 responses collated. Each surgeon rated each item according to their perception of its diagnostic importance. Their results were really eye-opening. Poor consistency was found rating the 37 diagnostic criteria (intraclass correlation coefficient (ICC) 0.33; 95% CI, 0.24 to 0.45) and within three domains (history ICC 0.29; ultrasound ICC 0.26; radiographs ICC 0.34). There was acceptable correlation for clinical examination (ICC 0.50) and there were definite intraregional trends with differences between differing regions.[1] We already know that getting a room full of orthopaedic surgeons to agree about anything is nigh on impossible, but it is fascinating to see what a problem this might cause in perceptions of disease. If surgeons across Europe cannot even agree on a diagnosis, what hope do we have of agreeing on treatments? This extremely interesting paper certainly raises more questions than it answers, and places the ball firmly in the court of the specialist societies to reach consensus statements on what is of course a very common (and apparently contentious!) disease.

Are adolescent and paediatric DDH differing diseases?

■ In a bumper month for hip dysplasia a second paper from **Seattle (USA)** asks another deceptively simple question: "is paediatric and adolescent hip dysplasia (DDH) the same disease?" In order to attempt to answer the question these cunning investigators decided to study the demographic characteristics of the two different presentation cohorts to establish if the risk factors are the same. The investigators were able to identify 633 patients who had undergone a peri-acetabular osteotomy, of whom 421 were suitable for inclusion in the study (contactable and not syndromic). The research team were able to contact 324 patients (representing an excellent follow-up of 70.3% for a retrospective study). Each participant completed an extensive questionnaire, examining their risk factors and demographics for development of hip dysplasia. The research team compared the responses from patients who received a diagnosis of DDH in infancy with those who had a later diagnosis. They identified some striking differences between the two cohorts. Patients with infantile DDH were significantly more likely to be female, affected on the left or bilaterally and have a history of breech presentation than their adolescent counterparts. In common between the two groups were a high number of first-order relatives with hip disease (40%). Although there was a stronger link between eventual arthroplasty in the adolescent group than the dysplastic group, both had a high incidence of hip replacements (50% *versus* 22.7%) by age 50. The authors conclude that this study confirms the demographic differences between the two groups and comment that this supports the hypothesis that the two are distinct conditions.[2] Here at *360* we were delighted to read a study with such an interesting methodology, and there is certainly both merit and sense in the explanation put forward by the authors for the differing risk factors for disease, namely that the two are in fact different diseases. However, there is of course another elegant explanation: the risk factors identified may be purely risk factors for early presentation of dysplasia, or that both type of DDH represent a continuous spectrum of disease.

The A-frame orthosis and Legg-Calvé-Perthes' disease

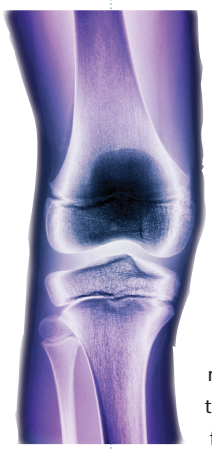
■ Although almost everything about Legg-Calvé-Perthes' (LCP) disease courts some form of controversy, or at least differing opinions, there is widespread agreement that 'containment' is an accepted treatment strategy with some of the best evidence to support its use. There is some evidence that the best results are achieved by starting an early range of motion protocol while maintaining a concentric reduction. Investigators in **St Louis (USA)** note that there is little evidence informing surgeons either way as to the benefit of early motion with or without osteotomy. They share their results of treating 240 hips in 213 children aged on average 6.4 years (2 to 11). All patients had advanced LCP in either the necrotic or fragmentation stages, and underwent an initial adductor tenotomy and abduction cast. Following cast treatment, an A-frame orthosis and a rigorous daily physiotherapy regimen was instituted to facilitate concentric positioning of the hip. Outcomes were assessed clinically (abduction range and leg lengths) and radiologically (head congruence, neck deformity) and outcomes (further surgery). The cohort included 12 type A, 113 type B and 115 type C hips. All patients with type A hips were spherical and congruent. Patients presenting with B type hips achieved 89% spherical and congruent, 7% aspherically congruent and 4% incongruent. The subgroup of patients presenting with C type hips achieved poorer results with only 70% spherically congruent,

22% aspherically congruent, and 10% incongruent. Age did not correlate with outcome. Hip abduction improved and was maintained in all groups.[3] The authors conclude that with 93% of patients overall achieving a congruent hip with this treatment method and the majority maintaining their abduction, this regime represents current gold standard results.

Failure of hip surgery for patients with cerebral palsy

Treatment of cerebral palsy (CP) associated hip dislocations is extremely challenging. The powerful muscle spasms combined with difficult decision making can sometimes make for an eventually poor functional result. Researchers in **Boston (USA)** sought to identify factors that might predict outcome in this tricky to treat group of patients undergoing unilateral hip surgery for CP related complications. The research team undertook a retrospective review (Level IV evidence) of patients who had undergone hip reconstruction to at least two years of follow-up. Outcomes included radiographic measurements (acetabular index, femoral migration index and centre edge angle), and factors screened for prediction of outcome included age, sex, pelvic obliquity, scoliosis surgery and concomitant contralateral soft-tissue release. The research team were able to identify 35 patients fulfilling the inclusion criteria to an impressive mean follow-up of 60 months, and contralateral soft-tissue release was performed in 37% of cases (n = 13). During the period of follow-up, 50% of patients developed subsequent subluxation (28% contralateral and 34% ipsilateral). The researchers were able to identify that lack of contralateral soft-tissue release, reversal of pelvic obliquity angle, and high contralateral femoral migration index (> 25%) were significant predictors of contralateral subluxation. As one would expect, pelvic obliquity (either persistence of or worsening) predicts ipsilateral failure. Although not significant, there was a higher rate of contralateral subluxation in young patients (under eight years) and those who also underwent spinal fusion surgery.[4] While the findings of this paper will not come as a surprise to many practicing orthopaedic surgeons, there are some very clear evidence-based messages here. Patients who have risk factors for recurrence should certainly have a comprehensive surveillance programme and surgeons should have a low threshold for ipsilateral soft-tissue release as, in this series at least, it significantly reduced the chances of contralateral hip subluxation.

Adolescent rotator cuff injuries



Rotator cuff injuries are poorly described in the young athlete but are generally thought to be caused by a slightly different pathophysiological process than in the adult or the elderly. The current theories abound, including internal impingement as a key pathophysiological process, where the greater tuberosity contacts with the posterior-superior aspect of the glenoid. This results in pinching of the cuff and labrum and is multifactorial in cause.[5] The classic description of internal impingement is as a 'pinch' of the under surface of supraspinatus in abduction and external rotation, causing 'inside out tears'. While the picture is more complex than this, the accepted theory of internal impingement explains in part why adolescent throwing athletes are particularly susceptible to the condition. Investigators in **Los Angeles (USA)** retrospectively reviewed a small series of seven patients presenting with rotator cuff injuries in the hope of shedding some light on this somewhat enigmatic diagnosis. They collected a thorough history and evaluated treatment and outcomes. The rarity of the diagnosis and the small nature of this series makes it difficult to really draw many conclusions from their paper. That said, the researchers noted that six out of seven patients were male and four sustained their injuries playing baseball. The injuries were somewhat varied with two subscapularis tears, one rotator interval tear, two lesser tuberosity avulsions and a single greater tuberosity avulsion. Interestingly, none of these injuries fit with the accepted mechanism for 'internal impingement'. Six patients were treated with operative repair of their rotator cuff and all patients returned to pre-injury levels of function.[6] Although they report on a fairly small series of patients (on whom nearly 50% have avulsion fractures rather than cuff tears), the authors don't let this stop them making some fairly bold statements concerning this injury. They argue that adolescents with rotator cuff tears can reliably return to sports and that the prognosis is very good following the injury. We would not have been quite so bold in our conclusions here, given that only two of these injuries are cuff tears, but we might have ventured a slightly different conclusion commenting that avulsion fractures are a much under-recognised injury in the adolescent and that treatment may be successful.

Paediatric peripheral nerve injuries: does ultrasound add much?

Management of peripheral nerve injuries is controversial in the adult, while the textbooks and accepted teaching is to adopt a 'watch and wait' approach for all but traumatic divisions where an early repair may be advantageous. Recently, however, there have been some advocates of early exploration of peripheral nerve injuries to maximise functional outcomes.[7] This raises the spectre of needless surgery and even iatrogenic injury in patients who may improve without surgery. Researchers in **Auckland (New Zealand)** reasoned that modern high resolution ultrasound may have some utility in determining the potential for eventual recovery. Arguing that ultrasound is capable of imaging nerve integrity and that intact nerves will not benefit from recovery, the authors set about a retrospective review of patients with closed upper limb injuries complicated with a peripheral nerve palsy. The research team identified 24 patients who fulfilled the inclusion criteria for their retrospective case series (Level IV evidence). In their series 15 patients were managed expectantly and demonstrated signs of return in function by four weeks following injury. Of the eight patients who underwent an ultrasound examination, three underwent exploration based on the findings of a discontinuous nerve (for neurolysis and repair) while the remaining five were managed expectantly. All of the patients with ultrasound-proven nerve continuity went on to recover function. The surgical group showed signs of recovery at a mean of 12 weeks, and the non-surgical group at a mean of 13 weeks.[8] It does appear that ultrasound is a useful adjunct to the traditional decision-making tools in evaluation of peripheral nerve injury. Although like many papers on rare diagnoses, findings based on just a few patients must be interpreted with caution.

Predicting residual deformity following Ponseti treatment

Ponseti treatment has revolutionised the treatment of talipes equinovarus the world over. The success rates are in the very high 90s when combined with Achilles tendon lengthening, even in more resistant deformities. However, some patients, especially those with neuromuscular disorders, are known to be more resistant to treatment with Ponseti casts. Researchers in **Seoul (South Korea)** aimed to establish which factors were predictive of residual deformity, paying particular attention to the prognostic value of known clinical scoring systems. The research

team reviewed 50 cases in 35 patients in an attempt to establish prognostic factors predictive of residual equinovarus deformities. Patients were assessed immediately prior to their percutaneous Achilles tendon release and were followed up for an average of just under two years. Subgroup analysis was performed depending on the requirement for further surgery to residual deformities. Only ten feet required further surgery and the researchers established that there were no statistically significant differences between initial Dimeglio and Pirani scores, although follow-up Pirani scores were sensitive for the need for further surgery, as was radiographic analysis (lateral tibiocalcaneal angle, and talocalcaneal angle) immediately before Achilles tendon release.[9]

The Dunn procedure: harder than one might think?

Treatment of unstable slipped capital femoral epiphysis (SCFE) is difficult and historically the results have left something to be desired. The popularisation of the Dunn osteotomy (subcapital derotation osteotomy) has increased in recent years but there are few large series concerning its use and the safety and efficacy are as yet unclear. Researchers in **Philadelphia (USA)** report on a large multicentre series performed by five specialist surgeons at different institutions. All of the patients reported in this retrospective multicentre study had unstable SCFE (by Loader's classification) and no underlying endocrinopathy. All of the procedures were performed by attending surgeons with specific training and interest in the Dunn procedure. The research team performed a full records review including intra-operative records and standardised patient outcome measures (VAS pain score, satisfaction score, Harris hip score and UCLA activity score).The research team were able to report on 27 hips in 27 patients with unstable hips at a minimum of one year's follow-up (mean 22.3 months). The researchers reported a surprisingly high complication rate (15% implant failures, 26% osteonecrosis). In those patients who did not develop a complication, the results were significantly superior to those who did (pain score 0.3 *versus* 3.1; satisfaction 97.1 *versus* 65.8; Harris hip score 88 *versus* 60; UCLA 9.3 *versus* 5.9).[10] It is hard to ignore the message of this series which is, we believe here at *360*, the largest series of Dunn osteotomies reported in the indexed literature. Each of the five specialist surgeons experienced at least one case of osteonecrosis, and the complication rate was not insignificant. That said, the results were impressive in patients who did not suffer a complication. This report makes a very compelling argument for management of these complex cases in a tertiary referral manner to minimise what can be catastrophic complications.

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