

Special symposium issue: Developmental dysplasia and dislocation of the hip

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The 37th EPOS Annual Meeting took place in Oslo, Norway, from 11th to 14th April, 2018. The topic of the pre-meeting course was Developmental Dysplasia and Dislocation of the Hip (DDH), which is an important part of children's orthopaedics. A vast amount of scientific studies has been published on DDH; during a recent search in PubMed more than 16 000 articles on hip dysplasia and dislocation were identified. However, there are still several aspects where there is a lack of consensus, including the optimal screening policy, the natural history, closed or open reduction, avascular necrosis (AVN), choice of additional surgical procedures for residual acetabular dysplasia, and long-term outcomes after different treatment methods. We were fortunate to have internationally renowned speakers for all these topics and are very grateful that they could come to Oslo and share their knowledge with the EPOS community.

As has become usual procedure in past years, we have the privilege of publishing all the lectures in the *Journal of Children's Orthopaedics* as a Special Symposium issue. The speakers have prepared articles based on their own research, clinical experience, and knowledge from current scientific literature.

The symposium started with DDH in newborns and infants. Rainer Biedermann from Austria and Deborah Eastwood from the UK have written a common survey on the use of ultrasonography in the screening of hips in newborns.¹ Their aim was to evaluate whether universal or selective ultrasound programmes were advisable. They conclude that it may be time for a paradigm shift of screening for DDH towards a universal ultrasound protocol as this seems to be advantageous in terms of avoiding late presentations and invasive surgical treatment and for achieving a better outcome in terms of less AVN.

The natural history of abnormal ultrasound (US) findings in infants under six months of age is important to elucidate in order to avoid over-treatment of children

with suspicious US findings at birth. Ralph Sackers from The Netherlands and Virginie Pollet from the UK present copious information and conclude that the natural history shows a benign course, especially in well-centered hips.² Thus, most suspicious hips and hips with moderate abnormalities on US should be followed up for a few weeks or months to await spontaneous normalization.

Hakan Ömeroğlu from Turkey gives an overview of indications, results and failures with the Pavlik harness in children under six months of age.³ He concludes that Pavlik's method cannot be considered as the best option in Graf IV hips (US) or highly dislocated hips and in infants older than three months, as the risk of failure and development of complications including AVN of the femoral head and femoral nerve palsy seem to increase in such circumstances.

Closed reduction of patients with late-detected DDH was previously the most commonly used method of treatment and is still practiced in many hospitals, especially in children < 1 year of age. Gradual, closed reduction by a skin-traction regime (Petit-Morel method) has evolved over the last 50 years and Philippe Wicart et al. from France present their experience with this treatment.⁴ Combined with pelvic osteotomy in cases of residual dysplasia, the method is effective in preventing recurrent dislocation and has a very low rate of AVN. The Petit-Morel method is suitable for children aged between six months and three years, whereas older children are less likely to achieve a successful result.

Pablo Castañeda et al. from the USA and Mexico have extensive material on children with late-detected DDH and give a review of the outcome in 645 patients who underwent open reduction, alone or in combination with pelvic osteotomy and femoral shortening osteotomy.⁵ The age at the time of surgery was one to 6.5 years. Good radiographic outcome (Severin types I or II) was achieved in 80% of the hips at a mean follow-up time of nine years. A trend was observed towards worse outcome in children ≥ 3 years, where 63% of hips had good radiographic outcome.

AVN is considered the most disastrous complication of either closed or open treatment. An updated and clinically relevant review is given by Stuart Weinstein and Lori Dolan from the USA, who prefer to use the term 'Proximal Femoral Growth Disturbance' (PFGD).⁶ There are various classifications of PFGD but few studies on the interobserver reliability of these classifications and little knowledge on

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how PFGD may influence the long-term outcome. The authors present current strategies to avoid PFGD and conclude that we still have much to learn about the complex growth interactions in hips compromised by PFGD.

The next three articles focus on residual acetabular dysplasia and the indications, results and complications of various methods of corrective surgery. Dega pelvic osteotomy is presented by Jarosław Czubak et al. from Poland, the country where Wiktor Dega developed his method more than 50 years ago.⁷ In patients with a mean age of 3.9 years at surgery, good results (Severin types I/II) were obtained in 79% at a mean follow-up period of four years. Michael Millis and Michael McClincy from the USA present good results of periacetabular osteotomy (PAO) in hips with residual dysplasia, with 74% survival (no conversion to total hip replacement (THR)) at a mean 18-year follow-up.⁸ Hip shelf operation was a common procedure for correction of residual hip dysplasia some decades ago, but has been much less commonly used after modern periacetabular osteotomies were introduced. However, Terje Terjesen from Norway reports good short- and long-term effects on hip pain after a modified Spitzzy shelf procedure and a 30-year survival rate (no THR) of 72% of the hips.⁹ These results seem to compare favourably with those of PAO and indicate that there is still a place for the shelf procedure in older children and young adults.

There are few studies on long-term outcome in DDH, which is the topic of the last two articles of the symposium. Simon Thomas from the UK has examined patients with late-detected DDH who were operated by Robert Salter in Toronto about 60 years ago.¹⁰ Patients at the age of 1.5 to five years were treated with open reduction and Salter pelvic osteotomy and the survival rate (no THR) at 45 years follow-up was 54%. The longest follow-up in DDH seems to be the study on closed reduction from Norway.¹¹ In patients aged 1.5 to three years, skin traction to obtain gradual closed reduction resulted in 76% survival at patient age 50 years and 54% survival at 58 years. This indicates that gradual reduction by traction, although the method has largely been abandoned, has similar long-term outcome as open reduction combined with Salter osteotomy.

Hopefully, the information in the various articles will help paediatric orthopaedic surgeons in their understanding of different aspects of DDH, in order to achieve better results and less complications in the treatment of this disorder, which is very interesting, but can be quite difficult to treat. On behalf of EPOS and the *Journal of Children's Orthopaedics*, I would like to express my sincere gratitude to all the authors for their contributions to this special issue.

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