Surgical Treatment of Hip Dysplasia in Children and Adolescents

Bernd Bittersohl, MD[a], Harish S. Hosalkar, MD[a], Dennis R. Wenger, MD[a,b,*]

KEYWORDS

• Hip dysplasia • Children • Surgical treatment • Acetabuloplasty

KEY POINTS

- Residual hip dysplasia, a well-known cause for early osteoarthritis (OA), is a relatively common disorder in children and adolescents.
- Three-dimensional imaging, including CT and MRI assessment has enhanced the diagnosis and treatment of patients with dysplasia by allowing clear identification of important pathomorphologic anatomy and cartilage degeneration.
- Treatment of residual hip dysplasia requires surgery with a goal of normalizing joint loading by increasing the contact area and improving the level arm of the hip to forestall the development of OA.
- Proper selection and performance of a corrective acetabular osteotomy and adjunctive procedures to provide a well-covered femoral head are prerequisites for a good clinical outcome and high survivorship of the hip.

INTRODUCTION

The human hip develops in utero and evolves to a large polyaxial stable joint that under ideal circumstances can last a lifetime. Unfortunately, both genetic and acquired factors can prevent this ideal circumstance, leading to hip dysplasia and early secondary degenerative arthritis.

Modern neonatal diagnostic methods have minimized the late diagnosis of hip dysplasia, with ultrasound, allowing treatment in the first months of life. Despite this progress, however, some patients end up with residual hip dysplasia, which requires surgical treatment in childhood or adolescence. The goal of surgery is to convert shear forces to compression forces (for which the articular cartilage is well-designed to withstand) (**Figs. 1** and **2**). Obviously, the earlier correction is provided, the greater the chance for normal development of the acetabulum and hip joint.

The goal of this article is to briefly describe the nature of residual hip dysplasia in childhood and adolescence and to present indications and methods for performing commonly used surgical procedures to correct hip dysplasia.

HISTORY AND PHYSICAL EXAMINATION

Initial assessment should focus on the patient history, symptomatology, activity level, and functional limitations, if any.

[a] Department of Orthopedic Surgery, Rady Children's Hospital San Diego, 3030 Children's Way, Suite 410, San Diego, CA 92123, USA; [b] Department of Orthopedic Surgery, Rady Children's Hospital San Diego/UCSD, 3030 Children's Way, Suite 410, San Diego, CA 92123, USA

* Corresponding author. Department of Orthopedic Surgery, Rady Children's Hospital San Diego/UCSD, 3030 Children's Way, Suite 410, San Diego, CA 92123.

E-mail address: dwenger@rchsd.org

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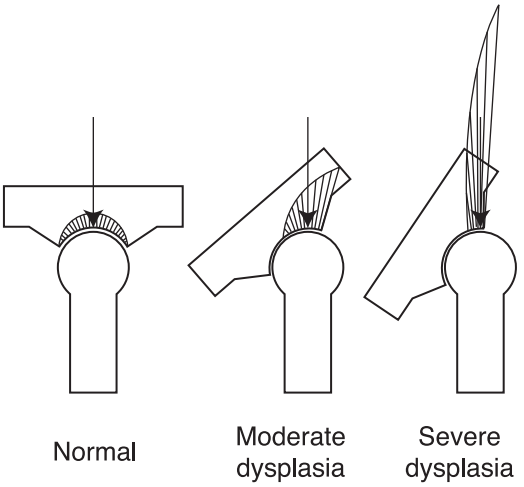

Fig. 1. Schematic drawing clarifying how compression forces become shear forces in a patient with hip dysplasia. Concentration of forces on the acetabular rim leads to cartilage degeneration.

The history should include any pertinent risk factors, such as breech-presentation, high birth weight for gestational age, or oligohydraminios.[1] A family history of hip pathology should identify heredity factors, including a history of acetabular dysplasia and joint laxity in the family.[2] Parents of children with hip dysplasia/hip dislocation may have observed a variety of features in their child, such as limping, walking on tiptoe, difficulty in crawling, and asymmetry of thigh creases, hip abduction, or leg length.[3] Many children and adolescents are incidentally diagnosed following radiographs for other reasons and are asymptomatic.

Patients with residual dysplasia may be asymptomatic or experience slight discomfort with weight-bearing activities. Adolescents who additionally have a labral tear may experience catching or locking symptoms with occasional popping sensations in their hip joint. In older teenager and young adults, symptoms of continued pain should make the clinician suspect and evaluate for osteoarthritic (OA) changes. Finally, because dysplasia is often asymptomatic in the child and adolescent, many of the patients were treated or evaluated for hip dysplasia as infants and toddlers. Therefore, a detailed surgical history is often required.

Fig. 2. AP view of the left hip in an older teenager with left hip dysplasia who now has severe pain. Concentration of forces on the anterolateral acetabular rim has led to a rim fracture, documenting the theory of Pauwels.

EXAMINATION

Physical examination should include inspection of the extremities for limb-length discrepancy, angular or torsional malalignment of the limb, provocative testing for hip instability, and evaluation of hip motion, including assessment of difference in abduction. Gait analysis may reveal a very subtle limp in early childhood or Trendelenburg gait in an older child. Timed Trendelenburg test (10–20 seconds) allows for the assessment of relative abductor muscle weakness. Pelvic obliquity and spinal alignment for scoliosis should be tested. Pain elicited by hip flexion, adduction, and internal rotation (positive impingement test) can be potentially caused by a torn labrum or an acetabular rim syndrome, which is associated with a limbus or bone fragment that has detached from the rim of the acetabulum.[4] Of note, children with untreated hip dysplasia often have normal hip motion and no pain.[5]

IMAGING

Standard Radiography

Plain radiographic evaluation of hips aids in the comprehensive assessment of hip dysplasia, helps monitor hip development, may guide treatment, and also assists in assessment of treatment outcomes. This includes an anteroposterior (AP) pelvis and a lateral radiograph at a minimum.[5] A false- (faux-) profile image may be helpful in certain patients depending on their age and severity of