

Fractures of the Acetabulum in Childhood and Adolescence

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Purpose: Acetabular fractures in childhood and adolescence are rare. Because of the triradiate cartilage in immature patients, growth disturbance or arrest can result from injury. The purpose of this study was to evaluate acetabular fractures in childhood and adolescence concerning mechanism of injury, fracture pattern, associated injuries, and clinical and radiographic outcome.

Methods: Between 2002 and 2011, 32 consecutive pediatric patients with 37 acetabular fractures were retrospectively analyzed at a Level I teaching trauma center. Fractures were classified according to OTA classification as 9 A1 (one-column posterior wall), 21 A3 (one-column anterior wall), 3 B1 (transverse), 3 B2 (transverse T-type), and 1 B3 (transverse posterior, hemitransverse anterior column) fractures. 12 (32.4%) fractures were isolated (group 1). 25 (67.6%) fractures had an associated pelvis fracture (group 2). The triradiate cartilage was involved in 12 (32.4%) fractures. Mechanism of injury, fracture pattern, fracture displacement, and treatment of the acetabular fracture were recorded. ISS and length of hospital stay were determined and differences between group 1 and 2 were evaluated. 18 children with 22 acetabular fractures with follow-up >6 months were included for further evaluation. Follow up averaged 33.3 months (range, 6-84). Union, nonunion, leg-length discrepancy (LLD), hip dysplasia, pain, and hip range of motion (ROM) were evaluated on final follow-up.

Results: Age averaged 12.8 years (range, 4-16). The main fracture pattern in group 1 (9, 75%) was a posterior wall fracture (A1); 6 were the consequence of a hip dislocation. The majority in group 2 (21, 84%) had anterior wall/column (A3) fractures, caused by traffic accidents in 88% (22). Average fracture displacement in group 1 was significantly higher than in group 2 (3.8 mm vs. 0.8 mm; $P = 0.0003$). Nine (24.3%) fractures were operatively treated, which was significantly higher in group 1 (8/12) than group 2 (1/25) ($P < 0.001$). Group 2 had a higher ISS ($P < 0.001$) (30 vs. 7) and a longer average hospital stay ($P = 0.041$) (2 vs. 6 days). All fractures healed by 11 weeks without delayed or nonunion. Three (13.6%) children had complications of LLD of 1.5 cm (2) or hip dysplasia (2). One (4.5%) child required a varus derotational proximal femoral osteotomy for increasing hip dysplasia and subluxation. None had hip-related pain on their final follow-up. Eight (36.4%) patients complained about low back/sacroiliac joint pain; all were in Group 2. One child (4.5%) had limited hip ROM.

Conclusion: In the pediatric population, high-energy acetabular fractures with an associated pelvic ring injury have different characteristics than isolated acetabular fractures. Combined injuries have less fracture displacement and are less likely to require operative treatment. Due to growth disturbance with injuries of the triradiate cartilage, leg-length discrepancy and hip dysplasia can occur and may require operative intervention.