

Sacral Fractures in Pediatric Patients

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Purpose: Sacral fractures in pediatric patients are rare and described in less than 0.2% of pediatric trauma cases. Misdiagnosis and underestimation of sacral fractures are frequently seen in adults. The purpose of this study was to analyze pediatric sacral fractures concerning injury and fracture pattern, treatment and outcome.

Methods: Between March 2002 and June 2011, 52 children (<16 years) presented with a sacral fracture with (51) or without (1) other associated pelvic ring injuries. Electronic records and imaging were retrospectively reviewed at a Level I teaching trauma center. Sacral fracture patterns were analyzed and classified by Denis and pelvic ring injury patterns were classified by OTA/AO classification. Patient age, demographics and mechanism of injury were recorded. Associated injuries, ISS, GCS (Glasgow Coma Scale), and length of hospital stay as well as initial treatment and neurologic symptoms were determined. Clinical and radiographic outcome was evaluated.

Results: There were 22 (42.3%) boys and 30 (57.7%) girls with 25 (48.1%) right, 15 (28.8%) left, and 12 (23.1%) bilateral sacral fractures. Age averaged 12.2 years (range, 3.0-16.0). 39 (75.0%) fractures involved Zone 1 and were crush injuries to the anterior sacral ala, 11 (21.2%) were Zone 2, and 2 (3.8%) were Zone 3. Both Zone 3 fractures were transverse sacral fractures, one below S3 and one lambda-shaped above. 20 (38.5%) children were skeletally immature, and 32 (61.5%) mature. The most frequent mechanism of injury in 42 (80.8%) children was a traffic accident including car occupant (28) or pedestrian versus car (14). Operative stabilization was performed in 9 (17.3%) children with sacroiliac (SI) screw fixation. Four (7.7%) children had neurologic symptoms. One child with a lambda-shaped transverse sacral fracture had decreased sensation of the proximal thigh, another child with a Zone 2 sacral fracture had a sciatic nerve paresthesia, another one with a Zone 2 sacral fracture had a lumbar plexus injury demonstrated with pelvic floor dyssynergia and partial fecal incontinence, and one child with a Zone 1 sacral fracture had a lumbar 5 nerve root paresthesia. All four children had a pelvic ring injury OTA B3 or B2 without injury of extremities. All fractures healed and had an average time to weight bearing as tolerated at 1.8 months (range, 0.1-3.6). One child died because of associated injuries. 11 (45.8%) children had low back or SI joint pain in final follow-up. Seven (29.2%) had a superior sacral displacement of 5-10 mm in their final radiographic outlet view, and nine (37.5%) had a posterior sacral displacement of 5-10 mm in their final inlet view. Four of the 7 malunited fractures had pain while 3 did not have pain. All children returned to normal activities without gait or limp problems. All paresthesias resolved, but the one child with lumbar plexus injury had persistent neurologic symptoms with incontinence.

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Conclusion: Most pediatric sacral fractures occur in the sacral alar region. More complex and unstable sacral fractures with neurologic symptoms occur and potentially benefit from stabilization. Persistent pelvic pain and deformity in this pediatric sample are present, do not remodel, and do not correlate.