

Does Skeletal Maturity Affect Pediatric Pelvic Injury Patterns, Associated Injuries, and Treatment Intervention?

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Purpose: Pediatric pelvis fractures are rare injuries, most frequently caused by high-energy trauma. Major associated injuries are common. Due to the high elasticity and flexibility of the immature pelvis, pediatric fracture patterns may be different than mature patients. The purpose of this study was to analyze the effect of skeletal maturity on pediatric pelvic fracture pattern and initial treatment.

Methods: 90 pediatric pelvic fractures receiving treatment at a private orthopaedic practice in association with a Level I teaching trauma center between 2002 and 2011 were retrospectively analyzed. Skeletal maturity was determined as closed triradiate cartilage. 41 (46%) were skeletally immature and 49 (54%) skeletally mature. Mean age was 11.5 years (range, 2-16). Fractures were 23 A2, 1 A3, 4 B1, 44 B2, 16 B3, and 2 C2 according to OTA / AO classification. OTAB and C fractures were 26 LC1 (lateral compression), 20 LC2, 10 LC3, 4 APC1 (anterior-posterior compression), 5 APC2, and 1 VS (vertical shear) injury according to Young and Burgess. Treatment of the pelvis fracture was operative in 28 (31%) and nonoperative in 62 (69%) children. Mechanism of injury, ISS, deaths, and associated injuries were recorded.

Results: 71 (79%) injuries were caused by traffic accidents. More complex fractures occurred in skeletally mature versus immature children ($P = 0.014$). 75% (12/16) B3 fractures, 100% (2/2) C2 fractures, 80% LC3 fractures (8/10), and 80% (4/5) APC2 fractures occurred in skeletally mature children. Skeletally mature children had a significantly higher rate of operative intervention ($P = 0.009$). The ISS in skeletally mature children was higher (25; range, 1-66) than in skeletally immature children (17; range, 4-43) ($P = 0.013$). 84% (41) skeletally mature and 78% (32) skeletally immature children sustained associated traumatic brain injuries (32 vs. 41), abdomen (14 vs. 20), thorax (16 vs. 25), spine (2 vs. 5), upper extremity (6 vs. 6), and lower extremity (6 vs. 9). 22% (11) of all skeletally mature children sustained urinary tract injuries, but only 7% (3) of all skeletally immature children ($P = 0.049$). One skeletally mature and one immature child died because of associated extrapelvic injuries.

Conclusion: The majority of pediatric pelvic fractures are caused by traffic accidents. Skeletally mature children are more likely to sustain more complex fracture patterns with a higher rate of operative intervention, similar associated injuries, and higher ISS than immature patients.