

Pediatric and Adolescent Calcaneal Fractures

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Purpose: Calcaneal fractures in children and adolescents are rare. Whereas in children most fractures show no articular involvement, fractures in adolescents often occur with similar patterns as in adults and require operative stabilization. The purpose of this study was to analyze calcaneal fracture patterns, treatment, and radiographic outcome.

Methods: Between 2002 and 2011, 48 consecutive pediatric patients with 50 fractures of the calcaneus were retrospectively analyzed concerning fracture pattern and treatment. Age averaged 12.1 years (range, 1-18) in 26 (54%) boys and 22 (46%) girls. 22 children (46%) were <13 years old (average 6.7 years; range, 1-12) and 26 children (54%) were ≥13 years old (average 16.3 years; range, 13-18). Three fractures (6%) were open. Fractures were classified according to Schmidt and Weiner as 25 type 1, 1 type 2, 4 type 3, 3 type 4, 13 type 5 (6 Tongue-type and 7 Joint-depression), and 4 unclassifiable fractures. 29 (58%) were non-operatively treated and 21 (42%) operative. The data of 19 children with 21 fractures were available for a follow-up analysis > 6 months in terms of union, infection, range of motion, pain, arthrosis, and arthrodesis.

Results: 86% (19) fractures in children <13 years were extra-articular. 90% (20) were non-operatively treated. 79% of children ≥13 years had intra-articular fractures with operative treatment in 68% (19). Only two (15.4%) of 13 compression fractures of the subtalar joint occurred in the younger group. Average preoperative Böhler angle in Type 5 fractures was 11° (range, -28° to 26°). Average postoperative Böhler angle was 30° (range, 22-44). Average age in children with follow-up >6 months was 14.7 years (range, 5-18). One (5%) non-union occurred, no wound infection was observed. Weight bearing as tolerated averaged after 10.5 weeks (range, 0-32). Range of motion with dorsiflexion averaged 18° (range, 0-30) and plantar flexion 40° (range, 30-50). Five (24%) had <50% subtalar motion. Six (29%) reported pain on final follow-up with one taking NSAIDs (nonsteroidal anti-inflammatory drugs) regularly. Two (10%) required orthotic shoe wear. Two (9.5%) showed mild subtalar arthrosis signs on final follow-up radiograph 30 months after fracture and two (10%) required subtalar fusion for severe symptomatic arthrosis 9 and 1 year after a type 5 fracture.

Conclusion: Whereas calcaneal fractures in children often have no articular involvement and do not require operative treatment, calcaneal fractures in adolescents often have similar fracture patterns as adults and require open reduction and internal fixation to restore the joint surface and Böhler angle. Long-term complications such as arthrosis requiring arthrodesis are present in these patients.