

The Early and Medium-Term Results of Early Primary Open Reduction and Internal Fixation of AO43-B/C Tibial Pilon Fractures: A Prospective Cohort Study

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Purpose: Our hospital manages AO 43-B and C fractures with early open reduction and internal fixation (ORIF) whenever possible, rather than using staged management with delayed ORIF. Previous retrospective studies of early definitive ORIF for pilon fractures have reported complication rates that are comparable to delayed or staged ORIF. The purpose of this study was to report the results on the first assembled prospective cohort of pilon fracture cases aiming to (1) determine the early and late complication rates and (2) determine the medium-term functional and radiographic outcome of these fractures

Methods: 53 patients with 55 AO 43-B (n = 17) or 43-C (n = 38) distal tibial pilon fractures were prospectively enrolled. Patients were reviewed with radiographs and functional scores (Short Form-36 [SF-36], Foot and Ankle Outcome Scores [FAOS], and Short Musculoskeletal Function Assessment [SMFA]) at baseline, 6, 12, and 60 months postoperatively. Fracture reduction was graded using a strict intraoperative and radiographic method (modified Burwell). Osteoarthritis was graded at final follow-up (modified Resnick and Niwayama). Our outcome measures were (1) deep infection requiring reoperation; (2) ankle arthritis requiring reoperation; (3) functional scores at 6, 12, and 60 months; and (4) radiographic osteoarthritis at final follow-up.

Results: The mean age was 42 years (range, 19-70). Three patients (4 fractures) received external fixation in referring hospitals and were managed with delayed ORIF. Of the remaining 51 fractures, 57% underwent early definitive ORIF within 24 hours of injury, 79% by 48 hours, and 91% by 72 hours. *Infection:* The deep infection rate was 2/43 (4.7%) for closed fractures and 2/8 (25%) for open fractures treated with early definitive ORIF. Of the 3 patients (4 fractures) referred with a fixator, one patient sustained an open (IIIb) AO 43.C3 fracture with significant metaphyseal bone loss and underwent delayed definitive fixation with free flap 14 days after injury. This patient underwent a below-knee amputation 4 months following injury for deep infection. *Arthritis:* One patient (1/51) underwent ankle fusion following a deep infection. *Aseptic Nonunion:* Two patients had aseptic nonunion and underwent successful revision ORIF. *Radiographic Follow-up:* 50 patients had 1 year or greater radiographic follow-up. Using strict reduction assessment method, 34 had reduction graded as "anatomical" and 16 had reduction graded as "fair". Fair reductions were significantly more likely to develop moderate or severe arthritis than mild or no arthritis (c^2 ; $P = 0.009$). *Functional Scores:* Mean normalized SF-36 scores improved but remain abnormal at 5 years (statistically significant with difference >MCID [minimum clinically important difference]). Osteoarthritis was associated with significantly worse FAOS scores at 12 months and five years (t -test; $P < 0.05$).

- The FDA has not cleared this drug and/or medical device for the use described in this presentation (i.e., the drug or medical device is being discussed for an "off label" use). For full information, refer to page 600.

Table 1: SF-36 Scores by Time for All Patients (50 Represents the Normal Population Score)

	Physical Component Score*	Mental Component Score*
Baseline (n = 55)	55.84 (53.74-57.92)	53.02 (50.14-55.90)
6 months (n = 49)	37.17 (34.08-40.27) P < 0.0001	51.04 (47.37-54.70)
12 months (n = 47)	44.59 (41.33-47.86) P < 0.0001	47.89 (44.45-51.31) P < 0.005
5 years (n = 20)	45.21 (40.93-49.49) P < 0.0001	49.56 (44.67-54.44)

*With 95% confidence interval.

Conclusion: This is the first prospective cohort study to report the medium-term functional outcome of distal tibial pilon fractures. The acute fixation of pilon fractures is safe and results in rates of complications that are comparable to those in published series of delayed or staged fixation. Anatomical articular reduction appears to be associated with better short and medium-term functional outcomes as well as less radiographic osteoarthritis. Patients with pilon fractures show significant long-term morbidity, although this effect appears to plateau with time, which could inform prognosis.