

Optimizing Fixation of Extra-Articular Distal Tibia Fractures (OTA 43-A): Does the Fibula Matter?

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Purpose: The purpose of this study was to evaluate whether lateral column support either through fibular fixation or an intact fibula better maintained axial alignment in distal metaphyseal fractures of the tibia (OTA 43-A) treated with either an intramedullary (IM)rod or locking plate.

Methods: After IRB approval, our prospectively collected database was retrospectively reviewed for all isolated unilateral/bilateral extra-articular distal tibia fractures (OTA 43-A) treated with either a distal tibial locking plate or IM fixation between July 1, 2005 and June 30, 2015. 223 fractures (219 patients) were initially identified. 106 fractures were excluded--39 for incomplete follow-up, 3 for frame treatment, 38 for skeletal immaturity, and 26 for concurrent lower extremity injuries--allotting 117 fractures in 114 patients. Fractures were divided into four groups: Group 1, locking plate fixation with fibular support; Group 2, locking plate fixation without fibular support; Group 3, IM fixation with fibular support; and Group 4, IM fixation without fibular support. The age, sex, comorbidities, injury pattern, fixation construct, follow-up length, subsequent procedures, complications, initial anterior distal tibial angle (aDTA), initial lateral distal tibial angle (IDTA), final aDTA, and final IDTA were recorded.

Results: 50.4% of fractures were experienced by males. Average age was 49.7 ± 16.5 years. Average follow-up was 23.7 months (range, 12.0-114.5 months). 38% of fractures were open. 66 fractures were treated with a locking distal tibial plate (52 with fibular support, 14 without). 51 fractures were treated with an IM rod (26 with fibular support, 25 without). 9.4% underwent staged grafting secondary to bone loss. Overall, 19.7% had an unplanned return to the operating room (8.5% for repair of infected nonunion, 5.1% for debridement without implant removal or exchange, 4.2% for treatment of aseptic nonunion, and 1.7% for delayed amputation). Patient demographics and complications were comparable between groups ($P > 0.05$). Change in alignment of more than 2° in either the frontal (IDTA) or sagittal (aDTA) plane was seen in 24.2%, 14.3%, 20.7%, and 16% of patients in groups 1-4 ($P = 0.215$). There were significantly more fractures in group 3 with a higher initial aDTA and fractures in group 2 with a lower initial aDTA; however, clinically both were within the normal anatomic variation. Importantly, there was no statistical significance between either IDTA or aDTA at final measurement between any of the groups in pairwise comparison, including those experiencing complications.

	Locking Plate; Fibula Fixed (Group 1) n = 52	Locking Plate; Fibula not Fixed (Group 2) n = 14	IM Rod; Fibula Fixed (Group 3) n = 26	IM Rod; Fibula not Fixed (Group 1) n = 25	Sig.
Age	49.7 (16.5)	50.6 (23.0)	50.8 (13.5)	43.7 (18.4)	p = 0.402
Sex [% Male]	50%	50%	46.2%	56.0%	p = 0.880
AOI Classification					p = 0.501
43-A1	28.8%	28.6%	34.6%	32.0%	
43-A2	25.0%	42.9%	34.6%	40.0%	
43-A3	46.2%	28.6%	30.8%	28.0%	
Initial Alignment					
Lateral DTA	88.7 (2.2)	90.5 (2.5)	88.9 (1.9)	88.6 (3.5)	p = 0.089
Anterior DTA	84.3 (2.7)	82.2 (2.8)*	85.1 (3.6)*	84.2 (3.5)	p = 0.049
Final Alignment					
Lateral DTA	88.4 (3.1)	89.1 (2.3)	88.4 (2.3)	88.0 (4.1)	p = 0.916
Anterior DTA	83.7 (3.2)	82.1 (1.9)	84.1 (4.6)	84.3 (5.2)	p = 0.346

*Significant value after multivariate analysis

Conclusion: Based on our data, when treating OTA 43-A extra-articular fractures of the distal tibia, locking plates and IM fixation work equally well. Both appear to maintain initial alignment over time with minimal angular change, regardless of fibular fixation or support.