

Low Rates of Soft-Tissue Complication with a Staged Protocol for Treatment of High-Energy Tongue-Type Calcaneus Fractures

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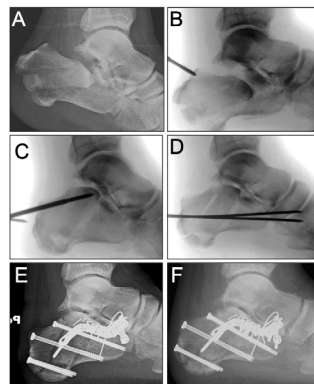
Purpose: Tongue-type calcaneus fractures are reconstructive challenges often presenting with both soft-tissue compromise and severe articular injury. Early definitive intervention through a hostile soft-tissue envelope leads to wound problems. Thus, we have adopted a staged protocol consisting of early percutaneous reduction and temporary fixation. Anatomic joint reconstruction occurs when the soft-tissue envelope defervesces. We hypothesized that staged management of tongue-type calcaneus fractures would be associated with low rates of soft-tissue complications.

Methods: A single-center retrospective case series consisting of tongue-type calcaneus fractures treated with a staged protocol and minimum 3-month follow-up was performed. The primary outcome was reoperation for soft-tissue complication and a logistic regression was performed to assess for risk factors.

Results: 28 patients were identified. Mean Bohler’s angle was $-6.5^\circ (\pm 24.6)$. 28 of 29 involved intra-articular extension, and 18 (66.7%) were Sanders III/IV. Soft-tissue compromise was present in 25 of 28 (89%). Definitive surgery occurred a median 16 days after injury (interquartile range 10.3-20 days). Soft-tissue-related reoperations occurred in 3 patients (10.7%). Type III open injuries ($P = 0.03$) were the only risk factor for the primary outcome.

Conclusion: In this series of tongue-type calcaneus fractures, initial displacement, soft-tissue injury, and degree of articular involvement were severe. Staged management with definitive reconstruction 2 to 3 weeks after injury was associated with a low rate of overall soft-tissue complications. High-grade open wounds were associated with subsequent wound-related complications, whereas initial displacement, lateral extensile approach, and time to definitive fixation were not.

	Median/range	IQR/SD	Risk factors for Soft tissue complication			
Age (years)	40.4 (14-83)	+/- 15.2	Risk Factor	OR	95% CI	p-value
BMI (kg/m ²)	26.6 (17.7-41.8)	+/- 6.1	Age	1.1	0.96-1.1	0.16
Gender			Male Sex	0.4	0.04-10.2	0.5
Female	4/28	14%	Bohler’s angle	0.99	0.95-1.04	0.8
Male	24/28	86%	Smoker	1.8	0.2-39.5	0.63
Tobacco Use			Open fracture	7.0	0.7-81.8	0.1
Yes	18/28	64.3%	PF angle	1.0	0.98-1.1	0.27
No	10/28	35.7%	Type III open	23	1.6-665	0.03
Sanders			Gastroc slide	0.2	0.01-1.8	0.2
II	9/28	33.3%	Lateral extensile	0.7	0.08-6.8	0.8
III	14/28	51.9%	Time to definitive	1.0	0.83-1.23	0.95
IV	4/28	14.8%				
Open Fracture						
Closed	23/28	82.1%				
Open	5/28	17.9%				
Soft Tissue Compromise						
Absent	3/28	10.7%				
Present	25/28	89.3%				
Time	Median	IQR				
Injury to Stage 1 (days)	0	0 - 1				
Injury to Stage 2 (days)	16	10.3-20				
Approach	Number	%				
Lateral extensile	16/28	57.1%				
Simas	5/28	17.9%				
Percutaneous	6/28	21.4%				
External fixator	1/28	3.6%				
Soft Tissue-Related Reop.	3/28	10.7%				



A) Lateral view of a displaced intra-articular tongue type calcaneus fracture with threatened skin. (B,C) a 4.0mm schanz pin drilled into the dense subchondral bone of the posterior facet manipulates the tongue fragment. D) smooth 7/64" Steinmann pins drilled across the calcaneocuboid joint and anchored into the cuboid resist displacement. E) 16 days later definitive treatment occurred through a sinus tarsi approach. F) Radiographs at 6 months demonstrated preserved height and articular congruity.

TECHNICAL TRICKS AND TIPS

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.