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Research Article

Accuracy of Reduction of Displaced Intra-Articular Calcaneal Fractures Using Limited Sinus Tarsi Approach (STA): CT Based Evaluation

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Abstract

The rationale behind the limited incision STA is to minimize soft-tissue dissection while still allowing fracture reduction and stabilization. A small 2 - 4 cm sinus tarsi incision permits direct visualization of the posterior facet fragment for reduction, as well as of the anterolateral fragment and the lateral wall.

Keywords: *Intra-Articular Calcaneal Fractures; Sinus Tarsi Approach (STA); CT*

Introduction

The rationale behind the limited incision STA is to minimize soft-tissue dissection while still allowing fracture reduction and stabilization. A small 2 - 4 cm sinus tarsi incision permits direct visualization of the posterior facet fragment for reduction, as well as of the anterolateral fragment and the lateral wall. The purpose of the study was to determine the adequacy of reduction with operative fixation of calcaneal fractures using a limited STA.

Patients and Methods

A prospective CT were performed to 43 patients between June 2016 and December 2018. Patients were excluded if 1ry subtalar arthrodesis or Lateral Extensile Approach (LEA) during the study collection period. Demographic data are listed in the below table 1.

Cases	**44 feet**
Age: y, mean (range)	35 (20-59)
Gender: female/male	16/27
Smoking, n (%)	8 (18%)
Diabetes, n (%)	5 (11.6%)
Laterality, n	
Right	27
Left	15
Bilateral	1
Time to surgery, d, mean (range)	7 (5 - 20)
Sanders's classification	
Type II	25 (14 IIA) (11 IIB)
Type III	17 (5 IIIAB) (12 IIIAC)
Type IV	2

A limited sinus tarsi incision with screws fixation was utilized for treatment of 44 displaced intra-articular calcaneal fractures. Imaging assessment of previously described fracture displacement measures was undertaken in preoperative and postoperative radiographs and CT. Mean preoperative Bohler angle measurement was 5 (range, -24 to 25) degrees.

Figure 1

Results

Mean intraoperative fluoroscopic Bohler angle measured 24.9 (range, 15.4 - 35.7) degrees. Average postoperative Bohler angle was 23.8 (range, 13.8 - 35.7) degrees. Postoperative CT, average step off was 0.6 (range, 0.0 - 2.9) mm. Only 2 of 44 (4%) posterior facet subtalar joints demonstrated step-off of greater than 2 mm postoperatively. Mean postoperative step off at the level of the calcaneocuboid joint was 0.6 mm (range, 0.0 - 7.3). Only 2 of 44 (4.5%) calcaneocuboid joints demonstrated step-off of greater than 2 mm.

	Step (mm)	Defect (mm)	Angulation (degrees)	Post Op N (%)
Posterior facet				
Excellent	None	None	None	12 (27.5%)
Good	< 1	< 5	< 5	25 (57.5%)
Fair	1 to < 3	5 to < 10	5 to < 15	5 (11%)
Poor	≥ 3	≥ 10	≥ 15	2 (4%)
CC Joint				
Good	None	None	None	35 (79%)
Fair	< 1	< 5	< 5	7 (16.5%)
Poor	≥ 1	≥5	≥5	2 (4.5)

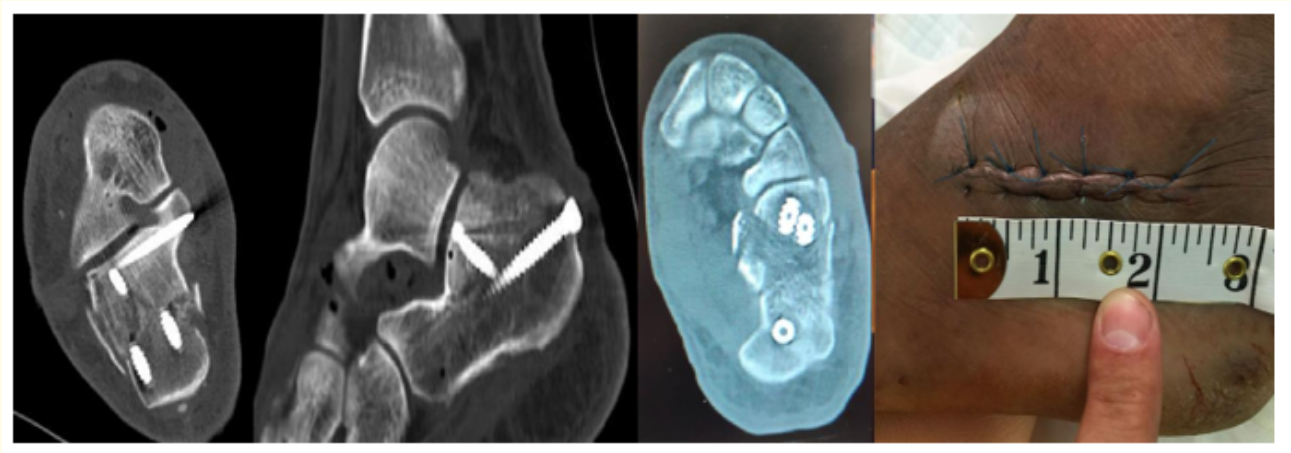

Figure 2

Discussion

Displaced intra-articular calcaneal fractures are treated using a sinus tarsi approach. Articular congruity and overall reduction were assessed by CT scan and plain radiography, depending on the Kurozumi CT Grading system posterior facet and CCJ reduction were good or excellent in 85% and 79% [1-4].

Conclusion

CT has a great value for diagnosis and classification of the posterior malleolus fracture. We validate the CT based classification which was published by Jan Bartonı´cˇek., *et al*. 2015 based on a large series. We hypothesized this classification was easily reproducible with high inter-observer and intra-observer reliability.

Conflict of Interest

The authors declare that there is no Conflict of interest.

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