

## Functional Outcomes of Minimally Invasive Versus Extensile Lateral Approach for Intra-Articular Calcaneus Fractures

*Seth Gengler, DO<sup>1</sup>; Michael Swords, DO<sup>2</sup>; Robert Zondervan, MS<sup>3</sup>; Landon Fine, DO<sup>1</sup>;*

*Phillip Penny, DO, MA, BS<sup>4</sup>; Andrew Sands, MD<sup>5</sup>;*

*<sup>1</sup>McLaren Greater Lansing, Lansing, Michigan, USA;*

*<sup>2</sup>Michigan Orthopedic Center, Lansing, Michigan, USA;*

*<sup>3</sup>Michigan State University, Lansing, Michigan, USA; <sup>4</sup>Lansing, Michigan, USA;*

*<sup>5</sup>New York Downtown Orthopaedic Associates, New York, New York, USA*

**Background/Purpose:** Treatment of calcaneus fractures carries a high rate of soft-tissue complications when they are treated operatively. Studies have shown that displaced intra-operative calcaneus fractures do better functionally when they are treated with open reduction and internal fixation versus nonoperative treatment. Minimally invasive approaches have recently been adapted to the calcaneus to decrease the soft-tissue complications while providing improved functional scores compared to nonoperative fixation. We hypothesized that patients treated with a minimally invasive (MI) approach versus a traditional extensile lateral (EXT) approach would have comparable functional outcomes with improved complication rates.

**Methods:** 44 charts were retrospectively reviewed for patients with a displaced intra-articular calcaneus fractures treated operatively with either a minimally invasive or a traditional lateral extensile approach. Demographic data were collected, as well as Short Musculoskeletal Function Assessment (SMFA) scores, infection rate, reoperation rate, incisional complications, final range of motion, and time to weight bearing.

**Results:** 26 patients were treated with a minimally invasive approach and 18 were treated with an extensile lateral approach. Demographic data showed no difference with the exception of follow-up, where the extensile lateral group had significantly longer follow-up (28.8 vs 73.06 months,  $P < 0.01$ ). SMFA functional scores showed no difference between the two groups for dysfunction (11.73 vs 14.56,  $P = 0.48$ ), bother (13.58 vs 16.72,  $P = 0.56$ ), or raw (12.54 vs 17.75,  $P = 0.52$ ) scores. The minimally invasive approach had a decreased reoperation rate versus the extensile lateral group (19.2% vs 50%,  $P = 0.049$ ). The minimally invasive group was also quicker to bear weight than the extensile group (12.94 vs 15 weeks,  $P = 0.01$ ).

**Conclusion:** When comparing the functional scores of patients with an intra-articular calcaneus fracture treated with either a minimally invasive approach versus a traditional extensile lateral approach, preliminary data show no significance difference between the two treatment approaches. The minimally invasive group did show quicker time to full weight bearing. The minimally invasive group also had a lower reoperation rate compared to the extensile lateral group, but the lateral approach group had significantly longer follow-up.

Table 1  
Demographics

	<b>All</b> (Mean ± SD)	<b>MI</b> (Mean ± SD)	<b>EXT</b> (Mean ± SD)	<b>p-value</b>
<b>Age (years)</b>	54.3±10.6	54.7±10.1	58.0±49.8	0.74
<b>Follow up (months)</b>	47.0±27.7	28.88±15.48	73.06±19.24	<.01
	<b>No. (%)</b>	<b>No. (%)</b>	<b>No. (%)</b>	
<b>Male</b>	33/44 (75)	19/26 (73.1)	14/18 (77.8)	1.0
<b>Closed</b>	39/44 (89)	23/26 (88.5)	16/18 (88.9)	1.0
<b>Classification</b>				
<b>Sander's II</b>	13/44 (30)	8/26 (30.8)	5/18 (27.8)	0.70
<b>Sander's III</b>	16/44 (36)	9/26 (34.6)	7/18 (38.9)	0.70
<b>Sander's IV</b>	1/44 (2)	0/26 (0.0)	1/18 (5.6)	0.70
<b>Unknown</b>	14/44 (32)	9/26 (34.6)	5/18 (27.8)	0.70

Table 2  
Clinical Outcomes

	<b>MI (%)</b>	<b>EXT (%)</b>	<b>p-value</b>
<b>Infection</b>	0/26 (0.0)	1/18 (5.6)	0.41
<b>Incisional Complications</b>	1/25 (4.0)	3/18 (6.7)	0.29
<b>Reoperation</b>	5/26 (19.2)	9/18 (50)	0.049

Table 3  
Functional Outcomes

	<b>MI</b>	<b>EXT</b>	<b>p-value</b>
<b>Dysfunction</b>	11.73±12.53	14.56±13.32	0.48
<b>Bother</b>	13.58±16.33	16.72±17.92	0.56
<b>Raw</b>	12.54±13.36	17.75±12.5	0.52
<b>Range of Motion</b>	72.5°±15.05	58.06°±33.57	0.10
<b>Weight Bearing (weeks)</b>	12.94±2.62	15±2.47	0.01

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.