

Bilateral Calcaneus Fractures Predominantly Present with a Concordant Essex-Lopresti Pattern

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Introduction

- ❖ Essex-Lopresti described the joint depression and tongue type as distinct calcaneus fracture patterns.
- ❖ Injury mechanism and hindfoot position likely contribute to fracture pattern determination, but anatomic predisposition has not been proven.
- ❖ 10% of calcaneus fractures occur bilaterally and offer opportunity to look at patient specifics
- ❖ We hypothesize that bilateral intraarticular calcaneus fractures will have similar fracture morphology

Methods

- ❖ Retrospective chart and radiographic review over 10 years at a level 1 trauma center.
- ❖ All patients with bilateral intraarticular calcaneus fractures were evaluated for demographics, mechanism and associated injury data, and fracture morphology
- ❖ X-ray and CT were reviewed to classify fractures by Essex-Lopresti and Sanders
- ❖ Non-parametric analysis was performed and Odds ratios calculated to determine significant associations

Results

- ❖ N=20 with bilateral intraarticular calcaneus fractures
- ❖ 95% had the same Essex-Lopresti fracture pattern bilaterally
 - ❖ 14 bilateral joint depression
 - ❖ 5 bilateral tongue type
- ❖ 80% of patients had a different Sanders classification from side to side
- ❖ Presence or absence of calcaneocuboid extension was consistent bilaterally in 18 (90%) patients
- ❖ Joint depression fractures were at an increased risk for calcaneo-cuboid extension with odds ratio of 16.7.

Figure 2. Essex Lopresti tongue type depression pattern.

Anteroinferior force, in combination with high gastrocnemius tension (A) and equinus position contributes to increased likelihood of tongue-type fracture pattern.

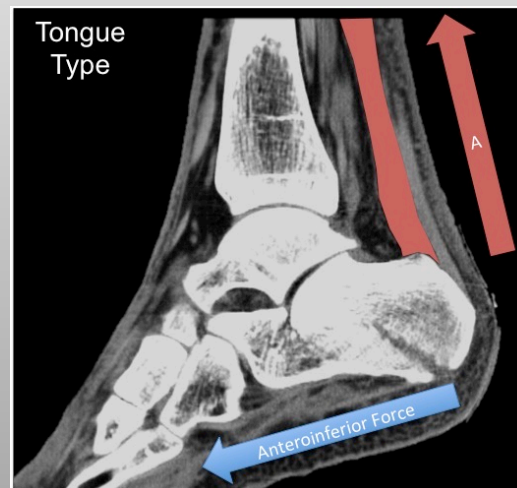


Table 1. Demographic and clinical features among patients sustaining bilateral calcaneus fractures

Patient Information	Mean ± SD
Age (years)	39±14
Weight (pounds)	160±32
Injury Mechanism	N (%)
Fall from height	19 (95%)
Motor vehicle accident	1 (5%)
Additional Fractures	N (%)
Axial Skeleton Injuries	11(55%)
Lumbar spine	9 (45%)
Pelvis/Acetabulum	4 (20%)
Appendicular Skeleton Injuries	8 (40%)
Tibia/Fibula	4 (20%)
Talus	4 (20%)
Metatarsal	2 (10%)
Cuboid	1 (5%)
Wrist	1 (5%)

Figure 1. Essex Lopresti joint depression pattern.

Axial Loading of lateral talus causes a shear fragment, with superolateral fragment of posterior facet driven into calcaneus body (A). Posterior load, creates transverse fracture separating posterior facet and tuberosity (B).

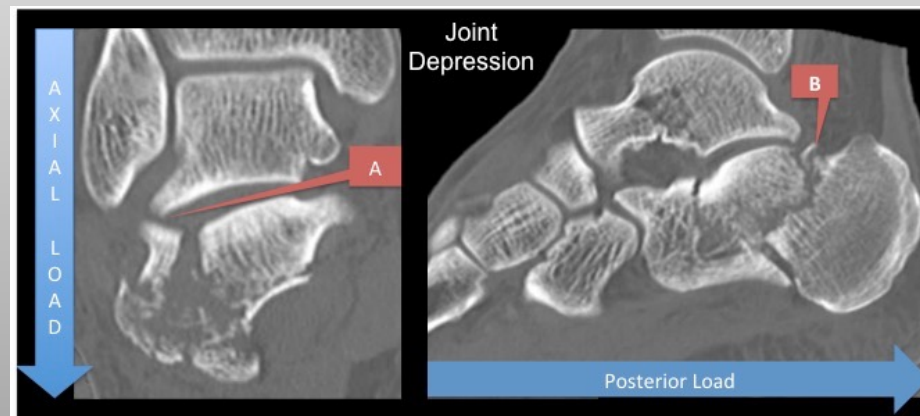


Table 2. Comparison of fracture morphology among individuals with bilateral calcaneus fractures.

Essex-Lopresti Pattern	N (%)
Overall Incidence	
Tongue-type (TT)	11 (28%)
Joint depression (JD)	29 (72%)
Bilateral Morphology	
Shared bilaterally	19/20 (95%)
Joint-Depression	14 (74%)
Tongue-Type	5 (26%)
Sanders Criteria	N (%)
Type I	2 (5%)
Type II	14 (37%)
Type III	18 (47%)
Type IV	4 (11%)
Shared bilaterally	5/19 (20%)
Different bilaterally	14/19 (70%)
Calcaneocuboid Extension	N (%)
Present	28 (70%)
Absent	12 (30%)
Shared bilaterally	18/20 (90%)

Discussion

- ❖ Bilateral calcaneus fractures occur with the same Essex-Lopresti pattern 95% of the time suggesting that there may be an underlying anatomic predisposition to one pattern or the other.
- ❖ Bilateral calcaneus fractures have a much higher rate of associated fractures both axial and appendicular than unilateral calcaneus fractures and the clinician should have a heightened sense of awareness.
- ❖ The distribution of bilateral calcaneus fractures by Sanders classification is similar to the overall distribution of unilateral calcaneus fractures.