

Role of Lateral Ankle Ligaments in Vertical Fibula Stability

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INTRODUCTION:

In unstable ankle fractures, the role of the deltoid and syndesmosis ligaments has been widely studied. However, it is uncertain what the importance of the lateral ankle ligament complex (LALC) is in the vertical stability of the fibula. Given its anatomical position, it should prevent the proximal translation of the fibula. This study aims to evaluate the role of the LALC in stabilizing the fibula in the vertical plane.

METHODS:

Eleven below-knee cadaveric specimens were used in this study. Proximal traction of the fibula was performed by applying 50 N in the intact state and after sequential transection of the syndesmotic ligaments, anterior talofibular ligament (ATFL), and the calcaneofibular ligament (CFL). At each stage, the proximal displacement of the fibula was measured. One-way repeated-measures analysis of variance (ANOVA) with post-hoc Bonferroni correction was carried out to determine any significant differences between the groups. A p value <0.05 was considered statistically significant.

RESULTS:

The vertical displacement of the fibula in the intact state, and after sequential transection of syndesmotic ligaments, ATFL, and CFL was 1.96 ± 1.19 mm, 3.96 ± 1.33 mm, 5.9 ± 1.73 mm, and 10.22 ± 2.76 mm, respectively. There was no significant difference in the proximal displacement of the fibula between the intact and the syndesmotic ligaments groups (p 0.05). However, when the syndesmotic ligaments were transected in conjunction with ATFL +/- CFL, a significant difference was observed compared to the intact state (p <0.001). We also found a significant difference between the syndesmotic and CFL groups, and between ATFL and CFL groups (p <0.001).

DISCUSSION AND CONCLUSION:

The complete disruption of syndesmotic ligaments did not significantly increase the proximal displacement of the fibula. However, when the ATFL +/- CFL were additionally disrupted, there was a significant increase in the vertical translation of the fibula.

Clinical relevance: To the best of our knowledge, this is the first study describing that LALC plays a paramount role in the vertical stability of the fibula. Concomitant syndesmosis and LALC should be suspected in an axially unstable fibular fracture with a significant proximal displacement.