Bimalleolar equivalent ankle fracture joint contact: Comparison of two stabilization methods.

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Introduction: When surgically repairing an ankle fracture one goal is to restore the stability of the ankle joint. The osseous injury that occurs during an ankle fracture can be accompanied by a ligamentous injury, specifically to the deltoid ligament complex. The purpose of this study is to evaluate measuring the contact area of the ankle joint with different stabilization methods of the deltoid ligament.

Methods: 5 frozen cadavers were utilized for this study. Ultra-low contact film was cut to match each of the unique anatomic characteristics of the talus. The film was carefully placed and secured within the ankle joint. An axial load of 100 psi was applied to each ankle under 4 conditions: (1) Normal ankle, (2) transected deltoid ligament off the medial malleolus, (3) transected deltoid ligament off the medial malleolus with a syndesmotic screw through a plate, and (4) direct repair of the deltoid ligament. The ankle joint contact area was tested in the 4 conditions and analyzed using the FujiFilm Pressure Mapping System ©.

Results: Our study demonstrated that the primary repair of the deltoid ligament more closely represented the average contact pressure of the normal ankle compared to syndesmotic screw placement. The highest maximum pressure was comparable to the normal ankle in the syndesmotic screw placement but the total areas of highest pressure and total area measured were elevated with the syndesmotic screw specimens compared to the normal ankle.