

Deltoid Ligament Injury and Ankle Fractures: To Fix the Ligament or Not

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The current journal issue has an interesting debate on methods of treating the injured deltoid ligament in association with ankle fractures. The deltoid ligament has been involved in up to 40% of ankle fractures; most of these are often due to a complex combination of sequential bony and ligamentous injuries, whose severity is dependent on foot position and the direction of deforming forces.^{1,2} Lauge Hansen¹ clearly stated that supination external rotation (SER) injuries account for nearly 80% of ankle fractures and that there was either a deltoid ligament tear or a medial malleolus fracture in stage IV SER. In pronation—external rotation fractures (PER) involving the fibula—again there is always a fracture of the medial malleolus or a deltoid ligament tear.³ These are recognized as unstable fracture patterns and are treated operatively.³ The fibula fractures are usually treated with plate fixation. It has been suggested in the past that deltoid ligament repair is not necessary.⁴ The debate was regarding the necessity of deltoid ligament repair while treating an ankle fracture.

Dr Burton Dunlop and Dr Jessie Doty's opinion in the current debate outlines some of the classic studies against repair of the deltoid ligament. They mention that De Souza,⁵ Baird,⁶ Harper,⁷ and Zeegers et al.⁴ are some of the authors from the 1980s who recommended not fixing the deltoid ligament. A subsequent randomized controlled trial (RCT) by Stromsoe et al.⁸ in 1995 and a meta-analysis by Dabash et al.⁹ in 2018 are some of the later publications quoted by them in favor of not repairing the deltoid ligament.

However, it is imperative to read between the lines. For instance, Zeegers et al.⁴ in their series of 290 ankle fractures have concluded that deltoid ligament fixation is not necessary. However, in that study, 28 patients were identified as having concomitant deltoid ligament injury (increased medial clear space, swelling over medial malleolus). All fractures were managed by the lateral approach only and no deltoid repair was performed. About 8 out of 28 patients (approximately 28%) had poor results and changes of osteoarthritis at an average of 1.5 years from injury; however Zeegers et al.⁴ still went on to recommend against deltoid repair!

The authors also mention an old paper by Lindsjo¹⁰ from 1981, which suggested that the deltoid ligament may be injured in 10% of ankle fractures. It is pertinent to note that newer studies suggest that up to 40% of acute ankle fractures may be associated with a deltoid ligament injury; this was clearly stated by Hintermann et al.¹¹ in the year 2000 in their series on ankle arthroscopy in 288 acute ankle fractures.

Dr Panchbhavi, in his counterpoint publication arguing for fixation of the deltoid ligament, quotes Hintermann¹¹ as well; he is convinced that the incidence of deltoid injuries with acute ankle fractures is worth intervention. He counters the assertion made in the historical classics like the studies by De Souza⁵ and Stromsoe⁸ by stating that residual pain and deformity in those with deltoid injury was not assessed postoperatively. He also talks about elite athletes

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who sustain high-energy trauma during sports. He mentioned that Hsu et al.¹² observed that the deltoid complex impinges in the medial gutter or retracts distally with high-energy unstable ankle fractures. They reviewed their results in 14 NFL players who underwent ankle fracture fixation with open deltoid complex repairs, and stated that all NFL players were able to return to running and cutting maneuvers by 6 months after surgery.

Dr Panchbhavi's paper becomes more relevant as it mentions more recent studies, specifically those by Woo et al.¹³ and Zhao et al.,¹⁴ these authors are in favor of deltoid ligament repair. Zhao's paper¹⁴ concluded that surgical repair of the deltoid ligament is helpful in decreasing the postoperative medial clear space and malreduction rate, especially for the Weber C ankle fractures. There is a recent meta-analysis by Salameh et al.¹⁵ that looks at primary deltoid repair in ankle fractures. The analysis included a total of 192 patients, 81 in the deltoid ligament repair group and 111 in the nonrepair group. The authors concluded that those who had their deltoid ligament repaired had superior radiological correction of the medial clear space with better pain scores.

As editors our take on the debate is as follows: most surgeons recommend deltoid fixation only if the torn ligament does not allow for adequate fracture fixation. However, in Weber B and C fractures, it is a good idea to perform an intraoperative talus stress view after fixing the fibula. If there is residual increase in medial clear space or talar tilt in the intraoperative post-fixation views, then the deltoid ligament must be fixed.³

Another subset of patients are those with a medial malleolus fracture (SER stage 4); about 25% also have disruption of the deep deltoid ligament.¹⁶ Therefore, fixation of a medial malleolus fracture with only a screw or a plate without repairing the injured deltoid ligament may not restore ankle joint stability.⁴ Tornetta¹⁷ showed that 26% of all patients with a fixed medial malleolar fracture had an evident incompetence of the deltoid ligament, seen radiographically as widening of the medial clear space even after fixation. Again, in such a scenario, repair of the medial deltoid ligament is warranted. This also underscores the importance of

intraoperative stress views after bony fixation. Jones and Nunley¹⁸ have also stressed that bimalleolar-equivalent fractures (ankle fractures with deltoid ligament injury and lateral malleolus fracture) do well with deltoid ligament fixation.

In conclusion, deltoid ligament repair should be performed:

- If the talus cannot be reduced intraoperatively and the medial clear space remains wide.
- If intraoperative radiographs confirm increased medial clear space or talar tilt on talar stress views even after fibular fixation.
- Even when there is bony injury to the medial malleolus, an intra-op stress view after fixing the medial malleolus is imperative. Widening of the clear space or talar tilt warrants deltoid ligament repair.
- In Bimalleolar-equivalent fractures even after syndesmotic fixation if intraoperative stress views reveal persistent medial instability.
- In high-energy trauma in professional athletes.

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