

Role for Primary Repair of Deltoid Ligament Complex in Ankle Fractures

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KEYWORDS

• Ankle • Deltoid • Fracture • Primary • Acute

KEY POINTS

- Deltoid injuries of varying degrees often occur in association with ankle fractures; partial or complete deltoid tears may lead to persistent instability.
- Medial ankle ligament instability is not tolerated well and may lead to long-term negative changes in the ankle joint.
- Stress views are often necessary to determine the extent of deltoid injury. Gravity stress views are as effective as manual stress.
- Acute deltoid injuries may be evaluated and repaired using arthroscopy or an open approach.
- Surgeons should consider primary repair of acute deltoid injuries that demonstrate instability following fracture stabilization.

INTRODUCTION

Ankle fractures may be mistaken for purely bony injuries. Surgeons, however, understand the imperative role periarticular ligamentous structures play in the functionality of the ankle joint. Much work has been done to better understand the ankle mortise and establish ideal methods for stabilizing the distal syndesmosis. Traditionally, surgeons have a low threshold for placing fixation at the syndesmosis itself, while leaving the known deltoid injury to heal without repair. With the growing interest in joint-sparing procedures, such as total ankle replacement, surgeons are encountering more and more ligamentous insufficiency complicating such procedures. For this and other reasons, a growing trend toward performing primary repair of the concomitant ligamentous injuries associated with ankle fractures is occurring.

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ANATOMY AND PURPOSE

The deltoid ligament complex is a multilayer, multiband structure linking and providing support to the ankle, subtalar, and talonavicular joints by spanning the medial malleolus, talus, calcaneus, and navicular bones. Ultimately, the deltoid provides peritalar stability, holding the ankle within the mortise by limiting both rotational and translational forces. The role of the superficial component is to resist eversion forces of the ankle and subtalar joint. The deep ligaments restrain external rotation, as well as lateral translation of the talus.¹ The superficial component lies deep to the posterior tibial tendon whose deep sheath often is incorporated with the superficial deltoid. A thin layer of adipose tissue may interpose between the superficial and deep ligaments. Campbell and colleagues¹ performed a cadaveric analysis of the individual bands of the deltoid complex. Although they found small variations, there were certain consistencies found in each specimen. The deep layer typically consists of the posterior tibiotalar and anterior tibiotalar with the posterior being the larger more robust. The tibionavicular, tibiospring, tibiocalcaneal, and superficial posterior tibiotalar make up the superficial complex.²

BACKGROUND OR HISTORY

Controversy in Deltoid Repair

Few studies from the nineteenth century evaluating ankle fracture treatment promoted that repair of the deltoid was necessary. Most studies from this time suggest there is no need to repair the deltoid.^{3–10} These studies set the trend for surgeons to be comfortable in leaving the deltoid injury to heal without repair. Unfortunately, by current standards, such studies are low-powered and greatly flawed. For example, Baird and Jackson,³ in their 1987 paper, “Fractures of the Distal Part of the Fibula with Associated Disruption of the Deltoid Ligament. Treatment Without Repair of the Deltoid,” promoted that exploration of the medial side of the ankle and repair of the deltoid ligament was not necessary unless reduction of the lateral malleolus fails to reduce the talus within the ankle mortise. It should be recognized that, although this was a good study for its time, it is now recognized as a relatively low-powered study because of small sample size, significant loss of patient follow-up, being single-blinded, and having no standardized scoring system. When considering whether deltoid repair is necessary, it is imperative surgeons make such decisions based on current literature and not previous historical trends.

Why Repair?

Standard treatment of ankle fractures includes reapproximation of fibula length, restoration of the ankle mortise, and rigid fixation. Long-term stability depends on appropriate balancing of the osseous and ligamentous structures. In order for this to occur, both the osseous structures, as well as the ligamentous ankle stabilizers, must heal not only with integrity but also adequate tension. The deltoid is arguably one of the most important stabilizers of the ankle mortise.^{11,12} In bimalleolar equivalent or greater injuries the deltoid may be partially or completely torn. Partial injuries typically involve the anterior aspect of the deltoid complex and, depending on the severity, may be found to unveil instability of the mortise in varying degrees.^{12–16} A medial malleolus fracture does not rule out deltoid injury because medial injuries may involve both ligamentous and osseous components.^{9,16–18} Typically, supramalleolar medial malleolus fractures will spare the deltoid. It is important to be aware that fixation of smaller anterior medial malleolus fractures, or intercollicular fractures, containing the superficial deltoid could also involve deep deltoid disruption. Therefore, it is

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