Role for Primary Repair of the Deltoid Ligament Complex in Acute Ankle Fracture Fixation

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None
Overview

- Historical Literature Trends
- Recent Literature Trends
- Why, when, and how of primary repair of the Deltoid Ligament Complex
- Key Points
• Up to 40% of ankle fractures have an associated deltoid ligament injury found on arthroscopic examination.
  
  – Hintermann et al. JBJS 2000

No consensus on the optimal treatment or preferred operative technique for acute deltoid ligament injuries during ankle fracture fixation.

- **Historical Trends to Fixation**
  - Fibular fixation with the addition of syndesmotic screws will indirectly address the deltoid ligament.

- **Recent Trends towards Fixation**
  - Primary repair of the deltoid ligament combined with syndesmotic fixation in order to restore and maintain the stability of the ankle mortise long-term.
“Historical Trends to Fixation”

- Literature suggested no need to primarily repair the deltoid ligament in ankle fractures.
  - Syndesmotic fixation was sufficient for restoring and maintaining ankle mortise stability.
- Relatively low powered studies
  - Small sample size
  - Significant loss of follow up
  - Single-blinded
  - No standardized scoring system
Controversy in Primary Deltoid Repair

• **Recent Literature Trends**
  – Report a significant subset of patients that continue to present with medial gutter pain and instability without primary repair of deltoid.
  – Raise concern for long term ankle arthrosis secondary to chronic medial ankle instability.

• **Horisberger et al. J Orthop Trauma 2009**
  – 20.4% incidence of posttraumatic ankle osteoarthritis in patients with an untreated deltoid ligament injury.
  – Between 20.9 year and 47 year latency between initial injury and end stage ankle OA.

Why repair?

- Prevent non-anatomical healing of the Deltoid Ligament Complex
  - Loss of peritalar stability resulting in:
    - Medial Ankle Instability
    - Medial Ankle Pain
    - Increased risk of Ankle Arthritis
    - Valgus related deformities
- Growing interest in Joint sparing procedures
  - TAA
- Earlier Weightbearing and ROM
Why repair?

- **Standard treatment goals of ankle fracture fixation**
  1. Approximation of Anatomical Fibula Length
  2. Restoration of Ankle Mortise
  3. Rigid Fixation

- **Long-term stability depends on appropriate balancing of the osseous and ligamentous structures.**
  - Must heal with adequate Integrity and Tension
When to repair?

- In Bimalleolar equivalent or greater injuries the deltoid may be partially or completely torn.
  - Partial Disruption
    - Anterior Aspect of Deltoid
  - Complete Disruption
    - Superficial and Deep Aspects of Deltoid
When to repair?

- Medial Instability
  - Preoperatively
  - Intraoperatively
  - Following ORIF
Assessing for Medial Ankle Instability

- Physical Exam Findings
  - Medial Tenderness, Edema, Ecchymosis
- Standard Radiographs
  - NWB
  - Miss subtle Deltoid Injury
- Stress Radiographs
  - Manual vs Stress Gravity Views
- Fluoroscopic Analysis
  - Stress Maneuvers
    - Eversion + Lateral Translation + External Rotation
- MRI
- CT
Assessing for Medial Ankle Instability

- **MRI**
  - Evaluate extent Superficial vs Deep Deltoid involvement
  - Evaluate Osteochondral lesion of Talus
- **CT**
  - Extent of Osseous Involvement
  - Subtle Syndesmotic Injury
  - Malrotations of fracture fragments
- **Diagnostic Arthroscopy**
  - Direct Visualization
  - Minimally Invasive
  - Decompress Hemarthrosis
Surgical Treatment

- Determined by fracture features
  - Location, displacement, and pattern
- AO Technique
- Repair Syndesmosis or Deltoid first?
- Open Primary Repair
  - Complete Deltoid Tear
  - Midsubstance Deltoid Tear
  - Avulsion of Deltoid from Talus
- Arthroscopic Repair
  - Patients with Comorbidities
  - Anterior Partial Deltoid Repairs
Open Primary Repair

• **Medial Approach**
  - Standard
    • Over distal aspect medial malleolus curving Anterior and Distal superior to course Posterior Tibialis Tendon
  - Anterior incision over medial malleolus extending distally and posteriorly
Open Primary Repair

- Suture and Bone Anchors
- Advancement of Soft Tissue
- Suture to Periosteum
- Internal Augmentation
  - Tape-like sutures with anchors
    - Complete Disruption of Deltoid
    - Larger Patients
    - Tenuous ligament fibers remaining
- Direct Primary Repair with Sutures
- Hardware for associated medial malleolus fractures
Arthroscopic Repair

- Minimally invasive
- Diagnostic
- Patient with Comorbidities
- Concern for incisional complications
- With midsubstance tearing or avulsions from Talus
  - Convert to open approach
Key Points

• Some studies suggest deltoid injuries heal uneventfully without repair.

• Other studies report a subset of patients that continue to present with medial gutter pain and instability.
  – This raises the question of whether those patients would have had improved outcome with a primary repair.

• Primary Deltoid Repair should be done if residual ankle mortise instability remains following ORIF of the Lateral Malleolus and Syndesmosis.
  – This may help prevent or delay:
    • Post-traumatic arthrosis
    • Medial Ankle Instability/Insufficiency

• Younger Patients/Athletic Patients may benefit from Primary Deltoid Fixation
  – Earlier WB and ROM
Ultimately, the question each surgeon must answer is:

Does the risk of complications from a medial incision, as well as the increased surgical time and expense, justify attempts at improving subjective and functional outcomes for the patient?
References