Repair of the acute deltoid ligament complex rupture associated with ankle fractures: a multicenter clinical study.

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Etiology – Deltoid Ligament Injury

• Acute deltoid (10-15% of ankle injuries)
• 40% ankle fractures, by arthroscopy

• Eversion injury
• Rarely isolated medial ligament injury
  • Ankle syndesmosis injury
  • Talar osteochondral lesion
  • Malleolar fracture

Deltoid is twice stronger than lateral ligament

**Removal**
- lateral malleolus
- superficial deltoid
- deep deltoid ligament

**Consequence**
- 2 mm lateral talar shift
- no increase in talar shift
- maximum lateral talar shift (4 mm)

- 1 mm lateral talar shift results in 42% reduced joint contact

Diagnostics

Clinical
X-RAY, CT
MRI
Arthroscopy
## Controversy

<table>
<thead>
<tr>
<th></th>
<th>Repair</th>
<th>Not repair</th>
<th>Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>de Souza</td>
<td>0</td>
<td>22</td>
<td>pain and deformity</td>
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<tr>
<td>Harper</td>
<td>0</td>
<td>36</td>
<td>residual ligamentous pain</td>
</tr>
<tr>
<td>Zeegers</td>
<td>0</td>
<td>28</td>
<td>medial clear space widen</td>
</tr>
<tr>
<td>Johnson</td>
<td>0</td>
<td>29</td>
<td>pain or abnormal gait</td>
</tr>
<tr>
<td>Stromsoe</td>
<td>25</td>
<td>25</td>
<td>residual pain</td>
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<tr>
<td>Stufkens</td>
<td>19</td>
<td>17</td>
<td>pain</td>
</tr>
</tbody>
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**Small sample**

**No randomized controlled trial**
Patients

- 2006.1-2011.12, 1533 ankle fx
- 131 deltoid rupture, M74, F57, 33.2Y (17-63)
- Lauge-Hansen:
  - supination-external IV: 42
  - pronation-external III: 36
  - pronation-external IV: 48
  - pronation-abduction III: 5
- AO/OTA:
Indication for repairing

- Mortise view: medial clear space ≥ 5mm in stress radiograph. Talus subluxation

- Medial clear space ≥ 1mm after ORIF

- Medial instability by external rotation stress after ORIF
Procedure

• 1 cm below the medial malleolus
• 5 cm long
• explore superficial and deep deltoid
• repair deep deltoid, after ORIF, tie it
• repair superficial, close wound
Technique

Repair method bases on the broken site:

- Insert of talus: 2 resorbable sutures anchors

- Intermediate tear: direct repair

- Insert of medial malleolus: bone tunnel suture OR 2 resorbable sutures anchors
Male, 51 years old, Maisonneuve fracture (AO/OTA 44-C3, Lauge-Hansen: Pronation-abduction type III); (A) X-ray shows widen medical clear space, lateral talar shift, tibio-fibular Syndesmosis diastasis; CT shows avulsion fracture from medial malleolus; (B) MRI shows deltoid ligament rupture. (C) Operative image showing a deltoid ligament avulsed from the medial malleolus (D) Maisonneuve fracture: fracture of proximal fibular. (E) Fluoroscopic image shows the location of a metallic anchor and screws fixation of tibio-fibular Syndesmosis; (F) X-ray of 14 months postoperation shows no abnormality of ankle.
Result

- Followed up about 27 months (12~72 month)
- Fracture healing was 14.5 weeks (11-16 weeks)
- No space widening than 1mm
- No valgus tilting of talus
- AOFAS score was 84.5 (78~94)
- No ankle instability
- No posttraumatic arthritis
Conclusion

- Multiple-center study
- Recommendation for repair in three indications.
- Appropriate repair technique according to the site of deltoid ligament rupture.
- Repair Prevents complication (pain, instability, OA)