Effect of Posterior Malleolus Fracture on Syndesmosis Reduction

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Disclosure

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Our disclosures are in the Final AOFAS Mobile App.

We have no potential conflicts with this presentation
Rotational ankle fractures are a common injury in which syndesmotic malreduction and the presence of posterior malleolus fractures negatively influence outcomes.

Posterior malleolar fixation has been shown to contribute to the stability of the syndesmosis.
Little is known if and how anatomic or non-anatomic fixation of the posterior malleolus affects syndesmotic reduction.

Study
- Cadaveric model of rotational ankle fracture
- Varying size of posterior malleolus fractures created
- Varying quality of posterior malleolus fracture reduction and fixation
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- **Methods**
  - Nine through-knee cadaveric specimens were randomized into two groups of varying sized posterior malleolar fragments
    - small (a third of the fibular notch, n=4)
    - large (two-third of the fibular notch, n=5)
  - A model of rotation ankle injury after fibular repair was created
  - Posterior malleolar fracture was created with preservation of posterior inferior tibiofibular ligament
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Methods

- High resolution CT scan was obtained in each specimen at the four stages
  - Intact
  - Neutral-axis syndesmotic clamping only
  - Clamping with anatomic fixation of the posterior malleolus
  - Clamping with non-anatomic fixation of the posterior malleolus using a 4.8mm interposed spacer

- Measurement of syndesmotic reduction in both anteroposterior and mediolateral planes was made automatically using a validated technique assisted by custom-developed software
Results

- Both neutral-axis clamping alone or with an anatomically reduced fracture fragment caused a slight anterior shift of the fibula that was more pronounced in the smaller fragment group.
- Two-way ANOVA indicated no significant effects of fragment size ($p=0.73$) or reduction ($p=0.09$) on AP fibular movement.
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Results

- In the large fracture fragment group, non-anatomical fixation caused the fibula to move significantly posteriorly (p=0.03 and p=0.01) relative to the intact and clamping only states.
Results

- Both neutral-axis clamping alone and clamping with an anatomically reduced fracture fragment both increased medial translation of the distal fibula.
- The non-anatomic reduction model of the posterior malleolus associated with corresponding lateral displacement of the distal fibula.
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Conclusion

- The overall anteroposterior reduction of the syndesmosis was generally not affected by posterior malleolar fracture except in a non-anatomic fixation of large fragments.
- Mediolateral syndesmotic reduction was affected by the conditions of posterior malleolar fixation with best results in anatomic fixation.
Conclusion

- Malreduction of the posterior malleolus led to a corresponding syndesmotic malreduction.
- In concomitant posterior malleolar fracture and syndesmotic injury, anatomic fracture fixation is paramount as it can affect syndesmotic reduction, especially with larger fracture fragments.
References


4. Influence of Fragment Size and Postoperative Joint Congruency on Long-Term Outcome of Posterior Malleolar Fractures.


