Open Reduction Internal Fixation of Posterior Malleolus Fractures and Iatrogenic Injuries: A Cadaveric Study

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My disclosure is in the Final AOFAS Program Book.
I have no potential conflicts with this presentation.
Introduction

- Posterior malleolus fractures are significant orthopedic injuries that cause significant morbidity.
- In recent years, there has been an increased interest in performing open reduction and internal fixation of these fractures from a posterior approach.
- The orthopedic literature has shown high risk of iatrogenic injury to the sural nerve and saphenous vein.
- One concern that has not been studied is the risk of iatrogenic injury to anatomic structures that run along the anterior aspect of the ankle.
- The purpose of this study is to determine the proximity of these anterior anatomic structures with relation to guide wires that are advanced through the anterior cortex.
- Inadvertent injury to tibialis anterior, extensor hallucis longus, deep peroneal nerve, and dorsalis pedis artery/vein are hypothesized to be at great risk.
Methods

- A total of 10 cadaver ankles were utilized in the study.
- A posterior lateral approach to the ankle was used.
- Using a ruler, the mid-portion of the plafond was determined at approximately 1.0, 1.5, 2.0, 4.0 and 5.0 cm above the articular surface in the sagittal plane.
- These levels above the articular surface were chosen to simulate screw placement for an antiglide plate and screw construct.
Methods

- Guide wires with drill guides perpendicular to the posterior bony surface of the tibia were then advanced.
- The drill guide prevented any excessive angulation while the wires were advanced.
- C-arm imaging was used to confirm that all guide wires had minimal degrees of angulation in the coronal and sagittal planes with regard to the initial starting point.
- Once the guide wires had been advanced at the varying levels above the articular surface, an anterior approach was used to dissect and then identify the neurovascular bundle, tibialis anterior tendon, and extensor hallucis longus tendon at the level of the ankle joint.
- The guide wires were identified and the distances from each guide wire to each of the three anatomic structures were then measured.
AP and Lateral Fluoroscopic Images
Results

- Overall, the anatomic structure most in danger of being injured was the tibialis anterior tendon ($p<0.001$).
- This tendon was injured by 52% of all guide wires that were placed.
- The neurovascular bundle was injured by 4% of all guide wires.
- The extensor hallucis longus tendon was injured by 2% of all guide wires.
- Wires that were started from a more medial position at the posterior aspect of the distal tibia had a higher rate of injury to the neurovascular bundle, tibialis anterior tendon, and extensor hallucis longus tendon.
Conclusions

• The data in this study suggests that guide wire advancement from the posterior to anterior distal tibial cortex should be done under direct fluoroscopic visualization to minimize the risk of injury to the anterior structures about the ankle joint.
References

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