Biomechanical Comparison Between a Posterior Blade Plate and Crossed Screws for Tibiotalar Arthrodesis

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

• Ankle arthrodesis has been the gold standard treatment for post-traumatic and primary ankle arthritis
• Ankle arthrodesis may also be used primarily in severe pilon fractures with significant articular comminution and bone loss
• Various ankle arthrodesis techniques have shown fusion rates over 90%\(^2-5\)
• Most arthrodesis techniques require an anterior and/or lateral approach
• These approaches may place patients at risk for soft tissue complications (skin grafts, previous incisions, compromised soft tissue envelope)\(^1\)
Introduction Continued

• A posterior approach for arthrodesis may decrease the risk for soft tissue complications
• *Thordarson* reported successful use of a posteriorly applied blade plate to achieve tibiotalar arthrodesis\(^1\)
• To our knowledge there are no biomechanical studies comparing the use of a posteriorly applied blade plate to other techniques
• The hypothesis is that there are no differences in rigidity between a posteriorly applied blade plate and a crossed screw construct
Materials and Methods

- Six matched cadaveric lower extremities were harvested and skeletonized with preservation of the ankle capsule
- A blade plate from posterior to anterior was placed on one limb of each matched pair
- Two partially-threaded cannulated 6.5 mm crossing screws were then applied to the other limb of the matched pair
- All ankles were fused in neutral flexion, 5 degrees of valgus, and 10 degrees of external rotation
- An MTS Bionix servo-hydraulic testing device was used for all biomechanical testing
Torsion Testing Parameters

- A torque of 5 newton-meters was applied to each of the specimens and the resultant angular displacement was measured.
Valgus Testing Parameters

- A load was applied to the medial surface of the tibia 12 cm proximal to the tibiotalar joint
- The amount of load required to create a 5 mm deflection was measured
Dorsiflexion Testing Parameters

• A load was applied to the posterior surface of the tibia 12 cm proximal to the tibiotalar joint
• The amount of load required to create a 5 mm deflection was measured
Results and Conclusion

• There was no significant difference in rigidity between the two constructs when tested in torsion or valgus for both paired t-test and Wilcoxon signed-rank test

• In dorsiflexion, the blade plate construct was significantly more rigid compared to the crossed screw construct for both paired t-test and Wilcoxon signed-rank test

• Statistical significance was set at 5% (p= 0.05)

• Conclusion: The study shows that a posteriorly-applied blade plate performs biomechanically favorable to a crossed screw construct in dorsiflexion but the two constructs are similar in torsion and valgus
References


