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## **Biomechanical comparison of plantar-to-dorsal and dorsal-to-plantar screw fixation strength for subtalar arthrodesis**

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### **ABSTRACT**

**Introduction:** Arthrodesis of the subtalar joint is performed for various arthritic and instability problems to correct alignment and relieve pain. Use of compression screws is the most common fixation method. Screws may be oriented from dorsal to plantar or plantar to dorsal. Arguments favoring one approach over another are based more on “expert opinion” than on hard data.

**Methods:** Eight matched pairs of cadaver feet underwent subtalar joint arthrodesis with two 7.3-mm cannulated screws. Randomization was used to assign the screw orientation, such that one foot in each pair was assigned dorsal to the plantar screw orientation (DP group), with the other foot plantar to the dorsal orientation (PD group). The standard surgical technique with fluoroscopy was used for each approach. Following fixation, each specimen was loaded to failure with a Bionix 858 MTS device, applying a downward axial force at a distance to create torque. Torque to failure was compared between DP and PD groups using the Student’s T-test, with  $p=0.05$  used to determine statistical significance.

**Results:** The statistical analysis demonstrated that the mean torque to failure slightly favored the DP group (37.3 N-m) compared with the PD group (32.2 N-m). However, the difference between the two groups was not statistically significant ( $p=0.55$ ).

**Conclusion:** In subtalar arthrodesis, there is no significant difference in construct strength between the dorsal-to-plantar and plantar-to-dorsal screw orientation. The approach chosen by the surgeon should be based on factors other than the biomechanical strength of the screw orientation.

**Keywords:** Subtalar joint; Arthrodesis; Arthritis.

