

Lateralizing Calcaneal Osteotomy Performed with a Percutaneous Burr Results in a Significantly Lower Increase in Tarsal Tunnel Pressure

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INTRODUCTION:

Translational single-plane calcaneal osteotomies are used for the management of hindfoot deformity; however, neurological complications are well-documented in the literature. Postoperative tarsal tunnel syndrome has been reported following lateralizing calcaneal osteotomy. Prior authors have hypothesized that lateralizing calcaneal osteotomies reduce the volume of the tarsal tunnel, and thus may cause tibial nerve compression and tarsal tunnel syndrome. Biomechanical studies have established that tarsal tunnel pressure is significantly increased and tarsal tunnel volume is decreased following lateralizing calcaneal osteotomy. Traditionally, calcaneal osteotomy is performed using an oscillating saw. No prior studies have investigated the effect of alternative surgical techniques on post-procedure tarsal tunnel pressure. The purpose of this study was to investigate the difference in post-procedure tarsal tunnel pressures following lateralizing calcaneal osteotomy performed with an oscillating saw versus a low-speed burr.

METHODS:

Lateral-to-medial, single-plane lateralizing calcaneal osteotomy via a lateral approach was performed on 10 below-knee cadaveric specimens; this was conducted on 5 specimens using an oscillating saw (saw group) and 5 specimens using a low-speed, high torque burr (burr group). The calcaneal tuberosity was translated 1 centimeter laterally in all specimens and transfixed using 2 Kirschner wires. Tarsal tunnel pressure measurements were performed under ultrasound guidance using one manufacturer's system; tarsal tunnel pressure measurements were collected both before and after lateralizing calcaneal osteotomy. Mean pre and post-procedure tarsal tunnel pressures were compared between the saw group and burr group. Differences in mean tarsal tunnel pressures were analyzed using Student's t-test.

RESULTS:

The mean pre-procedure tarsal tunnel pressure in the saw group was 25.8 ± 5.1 mm Hg and 26.4 ± 4.3 mm Hg in the burr group ($p = 0.85$). The mean post-procedure tarsal tunnel pressure was 63.4 ± 9.5 mm Hg in the saw group versus 47.8 ± 4.3 mm Hg in the burr group ($p = 0.01$). The change in tarsal tunnel pressure after lateralizing calcaneal osteotomy was significantly lower in the burr group (21.4 ± 4.3) compared to the saw group (37.6 ± 9.5) ($p = 0.03$). The increase in tarsal tunnel pressure was 43% lower in the burr group compared to the saw group.

DISCUSSION AND CONCLUSION:

In this cadaveric study, the increase in tarsal tunnel pressure following lateralizing calcaneal osteotomy was significantly lower if the osteotomy was performed using a burr versus an oscillating saw. This decrease in the magnitude of tarsal tunnel pressure increase suggests that use of a low-speed burr for lateralizing calcaneal osteotomy may mitigate the risk of postoperative tarsal tunnel syndrome, and further research in vivo should be aimed at investigating this.