

# Plantar Fascia Strain and Pressure Changes After Zadek Osteotomy

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**INTRODUCTION:** Insertional Achilles tendinopathy (IAT) is a frequent cause of posterior heel pain and functional impairment. Traditional surgical treatment involves debridement and reattachment of the Achilles tendon with excision of the posterosuperior calcaneal prominence. The Zadek osteotomy (ZO), a dorsal closing wedge osteotomy of calcaneus, has regained popularity, particularly with the advent of minimally invasive surgical (MIS) techniques. ZO has demonstrated to improve Achilles tendon mechanics, reduce retrocalcaneal impingement, and decrease pressure within the retrocalcaneal bursa. However, its biomechanical effects on plantar fascia strain remain unknown. This study aims to quantify the difference in plantar fascia strain and the medial calcaneal tuberosity pressure prior to and following ZO.

## METHODS:

Twelve fresh-frozen foot and ankle cadaveric specimens, amputated at the mid-tibia/fibula level, were used for biomechanical testing. Point pressure sensor catheters and differential variable reluctance transducers (DVRTs) were employed to measure medial calcaneal tuberosity pressure and plantar fascia strain, respectively, in both the pre- and post-ZO states of all specimens. The ZO was performed using a standardized one-centimeter dorsal closing wedge osteotomy, secured with a 6.5 mm cannulated screw. Paired t-tests were used to compare differences in measurements between the intact and post-osteotomy states ( $p < 0.05$ ).

## RESULTS:

When compared to the pre-ZO state, medial calcaneal tuberosity pressure increased significantly by 43% following ZO (from 67 mmHg to 96 mmHg;  $p = 0.0016$ ). Additionally, medial plantar fascia strain increased by 24%, rising from 0.00439 to 0.00543 ( $p = 0.124$ ), while lateral plantar fascia strain increased by 11%, from 0.00637 to 0.00709 ( $p = 0.311$ ). However, neither change in fascia strain reached statistical significance.

**DISCUSSION AND CONCLUSION:** In a cadaveric model, ZO significantly increased medial calcaneal tuberosity pressure. Although plantar fascia strain also increased, the change was not statistically significant. Our findings suggest that these biomechanical alterations may contribute to post-operative plantar fascia discomfort and help explain the plantar fascia-related pain reported by some patients following ZO.

