

## **Anatomical Mapping of the Sural Nerve Highlights Cautions for Lateral Calcaneal Approaches: The Relationship Between the Posterior Subtalar Joint and the Sural Nerve Using Cadavers and Fluoroscopic Imaging**

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**Purpose:** The surgical approaches for calcaneal fractures typically involve the extended lateral approach (ELA) or the sinus tarsi approach (STA). One of the complications associated with these approaches is sural nerve injury. This study aims to investigate the anatomical relationship between the posterior subtalar joint and the course of the sural nerve using cadavers and fluoroscopic imaging, proposing new landmarks for surgical consideration.

**Methods:** 19 limbs from cadavers were studied. The hindfoot was dissected to identify the sural nerve. 1.0-mm steel wire was placed along the nerve, and its course was visualized using fluoroscopic imaging. The fluoroscopic images were evaluated using lateral views of the ankle. In the images, a straight line was drawn across the posterior subtalar joint surface, and perpendicular lines were drawn from 3 points on the talus side: the anterior edge, the center, and the posterior edge. The distance from the talus to the sural nerve (DTSN) at each intersection was measured. For statistical analysis, the interquartile range (IQR) was calculated to assess the variability in the measured results.

**Results:** In all cases, the sural nerve was observed to run from the posterolateral aspect of the fibula down to its lower end. The DTSN measurements were as follows: anterior edge median 11.98 mm (range 6.9-19.1), IQR 8.1 mm; center median 14.86 mm (range 8.5-18.6), IQR 6.2 mm; posterior edge median 7.9 mm (range 1.9-12.0), IQR 6.6 mm.

**Conclusion:** The sural nerve runs approximately 10 mm parallel to the posterior subtalar joint and is as close as 1.9 mm, with an average distance of 7.9 mm, to the posterior edge of the joint. Therefore, caution is needed not to extend toward the posterior edge during the STA. Additionally, during the ELA, as the length of the skin incision increases, there is a higher possibility of intersecting the sural nerve at both the anterior and posterior edges. Therefore, it is necessary to carefully determine the length of the incision based on the course of the nerve.