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## Anatomical structures at risk in proximal fifth metatarsal fracture fixation: a cadaver study

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**ABSTRACT**

**Introduction:** Proximal fifth metatarsal fracture fixation is usually treated conservatively, but when chosen for surgical treatment, percutaneous fixation with screws is the most used. This study aims to evaluate the presence of injury of the structures at risk and to measure the distance of these structures to the entry point.

**Methods:** Eleven fresh-frozen below-the-knee specimens underwent standard operative fixation for a Jones fracture via the “High and inside” percutaneous technique. A guide wire was placed through the medullary canal and confirmed on fluoroscopy. The cannulated drill with a drill sleeve was then placed over the wire and advanced to the diaphysis. The guide wire was left, and the skin and subcutaneous tissues were carefully removed from the lateral midfoot to fully expose the structures at risk. The guidewire was then removed, and then the solid screw was placed. Neurovascular and tendinous structures were assessed for any injury. The distance of the wire in the base of the fifth metatarsal and these structures was measured and documented, including the branches of the sural nerve, cuboid, fourth metatarsal, peroneus longus, and peroneus brevis tendons.

**Results:** The structure with the shortest average distance from the pin was the peroneus brevis, measuring 0.91 mm ( $\pm 1.22$  mm S.D.), followed by the cuboid articular surface, sural nerve, peroneus longus, and base of the fourth metatarsal, respectively. The pin had damaged the peroneus brevis in 5 of 11 cadavers. The average distance from the tendon insertion point was 7.2 mm. The furthest measured distance was 10 mm, while the closest was 3 mm. The screw head contacted the articular surface of the cuboid in 3 of 11 cadavers. There were no instances of pin contact with or damage to the peroneus longus, sural nerve, or fourth metatarsal head.

**Conclusion:** We conclude that percutaneous fixation of fractures of the base of the fifth metatarsus presents a risk of partial lesion of the peroneus brevis tendon and lateral aspect of the cuboid. Therefore, specific care with these structures should be taken during the procedure.

**Keywords:** Cadaver study; Proximal fifth metatarsal fracture; Fixation.

Cadaver Number	1	2	3	4	5	6	7	8	9	10	11	Average ( $\pm$ Standard Deviation)
Distance from peroneus longus (mm)	3	6	6	8	12	6	11	11	2	6	4	6.82 ( $\pm 3.34$ )
Distance from peroneus brevis (mm)	1	0	0	1	1	1	0	0	2	4	0	0.91 ( $\pm 1.22$ )
Distance from Sural Nerve (mm)	2	3	5	6	12	11	4	3	4	7	3	5.45 ( $\pm 3.32$ )
Distance from Cuboid (mm)	0	3	1	0	3	8	9	2	0	2	3	2.82 ( $\pm 3.06$ )
Distance from fourth metatarsal (mm)	5	10	8	7	24	6	24	13	9	2	16	11.27 ( $\pm 7.33$ )

