A NOVEL METHOD OF PERCUTANEOUS FIXATION OF THE POSTERIOR MALLEOLUS USING POSTERIOR-TO-ANTERIOR LAG SCREWS: A CADAVERIC STUDY

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Fixation of posterior malleolar (PM) fractures typically involve an extensile open posterior approach that risks neuro-vascular injury, infection or other wound complications. In an attempt to minimize the risk to soft tissues, minimally invasive surgery has become increasingly popular. Percutaneous fixation of the medial and lateral malleoli have previously been described, as well as percutaneous anterior-to-posterior percutaneous screw fixation for the PM.

The purpose of this study was to assess whether percutaneous posterior-to-anterior lag screw fixation is anatomically safe to perform in a cadaveric model.

Method

Twenty cadaveric ankle specimens were obtained. Two were excluded due to pre-existing metalware. A transverse incision is made beginning 20mm proximal to the tip of the medial malleolus from the mid-point of the tendo Achilles and extending 15mm laterally. Windows were made lateral to, and through the substance of the TA for simulated reduction and placement of a single lag screw. The specimens were then fully dissected to assess integrity of vital neurovascular structures, the proximity of metalware, and instrumentation trajectories to the above structures.

Figure: *Marking the planned skin incision– a transverse incision is made at lateral border of tendo Achilles* and subsequent k-wire placement

Results

Fixation was appropriately placed in all ankles. No injury to the neurovascular structures, ankle joint or syndesmotic ligaments was observed. Mean distance from soft tissue window to sural nerve was 10.0mm (range 5-16), and 9.5mm to short saphenous vein (4-14). The muscle belly of flexor hallucis longus (FHL) was pierced in 33% of specimens, no injuries to the FHL tendon were observed. Mean distance from screw to syndesmosis was 9.3mm (range 3-15) and 12.7mm to ankle joint (7-17).

	Mean distance in mm (range)
Ankle joint	12.7 (7-17)
Syndesmotic ligaments (PITFL)	9.3 (3-15)

	Mean distance in mm (range)
Sural nerve	10 (5-16)
Short saphenous vein	9.5 (4-14)

Conclusions

This cadaveric study suggests that percutaneous fixation is anatomically safe and the accuracy of metalware positioning satisfactory. Further research is required to determine it efficacy in vivo.