

## Medial Clamp Tine Positioning Using Intraoperative Fluoroscopy Affects Syndesmosis Malreduction

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**Background/Purpose:** Treatment of ankle syndesmotic injuries requires precise anatomic reduction to provide optimal functional outcomes. Several recent studies have demonstrated unacceptably high malreduction rates. The ideal technique for reduction and intraoperative reduction assessment has been contested in the literature. The purpose of this study was to determine if the position of the medial clamp tine during syndesmotic reduction affected malreduction rates.

**Methods:** We prospectively enrolled 36 patients with malleolar ankle fractures and concomitant syndesmotic injuries into a study to assess multiple aspects of syndesmotic reduction and fixation. Patients had their malleoli fractures stabilized, and underwent stress examination of the syndesmosis. If the syndesmosis was unstable compared to the contralateral side, reduction and fixation was performed. Reduction was achieved using a reduction forceps, without visualization of the distal tibiofibular joint, by one of three orthopaedic traumatologists at a Level I center. The lateral clamp tine was placed on the fibular tubercle, or on a screw head on a posterolateral plate. The medial clamp tine was placed anteromedially on the distal tibia based on each surgeon's standard technique. Bilateral CT scans were obtained postoperatively. Various standardized measurements of syndesmotic reduction were performed based on several previous parameters described in the literature. Malreduction was defined as a difference of 2 mm between the injured and uninjured sides. Next, the true talar dome lateral fluoroscopy view was evaluated and measured to determine the medial clamp tine positioning on the true talar dome lateral relative to AP dimension of the tibia. A Fisher exact test was performed to assess for statistical association between medial clamp tine placement on intraoperative fluoroscopy and malreduction.

**Results:** A significant association was found between medial clamp position and sagittal plane translational malreduction of the syndesmosis. In 10 patients, the tine was placed in the anterior third of the tibial line, and there were no malreductions; in 22 patients, the medial clamp tine position was located in the central third of the tibia, and 4 (18%) malreductions occurred. Of the 4 patients in whom the clamp tine was in the posterior third, 2 (50%) malreductions occurred ( $P = 0.05$ , Figure). There were no significant associations between medial clamp placement and coronal plane (overcompression) or rotational malreductions.

**Conclusion:** When using reduction forceps for syndesmotic reduction, the position of the fibular clamp tine is relatively constant, but the position of the medial clamp tine can be highly variable. The eccentric angle created with off-axis syndesmotic clamping is likely a major culprit in iatrogenic malreduction. A true talar dome lateral image during intraoperative fluoroscopy creates a reproducible template on which deliberate medial clamp tine positioning can be performed. Sagittal plane malreduction appears to be highly sensitive to clamp obliquity, which is directly related to the medial clamp tine placement.

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.

