Rates and Types of Syndesmotic Fixation in Operatively Treated Ankle Fractures: A Retrospective Review

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Introduction/Purpose: Roughly 15% of ankle sprains and 23% of ankle fractures involve disruption of the syndesmotic ligaments. It has been shown that patients who require syndesmotic stabilization have worse subjective outcomes than those who do not require fixation. Recent studies have demonstrated that both Weber B and Weber C distal fibula ankle fractures can have concomitant syndesmotic injury necessitating trans-syndesmotic fixation. Significant controversy exists regarding the proper syndesmotic fixation strategy in regards to size, number and type of screws, and number of engaged cortices. The goal of our study was to establish the current practice in syndesmotic fixation in surgically-treated ankle fractures at our institution, through a retrospective review, based on fracture pattern and surgeon subspecialty training.

Methods: A multi-center retrospective cohort study of 219 surgically-treated ankle fractures over a 2 year period was performed. Institutional Review Board (IRB) approval and a waiver of informed consent were obtained prior to data collection. Patient selection criteria was based on CPT codes, while exclusion criteria included open trauma, pilon fracture, history of prior ankle fracture and pediatric patients. All preoperative radiographs were reviewed for Danis-Weber classification. All intra-operative fluoroscopy, operative reports and postoperative radiographs were reviewed to confirm surgeon detection of syndesmotic injury and type of syndesmotic fixation utilized. This search included number of screws, screw size (mm) and number of engaged cortices. Surgeons were divided into three groups according to fellowship training: foot and ankle, trauma, and general. There were two foot and ankle fellowship-trained orthopaedists, five trauma fellowship-trained orthopaedists, and eight generalists whose fellowships included sports, hand, and spine. Patient demographics and medical risk factors were also recorded.

Results: There were 153 Weber B and 64 Weber C cases. Of those overall, 32.4% required trans-syndesmotic fixation, with 33.8% being Weber B, and 66.2% being Weber C fractures. 15.6% of the Weber B and 73.4% of the Weber C cases required syndesmotic fixation.
There was a statistically significant difference in the use of two screws versus one screw overall and for Weber C ($P < 0.0009$ and 0.0003 respectively).

The fixation of four cortices was more common overall (59.6% of 71 cases) and for Weber C (63.8% of 47 cases).

3.5mm screws were used in 73.2% (52/71) of cases, 4.0mm screws in 19.7% (14/71) of cases and 4.5mm screws in 7% (5/71) of cases. Of the 4.5mm screws used, 80% were used in Maisonneuve injuries.

Conclusion: There is variability in the literature regarding fracture pattern and the presence of syndesmotic injury. Detection and repair of the syndesmosis is critical in maximizing post-operative outcomes. While many investigators have debated the practicality of fracture classifications and pre-operative imaging in diagnosing syndesmotic injury, a high clinical and intraoperative suspicion must remain, especially when accompanying a low level fibular fracture. When diagnosed, multiple acceptable fixation options exist; however, our study shows that surgeons prefer two screws over one screw for Weber C fractures, as well as screws with a diameter of 3.5 mm with no preference in engaged cortices.

IMAGES AND TABLES:

Classification	1 Screw	2 Screws	3 Screws	Total
Weber B	14	9	1	24
Weber C	6	41	0	47
Total	20	50	1	71

Table 1. Number of screws used for trans-syndesmotic fixation.

Classification	3 Cortices	4 Cortices	Total
Weber B	12	12	24
Weber C	17	30	47
Total	29	42	71

Table 2. Number of Engaged Cortices used for trans-syndesmotic fixation.

Classification	3.5 mm	4.0 mm	4.5 mm	Total
Weber B	18	5	1	24
Weber C	34	9	4	47
Total	52	14	5	71

Table 3. Size of trans-syndesmotic screws.

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