Syndesmosis Injuries in Ankle Fractures: Correlation of Fracture Type and Syndesmotic Instability

Christina Freibott, BA; Seth C. Shoap, BA BS; Sebastian F. Baumbach, MD; Kathrin Rellensmann, MD; Rami Alrabaa, MD; Hans Polzer, MD; Justin K. Greisberg, MD; J. Turner Vosseller, MD

Category: Ankle; Trauma

Keywords: Syndesmosis; Ankle Fracture Evaluation; Outcomes Measures

Introduction/Purpose: Ankle fractures are among the most common injuries treated by orthopedic surgeons. Syndesmotic disruption in ankle fractures can be identified preoperatively, however the decision to fix the syndesmosis is made after this intraoperative assessment. The AO classification groups ankle or malleolar fractures into A (infrasyndesmotic fibula fracture), B (transsyndesmotic fibula fracture), and C (suprasyndesmotic fibula fracture) with succeeding digits that further classify each fracture group in more detail. This study aimed to retrospectively review databases of ankle fractures across two major academic centers to determine the rate of syndesmotic injury and to assess the association between ankle fracture type (utilizing the AO classification) and presence of syndesmotic injury.

Methods: Patients 18 years or older who were treated surgically for an ankle fracture at two major academic institutions between 2010 and 2016 were selected for review. Exclusion criteria were open fractures, pilon fractures, tibial shaft fractures, or patients who underwent open reduction and internal fixation of an ankle fracture involving the posterior malleolus. The preoperative injury films of each ankle fracture was reviewed and classified according to the AO classification. The postoperative films were then reviewed for each case to classify the fractures into stable or unstable syndesmosis based on whether syndesmotic fixation was performed. Stability of the syndesmosis was tested intraoperatively after internal fixation of the fracture fragments using the Cotton test and external rotation stress views. Fixation of the syndesmosis was performed with either a syndesmotic screw or suture button fixation per surgeon preference. Chi-square analysis was used to assess the association between fracture types and syndesmotic injury.

Results: 733 patients met inclusion criteria. Average patient age was 54.22 with 52.8% being female. 273 patients had sustained a syndesmotic injury (Figure 1). Association between fracture type (AO classification) and syndesmotic injury was assessed with chi-square analysis showing significant association (X²=193.842, p<0.001). Type B fractures in this study were further classified with AO classification (9 subcategories) to assess for an association with syndesmotic injury within a subcategory of these fractures (Figure 1). Chi-square analysis of type B fracture subgroups revealed significant association between fracture subgroup and syndesmotic disruption (X²=76.379, p<0.001). There was a statistically significant association between single digit AO classification and syndesmotic injury (X²=193.842, p<0.001) as well as the two-digit AO classification for type B fractures and syndesmotic injury (X²=76.379, p<0.001).

Conclusion: This study aimed to identify ankle fracture patterns that are prone to syndesmotic injury. Identifying fractures preoperatively that are likely to have syndesmotic injury is beneficial to surgeon and patient as it aids in operative planning, intraoperative equipment needs, managing patient expectations, and counselling patients preoperatively about changes in rehabilitation protocols with injuries that involve the syndesmosis. Most of the type C fractures (88.50%) had syndesmotic injury, 7.14% of type A fractures involved the syndesmosis, and type B fractures had variable syndesmotic involvement (31.15%). Chi-square analysis revealed that significant association exists between type B2 and syndesmotic injury (X²=76.379, p<0.001).
Figure 1:

Syndesmotic Disruption by AO Classification

Percentage of Type B Fractures with Syndesmotic Disruption