Ankle Syndesmotic Fixation
Implants and Techniques

Ryan Harris, DO
Orthopedic Resident, PGY-4
Pinnacle Health Hospital
Harrisburg, PA
Introduction

• Ankle syndesmosis injuries can occur in up to 10% of patients with ankle fractures
• Due to the complex biomechanics of this injury and the increased healing time associated with it, there has been widespread debate on both the strongest and most appropriate methods of fixation when treated operatively.

![The components of the DLES.](image-url)
Introduction

• Historically screw fixation, either metallic or even bioabsorbable, have been evaluated for treatment of this injury and found to be effective.

• More recently, different methods of suture fixation have been studied as alternatives to screw fixation.
  – The benefit of these devices is that they do not require an additional procedure for removal as screw fixation does.
  – The risk is that biomechanically these devices may not be as stable as screw fixation.

• Hypothesis
  – Suture button fixation methods are equivalent to metallic screw fixation, as well as bioabsorbable screw fixation with a non-significant difference in complications rates, regardless of size and number of implants utilized.
  – Additionally technique of fixation versus standard technique will not have a significant impact on complication rates or syndesmosis stability.
Methods

- Studies were identified using a combination of PUBMED, JAAOS and JBJS search engines using “syndesmotic injury” or “syndesmotic fixation”. The bibliographies of relevant articles and reviews were cross-referenced to complete the search for applicable publications.
Results

- The most widely accepted options for fixation include 3.5mm and 4.5 mm cortical screw fixation, 4.5mm bioabsorbable screw fixation, and suture-button fixation.
- Xenos showed that when using tricortical 4.5mm screws in cadaver models, that using two screws was stronger than using a single screw.
- Another study showed no difference in outcomes of patients when two 3.5mm tricortical screws or one 4.5mm quadricortical screws were utilized at one year.
Results

• Bioabsorbable screws, additionally, showed excellent to good outcomes in 23/23 patients at an average of thirty-four months.

• Gardner showed in a cadaveric model that using 3.2mm screws through a locking plate can improve resistance to external rotation more than two cortical 4.5mm screws.
Results

• Thornes was one of the first to show success with suture button fixation, sixteen patients treated with suture fixation with significantly better functional scores at 3 and 12 months and a faster return to work versus sixteen patients with syndesmotic screw fixation.

• A recent 2011 cadaveric study showed that an anatomic method of fixation could improve the multidirectional stability of a syndesmotic repair compared to standard methods of suture button fixation.

• Finally a pair of studies highlighted the risk of complications, with 6/24 patients in one group needing suture button removal secondary to complications. Naqvi also had complications in 3/18 patients with suture button fixation that necessitated hardware removal, but after a modification to the surgical technique, went on to show no complications in the next 31 patients.
Discussion

• There are many considerations when treating syndesmotic injuries.

• The first thing to consider may be whether rigid versus semi-rigid fixation is more beneficial to the patient.
  – If the patient has a highly unstable injury and will require immobilization for an extended period of time, then rigid fixation may be more beneficial in the form of syndesmotic screw fixation.
  – If the injury has enough stability that early weight bearing is the goal, then a semi-rigid construct in the form of suture-button fixation may be more beneficial.

• The review showed that multiple screws may be stronger than a single screw, but in the review of patients there was no clinical difference.

Fig. 6: Theoretical model of syndesmotic motion in FiberWire construct. (Illustration by Justin Greene)
Discussion

- Several of the papers reviewed suggested technique changes that differed from standard procedure that could facilitate better outcomes.

- The first was utilizing syndesmotic screws through a locking plate can improve resistance to external rotation. With the increased availability and usage of locking plates in some unstable injuries this enhances the knowledge that syndesmotic screws incorporated through a plate construct can aid the syndesmotic fixation.
Discussion

• The other two techniques were in regards to suture-button fixation.
• The first was that changing the orientation of suture-button fixation to a more anatomic method to help recreate the stability of the AIFTL can better improve the multidirectional stability of the construct when compared to the standard orientation.
• The second was that, due to an increase in complications that necessitated the need for hardware removal in suture-button fixation patients, that elevating periosteum to help cover the knots after suture button placement may help prevent a second surgery.
• That was supposed to be one of the goals of using these products, but the literature showed that up to ¼ of these devices may necessitate hardware removal. Surgeons needs to understand this if it is their primary reason for utilization.
Conclusions

• Screw fixation with two 4.5mm tricortical screws in cadaver studies was stronger than a single screw, while clinically two 3.5mm screws was equivalent at one year with quadricortical 4.5mm screws.

• Bioabsorbable screws used to treat syndesmotic injuries showed excellent to good clinical results at long-term analysis.

• Suture-button fixation showed better functional scores and faster return to work versus screw fixation in some studies.

• Complication rates in suture-button fixation was as high as 25% in one study, compared to 22% complication rate after screw removal procedures.

• Technique modifications were recommended in several publications
  – Anatomic reconstruction of AITFL using suture-button fixation for multidirectional stability
  – Improved suture knot coverage using posterior fibular periosteal sleeve to prevent hardware complications that may necessitate removal
References


References


