

Bioabsorbable versus Metallic Screw Fixation of Distal Tibiofibular Syndesmosis Injuries

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Introduction

Ankle fractures are some of the most common types of fractures, reported 18% of skeletal injuries annually.¹ Approximately 1 in 7 ankle fractures is accompanied by a distal tibiofibular syndesmotom disruption.² Failure to diagnose and treat these disruptions has been shown to have poor long term outcomes. Numerous techniques have been described for operative reduction of the syndesmosis. The ideal method to stabilize the syndesmosis should be strong enough to resist diastasis and permit early mobilization while allowing physiologic micromotion.³ Metallic screw fixation is considered the current gold standard in treatment of these injuries.⁴ However, removal of these retained screws is sometimes necessary and may improve functional outcomes.¹ Bioabsorbable fixation offers several advantages over metallic screw fixation in these types of injuries. Bioabsorbable screws are hydrolyzed and resorbed, thus eliminating the need for removal. Also, these implants permit gradual transfer of stress to the bone resulting in improved remodeling and healing.⁵ The purpose of our retrospective comparative study is to compare the outcomes and assess the efficacy of bioabsorbable screw fixation versus metallic screw fixation of acute injuries to the distal tibiofibular syndesmosis.

Materials and Methods

Between September, 2006 and October, 2011, 21 adult patients with external rotation type injuries and intra-operative confirmation of disruption of the distal tibiofibular syndesmosis were retrospectively reviewed. Included in this study was any closed, unstable, trimalleolar, bimalleolar, lateral malleolar, or Maisonnueve fracture undergoing ORIF by one surgeon (Fig 1).



Fig. 1

In these patients, the syndesmosis was reduced with either metallic (group 1, n=11) (Fully threaded cortical stainless steel 3.5mm or 4.5mm screw) or bioabsorbable (group 2, n=10) (Arthrex® Trim-It™ Screw System, 100% PLLA, 3.5 or 4.5mm Figs. 2,3) fixation.

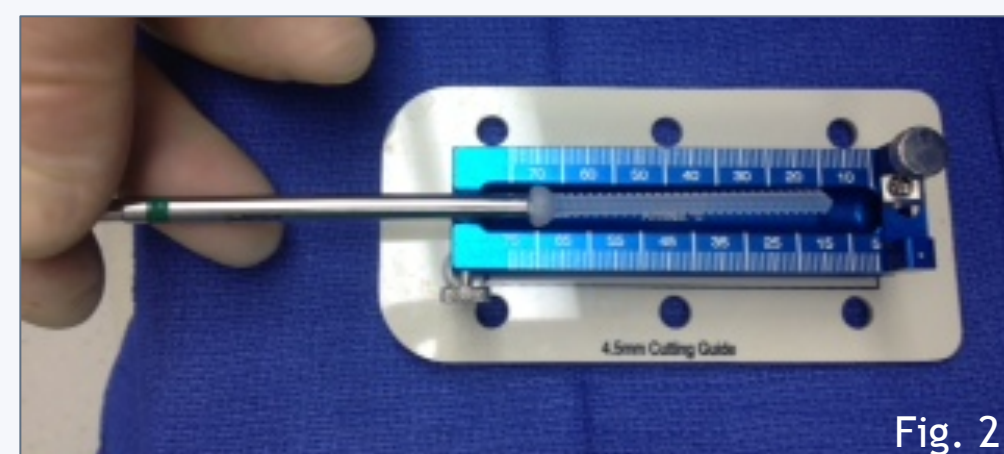


Fig. 2

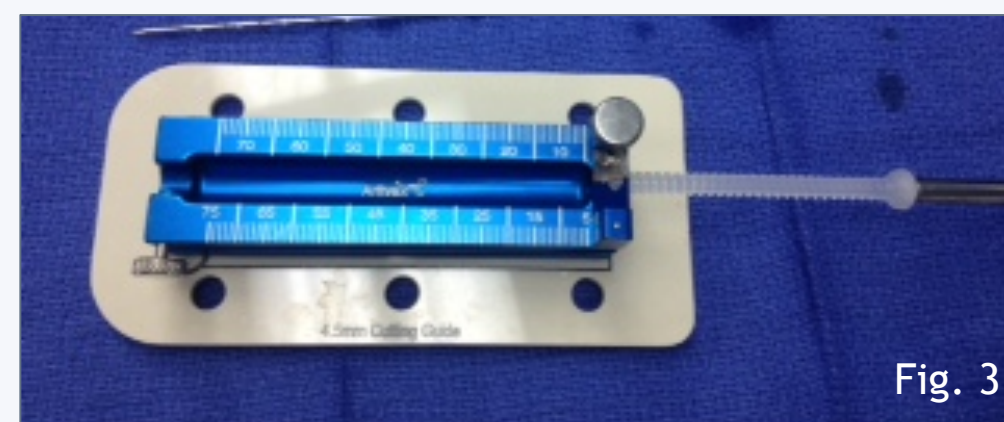


Fig. 3

Clinical and radiographic follow-up was performed. Radiographic assessment included measurement of tibiofibular clear space 1 cm above tibial plafond on mortise view (Figs. 4,5). Patients requiring subsequent procedures for transsyndesmotom implant removal were also recorded.



Fig. 4



Fig. 5

Procedures

After reduction of the fracture patterns, the syndesmosis was stressed with an external rotation force under live fluoroscopy. The syndesmosis was reduced using a large pelvic reduction clamp in both groups (Fig. 6). Either bioabsorbable or metallic screws were placed across the syndesmosis while purchasing 4 cortices using standard AO and manufacturer technique.



Fig. 6

Results

Average age was 59.6, 40.9 years for groups 1 and 2 respectively. The average time to final radiographic examination and final clinical follow up was 8.7, 19.14 months (group 1) and 6.15, 12.15 months (group 2). The measurements of the tibiofibular clear space in both groups are represented in table 1.

Group1 (cm)	Group 2 (cm)
0.31	0.51
0.38	0.48
0.34	0.42
0.43	0.52
0.51	0.41
0.39	0.34
0.35	0.40
0.62	0.41
0.32	0.32
0.42	0.37
0.43	N/A

Table 1. Tibiofibular clear space (cm)

The mean tibiofibular clear space for groups 1 and 2 was 0.41 and 0.42 respectively. Using an unpaired *t* test, the two-tailed *P* value=0.8185. This difference is considered to be not statistically significant between the groups. The 95% confidence interval ranged from -0.0871 to 0.0697. The most common construct was either two (metallic or bioabsorbable) 3.5mm or 4.5mm cortical screws. 2 patients (18.2%) in group 1 required a second procedure for screw removal. Both patients had complete resolution of their symptoms with screw removal. No patients in group 2 required hardware removal.

Analysis & Discussion

In our preliminary study we have observed that bioabsorbable fixation of distal tibiofibular syndesmotom injuries is equally efficacious as metallic screw fixation. No statistical difference was observed for measurement of tibiofibular diastasis following surgery between the groups. In addition, the need for subsequent removal of the implant is virtually eliminated with the use of bioabsorbable fixation. There are weaknesses of this study including small patient population and low powered nature of the investigation. This is a preliminary study; we plan to assess functional outcomes of our patient population. In conclusion, bioabsorbable fixation of syndesmotom injuries is a viable alternative to the current gold standard. Several advantages of this method include; a modulus of elasticity comparable to bone, gradual transfer of stress from the fixation to the bone, and eliminating the need for hardware removal.⁵

References

1. Miller AN, Omesh P, Boraiah S, et al. Functional outcomes after syndesmotom screw fixation and removal. *J Orthop Trauma*. 2010;24:12-16.
2. Schepers T. To retain or remove the syndesmotom screw: a review of the literature. *Arch Orthop Trauma Surg*. 2011;131:879-883.
3. van den Bekerom MPJ, Raven EEJ. Current concepts review: operative techniques for stabilizing the distal tibiofibular syndesmosis. *Foot Ankle Int*. 2007;28(12):1302-1308.
4. Schepers T, Van Lieshout EM, de Vries MR, Van der Elst M. Complications of syndesmotom screw removal. *Foot Ankle Int*. 2011;32(11):1040-1044.
5. Hovis WD, Kaiser BW, Watson JT, Bucholz RW. Treatment of syndesmotom disruptions of the ankle with bioabsorbable screw fixation. *J Bone Joint Surg*. 2002;84-A(1):26-31.

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