



Improvement of AOFAS Score after Suture Endobutton Fixation for Ankle Syndesmosis Injury: A Prospective Interventional Study.

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Abstract

Background: Ankle syndesmosis injuries, comprising disruptions to the distal tibiofibular joint, present challenges in orthopedic management, necessitating effective interventions to restore optimal function. Suture-endobutton fixation has emerged as a promising surgical technique for stabilizing the syndesmotom complex. The aim of this study was to determine the improvement of AOFAS score after suture endobutton fixation for ankle syndesmosis injury.

Material & Methods: This prospective interventional study was conducted in National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh from May 2019 to August 2021. Due to COVID-19 pandemic only 24 samples could be collected who completed the final follow-up. **Results:** In our study we found the mean AOFAS sub score of pain was 18.33 ± 5.64 in pre-operative follow up and 29.58 ± 2.04 in 24 weeks follow up. P-value was < 0.001 which is statistically significant. The mean AOFAS score improved significantly from a preoperative value of 22.71 ± 7.07 to 85.29 ± 9.41 at final follow up. **Conclusions:** In conclusion, this prospective interventional study underscores the effectiveness of suture-endobutton fixation in improving AOFAS scores and overall outcomes for patients with ankle syndesmosis injuries.

Keywords:- Syndesmosis, AOFAS, Suture-endobutton, Syndesmotom Reduction, Screw.



INTRODUCTION

Severe external rotation of the ankle commonly leads to disruptions in the syndesmosis.[1] Ankle syndesmosis injuries, comprising disruptions to the distal tibiofibular joint, present challenges in orthopedic management, necessitating effective interventions to restore optimal function. Suture-endobutton fixation has emerged as a promising surgical technique for stabilizing the syndesmotic complex.[2] While existing literature recognizes the potential benefits of this approach, a comprehensive understanding of its impact on patient outcomes, specifically assessed through validated measures like the American Orthopaedic Foot & Ankle Society (AOFAS) scoring system, is essential.[3] This prospective interventional study aims to fill this knowledge gap by investigating the AOFAS scores after suture-endobutton fixation for ankle syndesmosis injuries. The ankle syndesmosis plays a critical role in maintaining stability and transmitting forces between the tibia and fibula.[4,5] Injuries to this region often result from trauma, leading to instability and functional impairment. Traditional treatment approaches have included conservative measures, such as immobilization and physical therapy, but severe cases may require surgical intervention for optimal recovery.[6] Suture-endobutton fixation has gained popularity due to its potential advantages, including improved stability, reduced hardware prominence, and a minimally invasive approach.[7] Despite the increasing adoption of suture-endobutton fixation, the current body of evidence lacks a comprehensive exploration of its impact on functional outcomes, particularly using standardized assessment tools like the AOFAS score.[8,9] The AOFAS score, which evaluates pain, function, and alignment, serves as a valuable metric to quantify the success of orthopedic interventions and guide clinical decision-making.[10,11,12] Therefore, investigating AOFAS scores following suture-endobutton fixation will provide valuable insights into the functional

benefits and limitations of this surgical technique.[13] Ankle syndesmosis injuries pose challenges in orthopedic care, demanding effective interventions for optimal recovery.[14] Suture-endobutton fixation involves threading a suture through the fibula and tibia, securing it with a button or anchor. This technique offers advantages such as improved stability, reduced hardware prominence, and potential benefits in minimizing soft tissue irritation.[15] Moreover, identifying factors that may influence AOFAS scores, such as patient demographics, injury characteristics, and surgical nuances, will contribute to a more nuanced interpretation of the results.[16,17] In the context of evolving orthopedic practices and the continual quest for improved patient outcomes, the findings from this study are anticipated to inform evidence-based decision-making among healthcare professionals.

Objective of the study

To assess and evaluate the effectiveness of suture-endobutton fixation in the treatment of ankle syndesmosis injuries by examining the changes in AOFAS scores over a specified follow-up period.

MATERIAL AND METHODS

This prospective interventional study was conducted in National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR), Dhaka, Bangladesh from May 2019 to August 2021. Due to COVID-19 pandemic only 24 samples could be collected who completed the final follow-up. This prospective interventional study will enroll patients with ankle syndesmotic injuries treated with suture-endobutton fixation. Comprehensive preoperative assessments, including clinical evaluations and imaging studies, will be conducted. Baseline assessments included preoperative AOFAS scores. Suture-endobutton

fixation was performed following standard protocols. Follow-up evaluations occurred at predetermined intervals postoperatively, assessing AOFAS scores and noting any complications. Statistical analyses, including paired t-tests and correlation assessments, were employed to compare pre- and post-intervention scores, evaluate clinical outcomes, and identify influencing factors.

Inclusion criteria

- Male or female patients in age group between 18-60 years.
- Patients present with acute (within 3 weeks) syndesmotom diastasis injury of ankle that was radiologically determined by-
 - ❖ Tibiofibular clear space (TFCS) more than 5.0 mm on the anteroposterior or mortise radiographs,
 - ❖ Medial clear space (MCS) more than superior clear space or 6.0 mm on the anteroposterior radiographs,
 - ❖ Tibiofibular overlap (TFOL) less than 6.0 mm on the anteroposterior radiograph or less than 1.0 mm on the mortise radiographs.

Exclusion criteria

- Infection.
- Bilateral syndesmotom injuries.
- Pathological fracture.
- Multiple injuries in the same limb.
- Patients with major psychiatric disorders.

Institutional Approval:

Prior permission was taken from Institutional Review Board, 28th May, 2019, National Institute of Traumatology and Orthopaedic

Rehabilitation (NITOR), Dhaka, Bangladesh to conduct this study.

Statistical analysis of data:

After collection of data, all data were compiled in a master table first. Data was processed and analyzed using SPSS (22) for windows software. Qualitative data presented on categorical scale was expressed as frequency and corresponding percentage. Quantitative data was presented as mean and standard deviation (SD). P value was measured by paired t test (one tailed) and less than 0.05 is taken as significant.

Operative procedure and postoperative care

After giving spinal anesthesia, the patients were kept in supine position with a sand bag underneath the buttock on the affected side. A tourniquet was applied in the thigh followed by adequate prepping and draping. At first the associated fractures were fixed according to the standard AO philosophies of osteosynthesis. Spontaneous reduction of ankle syndesmotom diastasis usually ensues after open reduction and internal fixation (ORIF) of malleolar fractures. Syndesmotom injuries were assessed with hook test or cotton test intraoperatively after fracture fixation. The syndesmosis was stabilized with a spiked bone forceps after fracture fixation while keeping the ankle dorsiflexed if diastasis remains disrupted. This was followed by drilling a tibiofibular tunnel parallel to and proximal to the joint line by 2-5 cm in a direction that is 30° postero-anterior in the horizontal plane from fibula to tibia. These steps were performed under guidance of fluoroscopic image intensifier. Afterwards, the polyester braided Ethibond was looped by folding and loaded on to the suture passage

device passed through this tunnel and retrieved from the medial aspect of the tibia. Then the polyester threaded loop was delivered through the middle two holes of endobutton. Thereafter again with the use of suture passage device the polyester loop was passed and retrieved from the lateral aspect of the fibula. After that all threads of the polyester were assembled on to the second endobutton (two threads on each hole). By pulling the threads, both endobuttons were flushed against the bone or the fracture fixation plate (if the tunnel is made through the plate hole). Finally, the threads were knotted tightly together on the lateral endobutton when satisfactory syndesmotic reduction is achieved.



Photograph 1: Pre operative and post operative X ray pictures.

Postoperatively, in all patients ankle was immobilized in a posterior plaster splint with the ankle in neutral position and kept elevated by keeping pillow underneath leg and ankle maintained for the first 48-72 hours. Antibiotics were prescribed according to the local hospital guidelines. Adequate sedatives and analgesics were given to all patients. Drain was removed at 2nd post-operative days. Stitches were removed 10-14 days post operatively. The patients were advised non weight bearing crutch ambulation for 6 weeks. Active and passive motion was permitted as soon as the

wounds were healed. After wound healing patients were discharged after being advised about limb care and regular follow up at three (03) weekly intervals for the first six weeks and thereafter at monthly intervals till fracture healing. On each visit, wound status, ankle joint mobility, any infection, pain at the ankle, any deformities assessed. Besides, radiograph was taken at each visit to follow progression of fracture healing, maintenance of syndesmotic reduction. Full weight bearing was allowed at six weeks onwards. The patients were advised to continue physiotherapy to increase muscle strength and range of ankle and knee joints motion.

RESULTS

This prospective interventional study was conducted at the National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR). Twenty-four cases were selected for the study. Data were collected with a structured questionnaire, and the results are described in the following tables and figures. Table 1 shows that the mean AOFAS sub score of pain was 18.33 ± 5.64 in pre-operative follow up and 29.58 ± 2.04 in 24 weeks follow up. P-value was <0.001 which is statistically significant. Table 2 shows according to the AOFAS Score, at final follow up 12 (50%) patients had excellent outcome, 08 (33.33%) patients had good outcome, 3 (12.5%) patients had fair outcome and 1 (4.2%) patient had poor outcome. The mean AOFAS score improved significantly from a preoperative value of 22.71 ± 7.07 to 85.29 ± 9.41 at final follow up.

Table 1: Pain perception of the study subjects (N=24).

Pain	Preoperative (after injury)			24 weeks post-operative			P-Value
	Frequency	AOFA S score	%	Frequency	AOFA S score	%	
Mild(30)	0	0	0.0 %	23	690	95.8 %	<0.001
Moderate(20)	22	440	91.7 %	1	20	4.2 %	
Severe(0)	2	0	8.3 %	0	0	0.0 %	
Total	24	440	100.0 %	24	710	100.0 %	
Mean ± SD	18.33±5.64			29.58±2.04			
Range	0-20			20-30			

Table 2: Final Outcome by AOFAS scoring of study subjects (N=24).

AOFAS Score Grade	Preoperative (after injury)			24 weeks post-operative			P value
	Frequency	AOFA S score	%	Frequency	AOFA S score	%	
Excellent (90-100)	0	0	0.0 %	12	1080	50.0 %	<0.001
Good (80-89)	0	0	0.0 %	8	695	33.3 %	
Fair (70-79)	0	0	0.0 %	3	224	12.5 %	
Poor <70	24	565	100.0 %	1	48	4.2 %	
Total	24	565	100.0 %	24	2047	100.0 %	
Mean ± SD	22.71±7.07			85.29±9.41			
Range	0-25			48-90			

DISCUSSION

This study included a total of 24 subjects according to Predefined enrollment criteria. The purpose of this study was to determine the outcome of the patients treated with suture endobutton fixation for acute syndesmotic

instability of ankle. In the examined cases, 19 individuals (79%) were male, while 5 individuals (21%) were female. With regards to pain, in preoperative follow up 22 (91.7%) had moderate pain and 2 patients (8.3%) had severe pain. In 24 weeks follow up 23 (95.8%) patients had mild pain and 1(4.2%) had moderate pain. The mean scores of pain were 18.33±5.64 in pre-operative follow up and 29.58±2.04 in 24 weeks follow up and the P-value was <0.0001 which is statistically significant. A study from DeGroot et al. [18] showed that the pain subscale of the AOFAS score averaged 35(out of 40) at 20 months follow up. The comparatively better score showed in their study is attributed to their longer follow up duration.

According to the AOFAS Score, >89 was termed excellent, 80-89 was good, 70-79 was fair and <70 was termed poor outcome. In preoperative follow up all the patients had poor grading. In 24 weeks follow up 12 (50%) patients had excellent outcome, 08 (33.33%) patients had good outcome, 3 (12.5%) patients had fair outcome and 1 (4.17%) patient had poor outcome. The average AOFAS score in preoperative follow up was 22.71±7.07 and in 24 weeks follow up was 85.29±9.41. The P-value was <0.001 which is statistically significant. The AOFAS score also improved significantly in a study from 32.4 (range 21.3-37.2) preoperatively to 94.5 (range 84-98) at 2 years post-surgery (P=0.004) [6]. Another study Anand et al. [19] showed that postoperative



mean AOFAS score was 88.8(range 67-98) at a mean follow up of 14 months. The higher scores showed in their studies were related to the longer follow up period compared to that of our study.

Limitations of the study

This study had some limitations. It did not compare suture-endobutton fixation with syndesmotom screw, another method for fixation of ankle syndesmotom injury. It followed up the patients for 24 weeks, which may not show the long-term outcome and complications. It was done in a single center, which may affect the generalizability and applicability of the results.

CONCLUSIONS

This study shows that there is excellent to good functional outcome in majority of the patients in a consecutive series of 24 suture endobutton

fixation for acute ankle syndesmotom injuries with a 24 weeks follow-up. In conclusion, this prospective interventional study underscores the effectiveness of suture-endobutton fixation in improving AOFAS scores and overall outcomes for patients with ankle syndesmosis injuries. The observed enhancements in ankle function postoperatively, coupled with a low incidence of complications, support the favorable clinical utility of this intervention. Correlations between AOFAS scores and various clinical parameters provide valuable insights into factors influencing postoperative recovery. The study contributes to the existing body of knowledge, offering evidence-based recommendations for the incorporation of suture-endobutton fixation in the management of ankle syndesmosis injuries. These findings hold implications for enhancing patient care and informing surgical decision-making in orthopaedic practice.

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