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Short Communication

Functional outcome of ankle fractures with syndesmotic injury treated surgically

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Statistics

Figures	09
Tables	05
References	16

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Abstract

Background: Syndesmotic ankle fractures are common in orthopaedic practise. The second most common significant lower extremity fracture is an ankle fracture. Syndesmotic ankle injuries disrupt normal joint function, necessitating careful diagnosis and surgical treatment to avoid crippling disabilities. The purpose of this study was to assess the functional outcome of surgically managed ankle fractures with Syndesmotic injury using the AOFAS score.

Materials and methods: In this study, 40 patients with ankle fractures with Syndesmotic injury underwent Syndesmotic screw fixation with 3.5 mm cortical screws, as well as anatomical medial and lateral malleolus fixation. At 6 months, the functional outcome was assessed using the AOFAS score.

Results: In this study, 42.5% (17 patients) had excellent results, 45% (18 patients) had good results, 7.5% (3 patients) had fair results, and 5% (2 patients) had poor results. Two patients developed superficial wound infections that were treated with intravenous antibiotics. One patient developed nonunion, and another developed ankle stiffness. Conclusion: Open reduction and internal fixation of ankle fracture with Syndesmotic screw fixation helped to achieve good fracture union and pain free, stable ankle joint in all cases of Ankle fractures with Syndesmotic injury.

Keywords: Syndesmotic injury, AOFAS

INTRODUCTION

The ankle is a complex uniaxial hinge joint composed of the tibiotalar, subtalar, and inferior tibiofibular joints. The ankle joint is made up of the distal fibula, distal tibia, and talus dome. The distal tibiofibular joint is stabilised by the bony architecture and the supporting syndesmotic ligaments. The ligament complex's primary function is to maintain the integrity of the tibia and fibula as well as to resist axial, rotational, and translational forces. The Syndesmotic ligament contributes significantly to ankle stability. The anterior inferior tibiofibular ligament, Posterior Inferior Tibiofibular ligament (PITFL), transverse tibiofibular ligament, and interosseous ligament, a distal extension of the interosseous membrane, comprise the ankle syndesmosis [1].

Adult ankle fractures are among the most commonly treated fractures. Syndesmosis injuries are a severe type of ankle injury that must be detected because they provide stability to the ankle joint. Syndesmotic injuries are less common than ankle malleolar fractures, accounting for about 10% of all ankle fractures. Fibula fractures above the level of the distal syndesmosis ligaments are frequently associated with syndesmosis instability [2-4].

Syndesmotic injuries are most commonly associated with ankle fractures caused by pronation external rotation or pronation abduction, and less frequently with supination external rotation [5-6].

To avoid crippling disabilities, these injuries must be thoroughly evaluated and treated. These ankle injuries can be fatal if not treated properly, especially in athletes and those who perform heavy work on rough or irregular surfaces. As a result, treating these ankle injuries is critical [7-9].

MATERIALS AND METHODS

During the period of November 2018 to March 2020, 40 patients with Bimalleolar ankle fracture with Syndesmotic injury were treated surgically with medial malleoli fixation, fibular plate, and syndesmotic screw fixation at the Sanjay Gandhi Institute of Trauma and Orthopaedics in Bengaluru. Inclusion criteria included PER type 4 and SER type 4 injuries, as well as intra-operatively confirmed syndesmotic joint injury by cotton's and modified cotton's tests. Ankle fractures associated with an ipsilateral distal 3rd tibia fracture, evidence of ankle joint arthritis, and cases requiring revision surgery were excluded. Both radiological and intra-operative fluoroscopic examinations were used to diagnose syndesmotic diastasis. A stress view may be obtained when a syndesmotic injury is suspected clinically but not confirmed on conventional radiographs. Surgical technique The patient was placed in a supine position while under spinal anaesthesia. The affected limb was prepared and surgical draping was performed using all standard aseptic sterile precautions. The lateral malleolus was first fixed using the standard postero-lateral approach. After repairing the lateral malleolus, the syndesmotic integrity was evaluated using cotton's test under fluorescence and the medial Tibio-Talar Clear Space (TTCS) and Tibio-Fibular Clear Space (TFCS) were measured. The fibula was reduced into the insura, and a 3.5 mm tricortical syndesmotic screw was inserted about 1cm-2cm above the tibial plafond, about 30 degrees postero-lateral to antero-medial, and the syndesmosis was evaluated using fluroscopy. Cannulated cancellous screws or tension band wiring were used to secure the medial malleolus. In all cases, soft tissue interposition between fracture fragments of the medial malleolus was observed. The patients were all operated on while wearing tourniquets, and the surgery time ranged from 45 minutes to 90 minutes. A sterile dressing and a compression bandage have been applied. The patient is not allowed to bear weight on the affected limb.

POST-OPERATIVE PROTOCOL

Parenteral antibiotics were administered intravenously for three days following surgery, depending on the wound condition. The sutures were removed after 10 to 12 days, and OF ankle mobilization began (Figure 1 and 2).

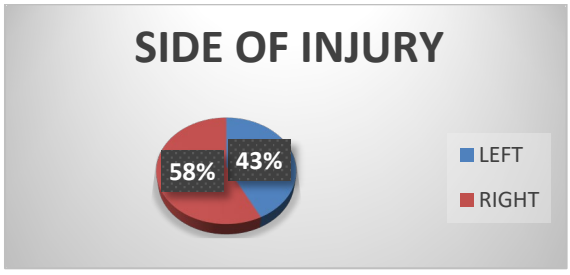

Fig. 1 Side of injury

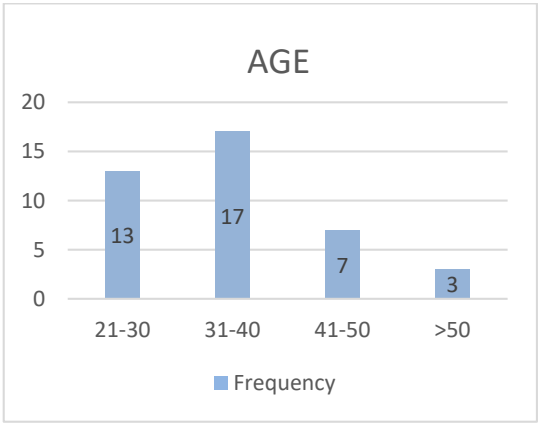

Fig 2. Age distribution

Follow up Regular follow-ups were performed at the end of one, three, and six months. X-rays were taken to monitor the healing of the fracture, to check the ankle mortise, and to see if the implant was properly positioned. Following surgery, patients began with ankle mobilisation and assisted toe touch walking with a walking aid for 6 weeks before progressing to full weight bearing. If there is persistent pain while walking, the screw was removed after at least 4 to 8 weeks. At the 6-month follow-up, the functional outcome was assessed using the AOFAS scoring system (Table 1 and 2 and Figure 3).

Table 1. Age distribution

AGE	Frequency	Percent
21-30	13	32.5%
31-40	17	42.5%
41-50	7	17.5%
>50	3	7.5%
Total	40	100%

Table 2. Gender distribution

SEX	Frequency	Percent
FEMALE	12	30%
MALE	28	70%
Total	40	100%

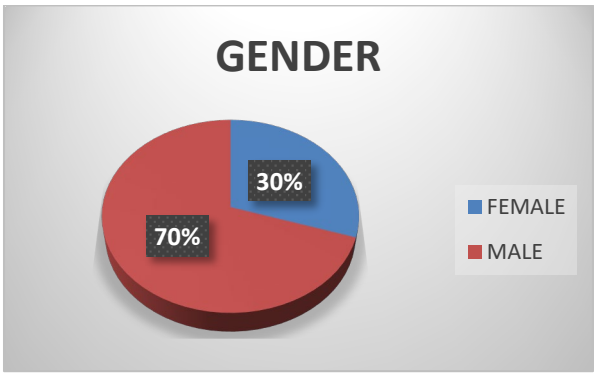

Fig 3. Gender distribution

RESULTS

The study subjects ranged in age from 21years to 53 years, with the majority falling between the ages of 31 and 40. In this study, 12 (30%) of the participants were females, while 28 (70%) were males. 17 (42.5%) of 40 patients on the left side and 23 (57.5%) on the right side were affected. The most common type of injury was a twisting injury. According to the Lauge-Hansen classification, pronation external rotations accounted for 67.5% (27 patients), while supination external rotations accounted for 32.5% 13 patients (Table 3-5 and Figure 4 and 5).

Table 3. Side of injury

SIDE OF INJURY	Frequency	Percent
LEFT	17	42.5%
RIGHT	23	57.5%
Total	40	100%

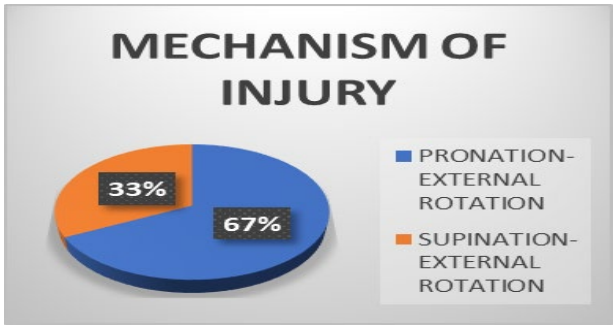

Fig 4. Mechanism of injury

Table 4. Mechanism of injury

MECHANISM OF INJURY	Frequency	Percent
PRONATION-EXTERNAL ROTATION	27	67.5%
SUPINATION-EXTERNAL ROTATION	13	32.5%
Total	40	100%

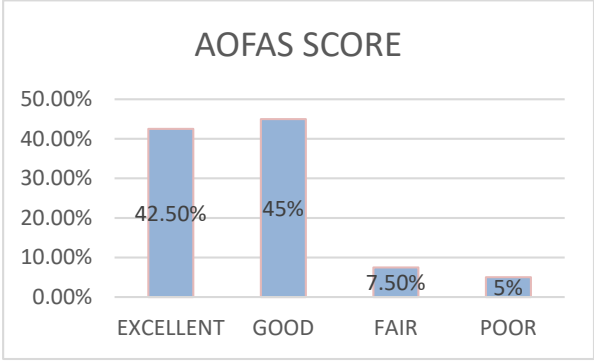

Fig 5. AOFAS Score

Table 5. AOFAS Score

AOFAS SCORE	Frequency	Percent
EXCELLENT	17	42.5
GOOD	18	45
FAIR	3	7.5
POOR	2	5
Total	40	100

According to AOFAS grading criteria, 42.5% (17 patients) had excellent outcomes (AOFAS score 90-100), 45% (18 patients) had good outcomes (AOFAS score 80-89), 7.5% (3 patients) had fair outcomes (AOFAS score 70-79), and 5% (2 patients) had poor outcomes (AOFAS score 69) (Figure 6-9).

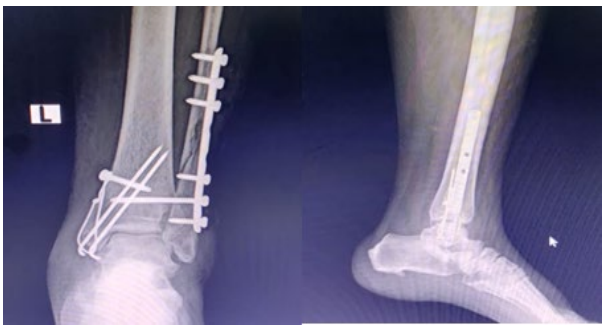

Fig 6. 6 months follow up

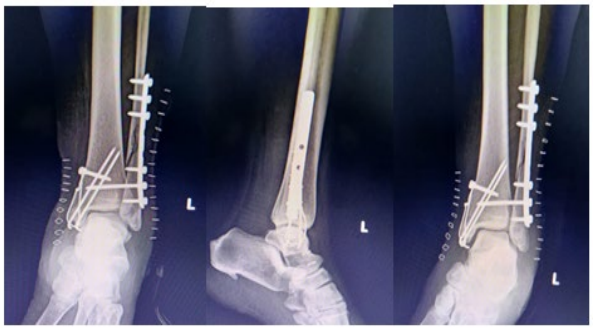

Fig 7. Post operative radiograph

Fig 8. 3 month follow up

Fig 9. Preoperative radiograph

Only two patients in this study developed superficial wound infections, which were treated with regular dressings and antibiotics. One of the two patients who had poor outcomes had nonunion and the other had ankle stiffness.

DISCUSSION

The intact ankle mortise is critical to the ankle's stability. In normal daily activity, the syndesmosis that connects the distal tibial and fibular bony structures can withstand significant three-dimensional loads [10].

Because an ankle with non-anatomically reduced syndesmosis can progress to osteoarthritis and cause lifelong disability, the primary goal of treatment in these cases is to achieve a stable, pain-free ankle joint in order to restore maximum function. Syndesmotic injury was caused by pronation external rotation in 27 patients (67.5%) and supination external rotation in 13 patients (32.5%). This is consistent with research by Riegels-Nielsen P et al. and Heim D et al [11-13]. As a result, pronation external rotation injuries are more likely to result in syndesmotic injury. However, supination external rotation injuries are the most common type of ankle injury and pronation external rotation injuries are more commonly associated with syndesmotic diastasis [14].

In this study, the syndesmosis was fixed with tricortical screw fixation using 3.5 mm screws because there was no

difference in outcome when quadricortical fixation was used. If the patients were symptomatic, a secondary procedure of syndesmotic screw removal was performed after an average of 6 weeks. In our study, the average AOFAS score was 86.9. In contrast, Egol et al. found that patients with syndesmotic injury had poor functional outcomes after a year of follow-up. Sagi et al [15-16]. concluded after two years of research on the functional outcomes of malreduced syndesmosis that malreduced syndesmotic injuries had significantly worse functional outcomes. Many studies, however, show that anatomical reduction is the most important factor influencing functional outcome in ankle fractures. Our study had two limitations: a small study group and a short follow-up period.

CONCLUSION

In conclusion, if a good anatomical reduction is achieved, treatment of an ankle fracture with syndesmotic injury with open reduction and syndesmotic screw fixation yields good results. According to the literature, there is no difference between tricortical and quadricortical fixation. With tricortical syndesmotic screw fixation, we had good results.

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