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Syndesmotic screw removed versus retained: A comparative functional analysis

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Abstract

Aim: Aim of the study is to analyse and compare the functional outcome among patients who had retained their syndesmotic screw with the group who had undergone syndesmotic screw removal.

Materials and Methods: Study was conducted on 48 patients whose outcome has been evaluated radiologically and functionally by AOFAS and OMAS score over a period of 12 months postoperatively.

Results: On comparing functional as well as radiological outcome between the two groups of our study we found that the results are similar on both groups.

Conclusion: The functional and radiological outcome was similar. The chances of complications due to screw breakage and infection was very minimal.

Keywords: syndesmotic screw, versus, radiological

Introduction

The syndesmosis is ruptured in ankle fractures as a result of a torsional movement of the talus which forces the tibia and fibula apart or as a result of severe abduction force [1]. Syndesmotic joint is a fibrous joint which is formed by distal part of tibia and fibula with the three strong ligaments (anterior inferior tibiofibular ligaments, posterior inferior tibiofibular ligaments and transverse tibiofibular ligaments) and interosseous membrane which provide exceptional stability to the ankle. Rupture of these 3 strong ligaments and interosseous membrane results in syndesmotic diastasis. While moving an ankle joint from a complete dorsiflexion to plantar flexion fibula rotates externally to a maximum of 2degrees relative to tibia with widening of ankle mortice about 1mm.

Pain, persisting instability and osteoarthritis can be a long term complication in cases which are managed non-operatively [2, 3]. About 15% to 23% of ankle fractures that are managed surgically are associated with syndesmotic injury [9]. Calf compression also known as squeeze test and External rotation stress are done to confirm the syndesmotic injury clinically [5]. Petronne *et al.*, conducted a 5 year study with radiological widening of syndesmosis and found that it is necessary to treat syndesmotic injury with surgical stabilization [4]. Particularly patients with PER fracture with deltoid ligament rupture are at high risk of developing syndesmotic injury.

As per Lauge Hansen classification for ankle injuries most commonly Pronation- external rotation followed by supination-external rotation results in syndesmotic injury. Radiologically the Tibio-fibular clear space (horizontal distance between the lateral margin of the posterior tibial malleolus and the medial border of the fibula) which is the most reliable parameter for assessing syndesmotic injury and other parameters like tibio fibular overlap in AP View and mortis view. Cross- sectional imaging like MRI is fundamental to confirming syndesmotic injury. Even Absence of tibiofibular diastasis radiologically will never rule out the diagnosis. In that case Stress CT and the weight-bearing CT are promising diagnostic tools in near future [6],

Materials and Methods

The study was conducted according to principles of Declaration of Helsinki. The informed consent obtained from the patient after explaining about the treatment they were subjected and the processing of their personal data.

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The case study was conducted between July 2019 and may 2021 among 54 patients in Sri Lakshmi Narayana medical college, Puducherry. Patients who are between age group 18 and 60 with weber B and C closed fractures which are unilateral fractures that is healed (confirmed by radiological investigations treated with plate and screws(ORIF) associated to syndesmotic fixations are included in the study. Out of 54 patients only 48 patients were taken up for final study (6 patients were excluded from the study as they developed infections, hardware failure, any requirement of resurgery, loss of medical records, those with severe comorbidities and patients who couldn't have proper follow up). After a thorough clinical and radiological assessment of patients who were done with syndesmotic fixation with 1 or 2 3.5mm screws with a tricortical or tetracortical placement they were divided into 2 groups: group 1(30 patients) with syndesmotic screw removed and group 2 with retained syndesmotic screw (18 patients).In our study syndesmotic screw were removed 3months after initial surgery.

Patients were adviced for strict immobilization for 4 weeks after which they were started with rehabilitation and progressive loading was allowed. It is completely a surgeons choice to decide whether to remove a screw or not

whom syndesmotic screw is removed about 7 to 10 weeks after initial surgery whereas in Group 2 totally 18 patients were involved. Among the patients in group 2 totally 4 patients broke the screw but then also there is no difference in overall outcome.

OMAS and AOFAS scores were used for assessing the clinical outcome (table 1.). Tibiofibular clear space and tibiofibular overlap is assesd radiologically from immediate post-op to 10-12 months postoperatively. Both clinical and radiological assessment were found to be equal with no differences in patients symptoms as well as x-ray findings. Both found to have a p value ($p < 0.05$). In a mean period of 3.8 months (rang 2.8 to 5 months) all fractures healed.

Table 1: A Clinical Outcomes of Study Population.

Clinical Outcome	OMAS	AOFAS
Group-1	92	92
Group-2	96	98
P Value	$p = 0.0076$	$p = 0.056$



Fig 1: Showing Normal Tibiofibular Clear Space



Fig 2: Xray Showing Syndesmotic Screw with Tri- Cortical Tetra Cortical Purchase.

Radiological evaluation done using AP, Lateral and mortise view. Tibiofibular clear space (most reliable parameter) is used for evaluating syndesmosis. functional evaluation was done 12 months postoperatively through 2 validated scoring system namely AOFAS and OMAS.

All the collected data are compiled through Microsoft excel. Clinical outcomes measured using AOFAS and OMAS are compared using Non-Parametric whitney U test. Statistical analysis were done using statistical package for the social sciences for windows (version 20.0). statistical significance found to have a p value of < 0.05 . A total of 48 patients were included in the study (32 were males and 16 were females). Mean age at the time of injury was 42 years (range 18-60 years). Among study population 21 patients sustained Denis-Weber B type fractures and the remaining 27 patients had type C injuries. Group 1 comprised of 30(62%) patients on



Fig 3: Fluoroscopic Image of Syndesmotic Screw.



Fig 4: Intraoperative Image of Syndesmotoc Screw Fixation.



Fig 5: Showing Broken Syndesmotoc Screw

Table 2: Radiological outcomes of study population

Radiological outcomes of study population	Tibiofibular clear space. Pre-operative in mm.[mean value]	Tibiofibular clear space. Post-operative
Group -1	5.0	4.5
Group -2	5.0	5.0
P value	p = 0.175	p = 0.685

Discussion

Overall, there is no absolute guidelines or indications available regarding removal of syndesmotoc screw [7, 9]. Removal of syndesmotoc screw before weight bearing has got no clinical significance. On other hand with no relation to clinical significance there are few cases reported with recurrence of diastasis in screw removed gap [8, 9]. Screw breakage is one of the most common complication and it has

got less significance in patients mobility. Interosseous breakage of syndesmotoc screw is associated with high rates of screw removal due to pain. Placement of screw about 20mm or higher from the tibiotalar joint might decrease the risk of syndesmotoc screwbreakage [15]. Minor or major wound infection, morbidity, economical burden are the issues faced, in case of screw removal [10]

Kaftandziev I, *et al* conducted a study and found that broken screw has more functional outcome than intact screw [12, 13]. Weening B *et al* conducted a study and came with a hypothesis that intact screw decreases the physiological movement of the fibula in relation to the tibia due to which ankle movement is limited [16]. Breakage of syndesmotoc screw may happen due to aggressive rehabilitation and early weight bearing which can be avoided by strict avoidance of early weight bearing [17]. Again it is highly controversial to decide the ideal time to remove a syndesmotoc screw because in a study conducted by Kempland C Walley *et al* they concluded that Removal of syndesmotoc screws is advisable mainly in cases of patient complaints related to the other implanted perimalleolar hardware or malreduction of the syndesmosis after at least 8weeks postoperatively [22]. Sometimes due to fear about the complications from broken screw patients themselves insist to remove the screw which is difficult to explain to them. In a study conducted by Young Jae MD and concluded that recurred diastasis of ankle significantly increased in the group with screws removed within 3 months hence removal of syndesmotoc screws can be performed about 3 to 4 months after surgery, especially patients with discomfort or limitation of ankle movements due to these screws [18]. On comparing our study results with previous studies the functional outcome between those two groups were found to be similar. In our study syndesmotoc screw were removed after 7 to 10 weeks of initial surgery and found to have no recurrence of syndesmotoc diastasis.

Conclusion

It is concluded that there is no significant difference between the group of patients done with syndesmotoc screw removal and those with retained screw. The common complications such as implant failure can be minimal by proper placement of syndesmotoc screw and proper post op rehabilitation and regular follow up. Additional surgery to remove a

syndesmotic screw can be avoided to prevent minor or major wound infection, morbidity and economical burden to the patients.

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