



## CLINICAL STUDY TO ANALYSE THE CAUSES & FUNCTIONAL OUTCOME OF VARIOUS PROCEDURES TO TREAT TENDO-ACHILLES INJURIES

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### ABSTRACT

The achilles tendon plays a crucial role in the bipedal human beings. Injury to achilles tendon causes great difficulty in walking and running. This study aims to present the various causes, various treatment modalities and the functional outcome of tendo Achilles injuries. This is a retrospective study of 25 patients with Tendo Achilles injury who presented at our department between July 2015 to December 2018. Patient age, cause of Tendo Achilles injury associated skin and soft tissue defect, tendon defect, various modalities of treatment and functional outcome were reviewed. A total of 23 men and two women with a mean follow up period of 6 months to 15 months were included. The most common cause of tendo Achilles injury was due to slipping of foot in an Indian closet.

**KEYWORDS** : Tendo Achilles Injury, Achilles Tendon defect, Skin defect in TA region

### INTRODUCTION

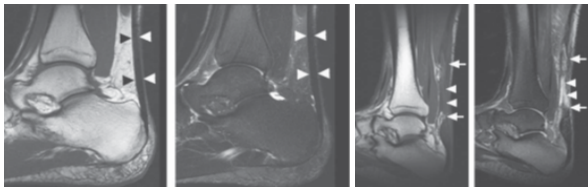
In our people acute injuries to achilles tendon with open wounds in TA region is more common unlike the west, where chronic ruptures and sport injuries are more common. This is because most Indians use Indian toilets which are a common cause of open injuries to achilles tendon [closet injuries]. Also most of us do not wear shoes hence the TA region is not protected at work place. TA region is a poorly vascularised area which may cause problems in healing.

When the patients present early the management is fairly straightforward. However if the patient is not managed well in the first chance then they may develop complications like skin necrosis over TA region and rerupture of the tendon. Then patient has to undergo more extensive procedures.

Hence this study was undertaken to evaluate the cause, the course, management and functional outcome of injuries to tendo achilles.

### INVESTIGATIONS

#### INTACT TENDO ACHILLES IN MRI



**Fig 1:** Smooth parallel lines corresponding to intact Achilles tendon are seen with low intensity. **Fig 2:** Disrupted anterior and posterior lines cut Achilles tendon with high intensity seen with low intensity.

#### CLINICAL DIAGNOSIS

In acute injuries there is a history of injury in TA region associated with pain and difficulty in walking. There is usually a history of injury at Indian toilet or due to sharp object at work place. Following injury patient is not able to stand on the toes on the affected side and he's not able to walk.

In closed rupture of achilles tendon patients have pain on walking and during climbing the stairs. On examination there may be a swelling or a palpable defect along the tendon.

#### OPEN TENDO ACHILLES INJURY



**Fig 3:** Patient has cut Achilles tendon with open

#### LATE PRESENTATION - TENDO ACHILLES DEFECT



**Fig 4:** Patient has a defect in Achilles tendon with healed scar in TA region

#### THOMPSON'S OR SIMMONDS' TEST

The patient is examined in prone position. Both feet should be hanging outside the table. Both the calf muscles are squeezed and compared. The foot with intact Achilles tendon will plantar flex. If the Achilles tendon is cut the involved foot will remain neutral.

#### MATLESTEST

The patient is examined in prone position and both legs are examined with knee at ninety degrees flexion. The foot with intact Achilles tendon will be plantarflexed at ankle. But the foot with cut Achilles tendon will remain neutral.



**Fig 5: Matles Test**

**AIM OF THE STUDY**

1. To study the various causes of tendo achilles injuries.
2. To analyse the functional outcome of various methods of repair done for tendo achilles injuries.

**MATERIALS AND METHODS**

This is a retrospective study of 25 patients with tendo achilles

**Table 1: Master Chart**

S NO	AGE	SEX	ETIOLOGY	NATURE OF INJURY	PROCEDURE	COMPLICATIONS	OUTCOME
1	21	M	Indian closet	openTA injury	primary TA repair	Nil Significant	satisfactory
2	10	MCH	gate	openTA injury	primary TA repair	Nil Significant	satisfactory
3	10	MCH	Fall from hight	openTA injury	primary TA repair	Nil Significant	satisfactory
4	28	M	Indian closet	openTA injury	primary TA repair	Nil Significant	satisfactory
5	57	M	twisting injury	closed TA rupture	Plantaris augmentation	Nil Significant	satisfactory
6	16	M	knife	TA defect	fascio lata graft	Nil Significant	satisfactory
7	22	F	Indian closet	openTA injury	primary TA repair	Nil Significant	satisfactory
8	28	M	steel sheet	openTA injury	primary TA repair	Nil Significant	satisfactory
9	19	M	fall of heavy object	TA defect	peroneus brevis	Nil Significant	satisfactory
10	43	M	fall of heavy object	openTA injury	primary TA repair	Nil Significant	satisfactory
11	35	M	knife	TA injury with skin loss	rotational flap	flap loss/ SSG done	not satisfactory
12	25	M	fall of heavy object	TA defect	turn down flap	Nil Significant	satisfactory
13	62	M	steel plate	openTA injury	delayed primary TA repair	Nil Significant	satisfactory
14	38	M	steel plate	TA defect	fascio lata graft	Nil Significant	satisfactory
15	11	MCH	due to fall	openTA injury	primary TA repair	Nil Significant	satisfactory
16	40	M	RTA	TA defect/ skin loss	free ALTF with fascio lata graft	Nil Significant	satisfactory
17	40	F	sickle	TA defect	turn down flap	wound infection & ankle stiffness	not satisfactory
18	18	M	steel plate	TA injury with skin loss	TA repair and rotation flap	Nil Significant	satisfactory
19	27	M	Indian closet	TA defect	turn down flap	Nil Significant	satisfactory
20	25	M	Indian closet	TA defect	Plantaris augmentation	Nil Significant	satisfactory
21	34	M	steel sheet	openTA injury	Secondary TA repair	Nil Significant	satisfactory
22	31	M	Indian closet	openTA injury	delayed primary TA repair	Nil Significant	satisfactory
23	50	M	Indian closet	openTA injury	primary TA repair	Nil Significant	satisfactory
24	30	M	Indian closet	openTA injury	primary TA repair	Nil Significant	satisfactory
25	38	M	Indian closet	openTA injury	delayed primary TA repair	Nil Significant	satisfactory

injuries who presented to our department between July 2015 to December 2018 Patients of all age groups and both sexes were included. Patients with open wounds with Achilles tendon injuries, closed rupture of achilles tendon and patients who were treated outside and developed complications like re ruptures were all included in the study.

All the patients were subjected to x ray foot and ankle to rule out bony injury. Diagnosis of tendo Achilles was made clinically and confirmed intra operatively. Ultrasound or MRI was done for establishing diagnosis in difficult cases.

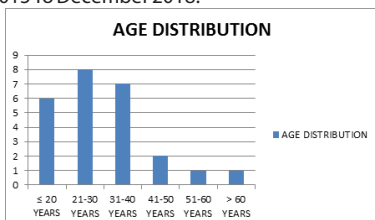
All the patients in whom the cut ends of the Achilles tendon could be brought together underwent suturing of the cut ends of tendon. The patients with totally cut tendon were managed with Bunnell sutures. The patients with partial rupture were managed with modified Kessler sutures.

The patients in whom the two cut ends could not be brought together were managed by reconstruction of Achilles tendon using various procedures like fascia lata graft, turn down flap, plantaris or peroneus brevis flap.

Postoperatively the limb was immobilised with the foot in plantar flexion for 8 weeks. At the end of 8 weeks the cast was discarded and gradual weight bearing and mobilisation started.

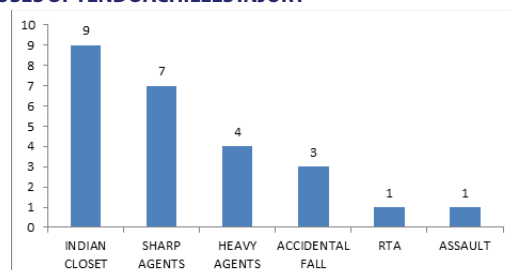
**OBSERVATION AND ANALYSIS**

Twenty five patients underwent surgery for Tendo Achilles injury from July 2015 To December 2018.



**Fig 6: The patients between the age group of 20 to 40 years were most commonly affected.**

**CAUSES OF TENDOACHILLES INJURY-**



**Fig 7: Accidental slipping of foot into Indian toilet closet was the most common cause of injury to Achilles tendon**

**Table 2:Time between injury and Surgery**

S.NO	TIME	No. OF PATIENTS
1	<48 HRS	13
2	48HRS-2 WKS	3
3	>2 WKS	9

**Table 3:Nature of surgery**

S.NO	SURGERY	NO OF PATIENTS
1	TENDON REPAIR	17
2	TENDON RECONSTRUCTION	8

**Table 4:Break up of Tendon Repair**

S.NO	SURGERY	NO OF PATIENTS
1	PRIMARY REPAIR	13
2	DELAYED PRIMARY REPAIR	3
3	SECONDARY REPAIR	1

**Table 5: Break up of Tendon Reconstruction**

S.NO	SURGERY	NO OF PATIENTS
1	FASCIA LATA GRAFT	3
2	TURN DOWN FLAP	2
3	PERONEUS BREVIS FLAP	1
4	AUGMENTATION WITH PLANTARIS	2

**DISCUSSION**

**AGE**

TA injuries occur in all age groups. In this study the most common age group involved is 20 to 40 years. Out of 25 patients about 15 patients belonged to this age group.

**CAUSE**

In this study the various causes of TA injuries are Indian closet, injury due to sharp objects at work place ,accidental fall, road traffic accident etc.Among these the most common cause was accidental injury in Indian closet.

Most of the TA injuries presented with open wounds unlike the west, this is because most of us don't wear the shoes which offers protection at work place.

In this study about 7 patients sustained due to accidental contact with steel sheet, sickle, etc, at working place.About 9 patients sustained open TA injuries due to accidental slipping in Indian closet.

**PRESENTATION TIME AFTER INJURY**

In this study about 13 patients presented within 48 hours of injury. About 3 patients presented between 48 hours to 1 weeks.9 patients presented after 2 weeks of injury out of whom 3 presented after 60 days from the date of injury. The reason for late presentation was that after injury they had been treated outside and developed complications like skin necrosis, rerupture of the tendo Achilles and had been referred to our institute. Many of these patients had a healed scar over the TA regions with rupture of the tendo Achilles.

**NATURE OF SURGERY**

From the point of management the patients with TA injuries can be broadly classified into 4 groups

- 1) Patients with TA injuries without skin loss or tendon defect.
- 2) Patients with TA injuries without skin loss but with tendon defect.
- 3) Patients with TA injuries with skin loss but without tendon defect
- 4) Patients with TA injuries with skinless and with tendon defect.

**PATIENTS WITH TA INJURIES WITHOUT SKIN LOSS OR TENDON DEFECT.**

These are the patients with TA injuries who present early. Usually there is wound in the TA region without skin loss and there is no tendon defect. The management is fairly straight forward and the outcome is good if properly managed .The first chance is the best chance.

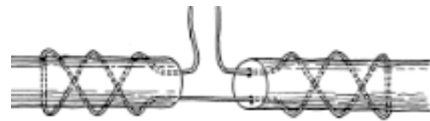
**THE SURGICAL PRINCIPLES**

In the management of tendo Achilles injuries should be followed rigorously.

- 1) The incision must extend upto the fascia to prevent skin necrosis because the TA region is a relatively poorly vascularised area.
- 2) The two cut ends of the tendons should be sutured without tension.
- 3) At time of tendon suturing the foot should be in neutral position so that the patient has no difficulty in dorsiflexing the foot when mobilisation is started.
- 4) The foot should be immobilised in 20 degrees plantar flexion to ease the tension on the suture line.
- 5) The immobilisation should be maintained for 8 weeks. Early mobilization may cause re rupture of the Achilles tendon.
- 6) Physiotherapy should be continued till good range of ankle movements are achieved because the site of TA repair has a tendency to form adhesions.

The tendon repair is done by suturing the cut ends together using Bunnell's or Modified Kessler's sutures. Few peripheral sutures are applied. In this study 17 patients with TA injuries were managed by suturing the cut ends together. Of these 13 patients underwent primary repair .The 3 patients underwent delayed repair.1 patient underwent secondary repair.

**BUNNELL'S SUTURE**



**MODIFIED KESSLER'S SUTURE**



**OPEN TENDO ACHILLES INJURY WITH OUT SKIN LOSS**



**Fig 8 :There is a open wound with out skinloss and cut Achilles tendon**

**CUTTENDO ACHILLES**



**Fig 9:Both the cut ends of the Achilles tendon are visible**



**Fig 10: End to end suturing of cut Achilles tendon done**

**PATIENTS WITH TA INJURIES WITHOUT SKINLOSS BUT WITH TENDON DEFECT.**

These are the patients who present late and who have been treated outside usually the wound over the TA region has healed. But the TA injury has not healed and cut ends retracted and there is a defect in the tendo Achilles. It is not possible to bring the two cut ends of the tendon together and suture it. These patients will need reconstruction of the tendo Achilles

**DEFECT IN ACHILLES TENDON WITH HEALED SKIN WOUND**

Patient is not able to stand on his left toes



In this study 7 patients presented with tendon defect and without skin loss. Of these 2 patients underwent fascial TA graft for reconstruction of tendo Achilles. 2 patients underwent reconstruction with turn down flap.

patients underwent augmentation of the TA repair using the plantaris tendon. 1 patient underwent reconstruction using peroneus brevis flap.

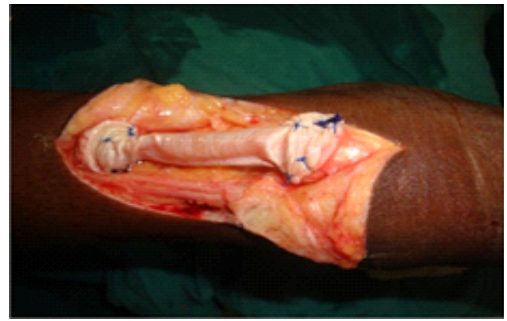
**FASCIA LATA GRAFT**

Fascia lata graft is used to reconstruct tendo Achilles defects if the cut ends are frayed, ragged and unhealthy and the defect is large. The tendon edges are freshened and the defect size is measured. A Fascia lata graft which is about 2-4 cm longer than the defect size is harvested. The graft is tubed around the cut ends of the Achilles tendon and sutured using 1-0 prolene simple sutures.

**DEFECT IN ACHILLES TENDON IS MEASURED**



**FASCIA LATA GRAFT USED TO BRIDGE THE DEFECT**

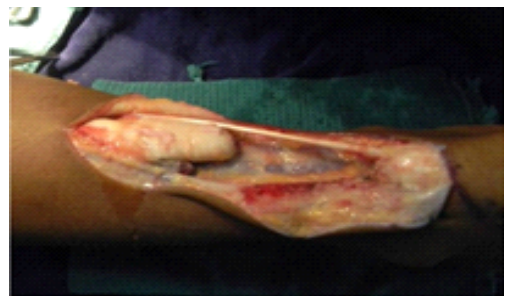


In this study there were three patients with large defects of achilles tendon greater than 5 cm and the fascia lata graft was used to reconstruct the Achilles tendon

**TURNED DOWN FLAP**

This procedure is done when the cut ends of the tendon are clean and healthy and the defect of the tendon is not large. A strip of aponeurotic flap is raised from the proximal portion of cut Achilles tendon. The raising of the flap is stopped about 2-3 cm from the cut end of the proximal portion. The flap is turned down and sutured to cut distal end of the Achilles tendon.

**DEFECT IN ACHILLES TENDON WITH INTACT PLANTARIS**



**TURN DOWN FLAP AND WEAVING OF PLANTARIS**



**TURN DOWN FLAP SUTURED TO THE DISTAL CUT END**

**PATIENTS WITH TA INJURIES WITH SKINLOSS AND WITH TENDON DEFECT**

In this study one patient presented with raw area in the TA region and Achilles tendon injury with loss. We planned to reconstruct both the skin loss and the Achilles tendon defect in a single stage.



**Fig 11: fascia lata graft has Fig 12: Free anterolateral thigh been harvested and sutured to flap cover has been given to the both ends of the cut cover the raw area over the TA Achilles tendon. region after reconstructing the defect in Achilles tendon with fascia lata graft.**

**EVALUATION OF FUNCTIONAL OUTCOME**

- The functional outcome is evaluated by

**CONCLUSION**

The following conclusions are derived from this study 1]Tendo acilles injuries are more common in males possibly because more of them get injured at work place.

2]Open injuries to Achilles tendon is the usual presentation unlike the west because of our habit of using Indian toilet and our habit of not wearing shoes 3]First chance is the best chance to treat tendo Achilles injuries.Primary surgical management if done well produces the best functional outcome 4]If patient develops complications due to mismanagement in the first instance, further management needs more extensive procedures and the complication rates are also higher 5]Rehabilitation following surgery with adequate immobilisation and effective physiotherapy is very important for good functional outcome

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