

**A Prospective cohort study on management Achilles tendon injuries in a tertiary care centre**

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**Abstract**

**Introduction:** Tendo achilles is the strongest and the longest tendon. Open tendo achilles injuries are more common in our country , unlike western countries , where closed injuries are more commonly seen. Prompt repair of achilles tendon is important. Providing a gliding tendon and sensate achilles region are major management goals in achilles tendon injuries.

**Aim:** Our aim is to analyse the demographic data, various modes of injury , types of injuries ,various modalities of managements and their outcome in tendo achilles injuries.

**Materials & Methodology:** This is a prospective clinical cohort of 20 patients who presented with

achilles tendon injuries with or without soft tissue defect over achilles region, to the department of plastic surgery at Gandhi medical college and hospital Secunderabad between September 2018- August 2020. For all the patients clinical examination, USG for closed injuries, surgical profile, surgical procedure , immobilisation of limb in slab for 2 weeks followed by cast application for 10 weeks and physiotherapy were done.

**Results:** Most common age groups affected were 21-30 and 31-40 each contributing upto 30% of total cases. Male to female ratio was 7:3. RTA was the most common mode of injury accounting upto 65% of total cases. 55% cases were treated with tendon repair and

primary closure and 45% cases were treated with tendon repair and flap cover.

**Conclusion:** Open injuries of tendo achilles were common, a significant number of cases were addressed with flap cover after tendon repair.

Outcomes of cases addressed with flap cover were comparable with that of cases addressed with tendon repair and primary closure.

**Keywords:** Achilles tendon injuries, closed and open injuries, slab, casing and physiotherapy.

### **Introduction**

In our country more often open injuries are common, unlike western countries where closed injuries are common. Prompt repair of tendon and reconstruction of achilles region is very important. It plays an important role in walking and jumping. Hence providing a gliding tendon and sensate achilles region is important to provide functional results and to reduce morbidity to the patient. As it is the region of footwear, cosmetic concern and comfort of the patients should also be given consideration. This study helps to analyse the needs of tendo achilles region reconstruction with various treatment modalities and their role in giving good functional outcomes.

### **Aim of the study**

This study aims to study the various causes and various treatment modalities and their functional outcome in the tendo achilles injuries.

### **Objectives of the study**

To study the etiology and various types of tendo achilles injuries.

To analyse the various treatment modalities.

To analyse their functional outcome.

### **Patients and methods**

**Study design:** This study is a prospective observational cohort of 20 patients who presented

with tendo achilles injuries to the department of plastic surgery at Gandhi medical college and hospital, Secunderabad between September 2018- August 2020.

### **Inclusion criteria**

All the patients who sustained tendo achilles injuries with or without soft tissue over the achilles region admitted to the department of plastic surgery, Gandhi hospital were included in the study.

### **Exclusion criteria**

All patients who sustained skeletal injuries of that limb along with other tendons and neurovascular structures of that achilles region were excluded.

### **Ethical clearance**

Clearance was taken from the ethical committee of Gandhi medical college and Hospital.

### **Preoperative evaluation**

Closed injuries: clinical examination, Thompson's test, Ultrasonogram of achilles region of affected limb and routine surgical profile. (Fig: 1)

Open injuries: clinical examination limb and wound, Thompson's test and surgical profile.(Fig:2)

Colour doppler of the injured limb to rule out vascular injuries, X-ray of ankle and foot to rule out skeletal injuries.

### **Management of the**

Patients were managed by dividing into two categories according to the soft tissue component over the injured tendon.

1. Patients with tendo achilles injuries without soft tissue loss.
2. Patient with tendon achilles injuries with soft tissue loss.

Patients with tendo achilles injuries without soft tissue loss:

This includes patients presented with closed ruptures , cut lacerations and patients who sustained injury and skin closure done primarily and referred to tertiary care centers.

The surgical principles in the management of tendo achilles injuries were followed are:

1. Posteromedial incisions were given to avoid injury to the sural nerve which passes laterally to the achilles tendon and helps to retrieve plantaris tendon which lies medial to the tendon.
2. In case of cut lacerations and primarily closed injuries , existing suture lines were extended.
3. The incision was deepened to include the fascia to prevent skin necrosis because the tendo achilles region is a poorly vascularised area.
4. End to end repair of the tendon was done without tension with krakow's technique(Fig:4) in complete tears and with kessler technique in partial tears(Fig:3) of <50% of the width.
5. At the time of end-to-end repair the foot should be in a neutral position , so that the patient has no difficulty in dorsiflexing the foot when mobilisation has started.
- 6.The immobilisation should be maintained for 12 weeks, as early mobilisation may increase the risk of re-rupture of achilles tendon.
- 7.Physiotherpahy should be continued till good range of ankle movements are achieved because the site of achilles repair has a tendency to form adhesions.

#### **Patients with tendo achilles injuries with skin loss**

The tendo repair is done by suturing the cut ends together. The soft tissue defect(Fig: 7)(Fig :10)of the tendo achilles region is covered with flaps .

For small defects Lateral supramalleolar flap was used , for medium sized defects Island reverse sural artery flaps(Fig:8) were used and for

large defects Reverse sural artery cross leg flap was used(Fig:11).

#### **Postoperative management**

Antibiotics, analgesics and anti -edema measures. Limb was elevated and immobilised with above knee plaster of paris slab with ankle joint 30 degrees plantar flexion(Fig : 5). Window is created in the dressing to monitor the flap . The inspection of the skin graft at the donor site of flap was done on the 4th and 6th postoperative day(Fig :12). Sutures were removed on the 14th day if healing was achieved.

After 2 weeks slab is converted to cast with foot in 20 degrees plantar flexion. (Fig:6)

Immobilization was continued till 12 weeks. Full range of ankle movements was allowed after 12 weeks.

#### **Evaluation of functional outcome**

The functional outcome is evaluated by:

1. Ability to do both plantar flex as well as dorsiflex the ankle joint (Fig: 9, Fig: 13).
2. Patients' ability to walk and to stand on toes is tested.
3. Healing of the skin wound over the tendo achilles region.
4. Patients return to work ,school etc
5. Patient satisfaction.

#### **Results**

1. Most common age group sustained tendo achilles injuries were 21-30yr and 31-40 years each accounting upto 30% of total cases.
2. Males were more commonly affected than females with male to female ratio 7:3.
3. Road traffic accidents were the most common mode of injury contributing upto 65% of total cases followed by injury with sharp objects was seen in 20% of cases ,

fall on twisted leg ,cycle spoke injuries and toilet seat injuries were seen in 5% of cases respectively.

4. 65% of cases presented within 48hrs from the time of injury, 20% of cases presented before 7days and 15 % presented after 7days.

5. Open achilles tendon injuries were seen in 95% of cases, closed injuries were seen in only 5% of cases.

Among cases presented with open injuries lacerated wounds were seen in 74% of cases and crush injuries were seen in 26% of cases.

6.55% of cases presented without soft tissue loss and 45% of cases presented with soft tissue loss, eventually these 55% cases were addressed with tendon repair and primarily closure and 45% of cases with flap cover.

7. In study 80% of cases were in a single stage procedure that is either with tendon repair and primary closure or Islanded Reverse sural artery flap . Only 20% of patients required multi stage procedures like Reverse sural artery cross leg flap and Lateral supramalleolar flap.

8. Among the cases addressed with flap cover , Islanded Reverse sural artery flap was done in 55% of cases , Lateral supramalleolar flap was done in 33% of cases and Reverse sural artery cross leg flap was used in 12% of cases.

## Discussion

Tendon achilles is the strongest and the longest tendon in the body. It is the hallmark of a bipedal man.<sup>(1)</sup> Tendo achilles plays an important role in walking and jumping.

In our study mean age of the patient presented with tendo achilles injuries was 28 years with most people between 21-40year were affected, our result were comparable with study conducted by Dr.Jahir Hussain et al in 2019,<sup>(2)</sup> where most patients of age between 21-40years were commonly affected.

Male to female ratio is 7:3 which is similar to study conducted by Leppilhati et al<sup>(3)</sup> where ratio is 5.5:1 between males and females.

Most common mode of injury in our study was RTA accounting upto 65% of total cases which was similar to study conducted by Awe. AA et al <sup>(4)</sup> where 63% cases presented due to RTA.

68% of cases presented within 48hrs of injury ,20%cases presented within seven days and 15% cases after 7days, these results were comparable with the study of Dr. Jahir hussain et al <sup>(2)</sup> where 52% of cases presented within 48hrs from the time of injury.

95% of cases presented with open injuries and 5% with closed injuries , these results were similar to study of Dr.Jahir Hussain et.al<sup>(2)</sup> where 96% cases of open injuries and 4% of closed injuries were seen.

55% of cases presented without soft tissue loss and 45% of cases presented with soft tissue loss , eventually these 55% of cases were addressed with tendon repair and primary closure and 45% cases addressed with tendon repair and flap cover. Our results were comparable with study done by Awe et al<sup>(4)</sup> where 53% of the cases were addressed with primary closure and 8% were addressed with flap cover, Similarly in the study of Sasanka et al <sup>(5)</sup> where 88% of cases were addressed with primary closure and 12% of cases with flap cover.

In our study 80% of cases were managed in a single stage , that is either a primary closure or a Islanded Reverse Sural artery flap . Only 20% cases were managed in multi stage that required flap division and inset in lateral supramalleolar flaps and cross leg flaps. These results were comparable a study conducted by Jpengnanam TS et al in 2009 where all open contaminated achilles tendon injuries were addressed in single stage with Island Reverse Sural

artery neurocutaneous flap .<sup>(6)</sup> In another study conducted by Bullocks JM et.al where all the cases of achilles region defects were addressed reverse sural artery flap.<sup>(7)</sup> These result were also comparable with study of Mastacaneanu et al where single stage management was done with local flap.<sup>(8)</sup>

Among the cases addressed with flap cover, 55% cases were given Islanded Reverse sural artery flap,Lateral supramalleolar flap was given in 33%of cases and 12% cases were given Cross leg Reverse Sural artery flap .These results were also comparable with study of R. Goplakrishanan et al<sup>(9)</sup> where Lateral supramalleolar flap was given in 40% of cases and Reverse Sural artery flap was given in 30%of cases and also in study of Biswajit M et al<sup>(10)</sup> Cross leg Reverse Sural Artery flap was used in 3% of cases and Reverse Sural artery flap was given in 30% of cases.

In our study ,92% of patients presented within 48hrs of injury were addressed in a single stage, 8% cases were addressed in multistage management . Among patients presented within 48hr -7days , 50% cases were addressed in single stage management and 50% cases were managed in multistage approach . In patients presented after 7days of injury 33% of cases were addressed in single stage and 66%in multistage approach . This tells that cases presented early have the advantage of a single stage approach . Cases presenting late require a multistage approach. This may be due to contamination of wounds, infection of wounds and necrosis of earlier sutured skin flaps.

In our study cases presented early that is within 48hrs of injury, 62% of cases underwent primary closure,38% required flap cover .Among the cases presented between 48hr -7days 50% cases were addressed with primary closure and 50% cases with flap cover.Among cases presented after 7days of injury

33% of them underwent primary closure and 66% of them required a flap cover. This observation concludes that even in cases presented early ,38% of them required flap cover , indicates that even in early presentation loss of soft tissue dictates the need for flap cover irrespective of time of presentation.

In our study cases managed in a single stage with flap cover were addressed with Island Reverse Sural artery flap. This flap does not require division of flap from the donor site hence it can be done in a single setting without any further interventions. Hence even in cases of soft tissue loss this flap has reduced the duration of hospital stay and improved patient compliance.

In our study, patients who underwent tendon repair and primary closure, excellent results were seen in 64% of patients, good results were seen in 27% of patients and fair results were seen in 9% of patients.In cases of tendon repair and flap cover excellent results were seen in 56% of cases,good results were seen in 22% of cases fair results were seen in 11% of cases and poor result in another 11% of cases.

Though there was no significant difference of function seen in both types like standing on tiptoes ,ability to dorsiflex and plantarflex the ankle and ankle movements etc, difference was observed only from the point of view of patient satisfaction. Patients who underwent flap cover have long duration of stay , flap adds bulk to posterior ankle region which makes difficulty in wearing foot wear and donor site defect was noticeable in some situations . These results were comparable with study conducted by Jahir Hussain et al in 2019 where satisfactory results were seen in 92% Of cases.<sup>(2)</sup>

## Conclusion

Patients treated with tendon repair and primary closure of skin flaps had less duration of hospital stay and showed excellent outcome. Patients treated with tendon repair and flap cover have relatively more duration of stay and have good outcome. Irrespective of time of presentation the requirement of flap cover was based on the amount of soft tissue loss. Physiotherapy during the postoperative period and in rehabilitation phase has a significant role to restore the normal functioning of the limb. Flap cover was a savior in cases presented with soft tissue damage to restore normal form and function in the injured areas of limb.

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## Legends Figures



Figure 1: An elderly female presented with closed tendo achilles injuries.



Figure 2: Open tendo achilles injury with visible distal cut end of the tendon.



Figure 3: intraoperative image showing partial tear of tendo achilles.



Figure 4: intraoperative image showing end to end repair of achilles tendon with KRAKOW'S technique.



Figure 5: Application of Slab with 30 degrees plantar flexion of foot.



Figure 6: conversion of slab into cast after 2 weeks.



Figure 7: 15 year female presented with wound over tendo achilles after 2 months of injury.



Figure 8: Soft tissue cover given with Reverse sural artery island flap after tendon repair



Figure 9: Post operative picture of same patient showing settled flap and ability to do plantar flexion and dorsiflexion.



Figure 12: Postoperative image showing settled Reverse sural Artery cross leg flap



Figure 10: Another patient 22 year old female present Compound wound over Achilles region exposing injured achilles tendon



Figure 13: Follow up at 6 months showing plantar flexion of limb equal to the opposite limb



Figure 11: Reverse sural artery cross leg flap was done after tendon repair for the same patient.