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**Dr. Koduru Satya Kumar**  
Professor of Orthopaedics,  
NRI Academy of Sciences,  
Chinakakani, Guntur, Andhra  
Pradesh, India

**Riyaz Babu**  
Associate Professor Of  
Orthopaedics, Department Of  
Orthopaedics, NRI Academy Of  
Sciences, Chinakakani, Guntur,  
Andhra Pradesh, India

**Tajuddin Shaik**  
Junior Resident In The  
Department Of Orthopaedics,  
NRI Academy Of Sciences,  
Chinakakani, Guntur, Andhra  
Pradesh, India

**Dr. Chayam Hanumantha Rao**  
Professor & Hod of  
Orthopaedics, NRI Academy of  
Sciences, Chinakakani, Guntur,  
Andhra Pradesh, India

## Merits and demerits of different surgical techniques in treating old, neglected ruptures of tendo achilles

**Dr. Koduru Satya Kumar, Riyaz Babu, Tajuddin Shaik and Dr Chayam Hanumantha Rao**

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### Abstract

Study conducted in 25 patients in NRI general hospital. Study included 19 males and 6 female patients. Trauma is most common mode of injury and ruptures were significantly common in patients who received local steroid injection. Most of ruptures are in zone 2. In majority of cases gap in tendon is more than 4cms. Bosworth repair done in 13 cases, FHL transfer in 7 cases and peroneus brevis transfer in 5 cases. Excellent results are seen in 14 cases, good in 7 cases, fair in 3 cases and poor in 1 case. All the procedures had similar good to excellent results in range of 80-85%. Though many surgical treatments are available for reconstruction of a neglected Achilles tendon rupture, there is no concrete data to support that one technique is superior over another.

**Keywords:** different surgical techniques, treating old, ruptures, tendo achilles

### Introduction

The Achilles tendon is the strongest tendon in the body. The anatomy of the Achilles tendon makes it vulnerable to having different pathogenesis. It's function is to transmit load from the triceps surae to the calcaneus. It is able to with stand the forces eight times the body weight as produced while running.

Over use of the Achilles tendon are common in running and other sports that involve jumping and sprinting movements. Treatment of Achilles tendon rupture was first reported in literature by AMBROISE PARE in 1575. Surgical treatment increased primarily because of ABRAHAMSON in 1923 an ARNER and LINDHOLM in 1959.

Tendo achilles is a unique structure because of unparalleled strength when severed, Impetus for motion is lost and stability in standing is jeopardized. Therefore to achieve good structural healing is aim of treatment. Bridging of defect in tendon- Achilles by fibrous tissue replacement is no good as fibrous tissue gets stretched gradually and cannot with stand stress and strain exerted upon calf muscles. Therefore good co-adaptation of cut ends of Tendoachilles and repair is essential. Ends retract with tendon severance and lie loose in sheath.

In event of infection, some proliferation occurs and ends become adherent to sheath .But when enclosed in paratenon cut ends show less reaction and proliferate well. Tendon repair in a synovial sheath is not followed by good results due to adhesions. These are minimised by atraumatic technique use of non-irritant suture, immediate debridement and repair with meticulous soft –tissue handling.

An Achilles rupture is considered chronic if a four week interval between rupture and repair as described by Gabel *et al.* <sup>[1]</sup> Contraction of the gastrocnemius-soleus complex may occur as early as three to four days after rupture. As a result, any delay in diagnosis and treatment will worsen the outcome and treatment options become more limited.

### Aims and Objectives

1. To describe various methods of management of neglected tendoachilles rupture.
2. To outline various procedures of tendoachilles repair done at our hospital.
3. To describe merits, demerits and surgical outcome of each procedure.

### Correspondence

**Dr. Koduru Satya Kumar**  
Professor of Orthopaedics,  
NRI Academy of Sciences,  
Chinakakani, Guntur, Andhra  
Pradesh, India

**Materials & Methods**

A total of 25 patients were seen from October 2014 to September 2016 with neglected tendoachilles rupture and were taken for study and pattern of presentation and problems in management.

All of them were treated and followed up in NRI medical hospital, Orthopaedic department. The study is prospective analysis of rupture patterns, treatment modalities, functional results and outcome.

**Inclusion criteria:**

1. Patients above 18yrs
2. Neglected cases (duration more than 4 weeks).

**Exclusion criteria:**

1. Patients below 18yrs
2. Patients with comorbid conditions (uncontrolled diabetes, peripheral vascular disease) and medically not fit for anesthesia.
3. Patients who did not give consent for study
4. Acute ruptures

Study included 19 males and 6 females.

Clinical evaluation included local examination for skin and soft tissue changes i.e. hyperpigmentation, hypopigmentation and minimal abrasions and lacerations.

**Surgical procedures**

Various procedures followed in study are Bosworth technique, Wapners technique and Modified teuffer technique. After the incision the tendon is inspected for contusions, fraying, fragmentation, integrity of paratenon and exostosis. The tendon is studied for level of rupture, the length of distal stump and gap in the tendon.

After the repair wound is closed in layers including peritenon with ankle in 10 to 15 degrees of plantar flexion with suction drain. After skin closure above knee casting applied with knee in 15 degrees of flexion and foot in 15 degrees plantar flexion.

**Immediate post-operative period**

In immediate post-operative period the patient is kept on systemic antibiotic and regular wound inspection is done through window in the casting. Wound is inspected for superficial infection, edema, necrosis and gaping. Wound is followed up for suture granuloma, infections, wound dehiscence and heel problems. Suture removal is done usually on 16<sup>th</sup> post operative day. Above knee Casting continued and window closed after suture removal.

The post-operative protocol we followed is

1. Wound dressing was refreshed through a window over the cast 2 days after surgery.
2. Two weeks after surgery, the sutures were removed.
3. After 6 weeks, cast removed and full weight bearing advocated.
4. Gradual return to function by 12 weeks.

**Late post-operative period**

Patient is examined for

- Dynamic deformities
- Range of ankle movements
- Power of gastrosoleus
- Calf muscle measurement
- Ability to stand on tiptoes
- Heel above floor distance

- Subjective assessment of pain
- Ultrasound evaluation of intactness
- Thickening of tendon
- Calcification are noted

**Quigleys scoring system** [24]

Objective grade of injury after surgery for ruptured Achilles tendon comparing involved side with uninvolved side

**Table 1:** Quigleys scoring system

Grade	Calf atrophy	Range of motion difference	Toe rise difference(cm)
Excellent	Equal	equal	< 2
Good	0.25	<5 degrees	2
Fair	0.50	<10 degrees	5
Poor	>0.50	<20 degrees	>10

Due to lack of dynamometric studies muscle power estimation could not be done.

Patients are followed for a mean period of 2 yrs. Results are compared with other series by quigleys scoring system and juhana leppilahti scoring system the results are present, analysed and discussed.

**Results**

Total number of patients studied were 25 in department of orthopaedics, NRI general hospital.

**Duration of study:** October 2014 to September 2016

**Sex incidence:**

In total of 25 cases 19 cases were male and 6 were female.

**Table 2:** Sex incidence

Sex	No. Of cases	Percentage
Males	19	76
Females	6	24

Age incidence:

Most common age was age group was between 41-50 years.

**Table 3:** Age incidence

Age	No. of cases	Percentage
21-30	2	8
31-40	6	24
41-50	8	32
51-60	7	28
>61	2	8

**Etiology**

Of the 25 cases 9 cases had history of steroid injection and 15 had history of trauma.

**Table 4:** Etiology

Etiology	No. of cases	Percentage
Local steroid injection	9	36
Compound injury	1	4
Trauma (trivial, blunt)	15	60

**Chief complaints**

**Table 5:** Chief complaints

Complaints	No. of cases	Percentage
Pain	13	52
Gap in tendon	12	48
Calf muscle weakness	19	76

**Clinical evaluation**

**Table 6:** Clinical evaluation

Clinical feature	No. of cases	Percentage
Skin changes	15	60
>20% difference in calf measurement	14	56
Weakness of plantar flexion	21	84

**Site of rupture**

In 25 of our cases 13 cases have ruptures in zone 3.

**Table 7:** Site of rupture

Zone	No. of cases	Percentage
Zone 1	9	36
Zone 2	13	52
Zone 3	3	12

**Table 8:** Different procedures performed

Procedure	No. of cases	Percentage
Bosworth repair	13	52
FHL transfer	7	28
Peroneus brevis transfer	5	20

**Complications encountered:**

**Table 9:** Complications

Complication	No. of cases	Percentage
Superficial infection	4	16
Scar hypertrophy	4	16
Deep infection	2	8
Loss of eversion	1	4
Loss of hallux ROM	1	4

**Quigleys scoring system:**

**Table 10:** Quigley’s scoring results

Result	No. of cases	Percentage
Excellent	14	56
Good	7	28
Fair	3	12
Poor	1	4

**Results of various procedures:**

All the procedures had good to excellent results in range of 80-85%.

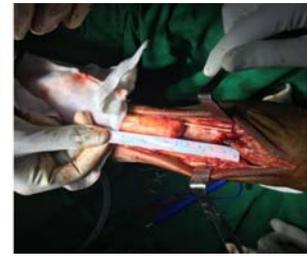
**Table 11:** Combined result

	Total cases	Good-excellent	Fair	Poor
Bosworth	13	11 (84.61%)	1(7.6%)	1(7.6%)
FHL transfer	7	6 (85.71%)	1(14.28%)	-
Peroneus transfer	5	4(80%)	1(20%)	-

**Case 1**



Pre op photo



Intraop photo showing gap



Exposed tendon



Sutured tendon



Wound closure

**Case 2**



Preoperative photo



Intraoperative suturing



Neutral position



Plantar flexion



Scar hypertrophy

### Discussion

The goal of study is about different options for repair of old tendoachilles rupture, their merits and demerits. Our study consists of 25 patients treated by Bosworth method, FHL transfer and peroneus brevis transfer method.

### Age distribution

In our series majority of cases i.e.15 (60%) were seen in age group of 41-60. This is in correspondence with series by juhana leppilahti where there was maximum incidence of cases in age group between 41-50 years. There were only two cases above age of 60 who sustained tendoachilles rupture.

### Sex incidence

Number of males were 19(76%) and females were 6(24%). Probably the increased cause may be due to increased manual labour in day to day life among male population and females exposed to less hardwork.

### Etiology

In our study, 15 patients sustained rupture of the Achilles tendon because of trivial trauma and blunt trauma.9 patients had received local steroid injections for painful ankles. All patients with trivial ruptures had a history of long-term ankle pain. This suggests that most Achilles tendon ruptures are associated with chronic ankle pain (tendinitis and retrocalcaneal bursitis). The common casual activity that led to rupture was stumbling.

The etiology of Achilles tendon rupture remains unclear, but some investigations have proposed that chronic degenerative changes are a common cause based on the histological examination of the material obtained from the ruptured area during surgery [25].

Balasubramaniam *et al.* [26] stated that injection of steroids into the tendon insertions caused necrosis at the site of injection and a delayed healing response. The anti-inflammatory and analgesic properties of corticosteroids may mask the symptoms of tendon damage, inducing individuals to maintain high levels of activity even when the tendon is damaged.

The evaluation showed skin changes in the condition of skin is important for planning the incision and to some extent influences wound healing. In patients who have received steroid infiltration, the skin was hypopigmented and appeared to have thinned out. Tendon gap was not always palpable and a clear gap of more than 3 cm palpated from outside is indicative of real gap left in tendon after debridment and is an indication for tendon transfer. The other clinical indicators like increased dorsiflexion at ankle, weak plantar flexion and difference of over 20% calf measurement are indicative of chronicity of problem and dictate need for dynamic transfer

for early functional recovery.

In our series all cases presented 4 weeks after trauma the delay in presentation was due to

1. Negligence of patients
2. Attributing injury to exacerbation of previous retrocalcaneal pain
3. Inability to diagnose condition by attending physician
4. Minor disability experienced by patient which gets worsened in time.

In our study we had one case of compound injury which was due to injury by axe case which was not diagnosed initially by attending physician.

### Location of rupture and defect

Most of the ruptures in our series had a gap of more than 4 cm (Type 3 and Type 4 according to Kuwada's classification). Such cases cannot be treated conservatively, and surgical management is necessary to obtain normal range of ankle motion. Porter and colleagues found an average gap of 3 to 5 cm between the tendon ends after removal of the fibrous scar tissue [27].

Achilles tendon tears may be grouped (according to severity of the tear and degree of retraction) into 4 types:

**Type I:** partial ruptures  $\leq 50\%$

**Type II:** complete rupture with tendinous gap  $\leq 3$  cm

**Type III:** complete rupture with tendinous gap 3 to 6 cm

**Type IV:** complete rupture with defect of  $>6$  cm (neglected ruptures)

The site of tendon rupture is usually 2 to 6 cm above the tendon insertion into the calcaneum, which is a relatively hypovascular area as shown by angiography. In our study 16 cases are in this range.

According to lagergran and lindholm<sup>28</sup> tendoachilles is divided into three zones. They are

Zone 1  $<3$  cm from calcaneal insertion

Zone 2 3 to 6 cm from calcaneal insertion

Zone 3  $>6$  cm from calcaneal insertion

Most of the ruptures in our series were in zone 2.

### Conclusion

1. Ruptures were significantly present in patients who were given local steroid injection.
2. Most ruptures occurred in zone 2
3. Neglected Achilles tendon ruptures are debilitating injuries, and one must appreciate the increased complexity of the situation. Surgical management is recommended, and only in the poorest surgical candidate conservative treatment entertained.
4. Many surgical treatments are available for reconstruction of a neglected Achilles tendon rupture. There is no concrete data to support that one technique is superior over another. All the procedures in our study had good to excellent results in range of 80-85%.
5. The ability of the patient to achieve a single limb heel rise on the affected side, most often indicates a successful outcome, although some patients are satisfied without attaining this goal.

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