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Evaluation of clinical & functional outcome of modified percutaneous repair of Acute Tendo Achilles Rupture using SS wire

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Abstract

Aims and objective

1. To evaluate the results 2 year after the management of Achilles tendon rupture, using standardized, validated assessment methods for symptoms and function in patients treated with percutaneous surgical repair augmented with ss wire.
2. To evaluate the recovery of function 2 year after injury and to study how function relates to patient-reported outcomes, with regard to lower limb function, as well as general health and quality of life.

Material and method: This was an Prospective Cohort study of 50 patients of acute ruptured Tendo Achilles who were treated with percutaneous repair. Cases were taken up according to inclusion and exclusion criteria. All patients underwent a rehabilitation program. Cases were followed and evaluated at 3 weeks, 6 weeks, 12 weeks, 6 month and 1 year interval. The results were evaluated clinically and functionally by Leppilahti scoring method.

Results: All the patients were followed up at 3 weeks, 6 weeks, 12 weeks, 6 months and 1 year interval. Mean time to return to work was 4 months in patients treated with percutaneous repair of acute ruptured Tendo Achilles. Lippelahti scores was excellent in 92%, good in 6% and fair in 2%.

Conclusion: the results of our study shows that complications associated with Percutaneous repair with modification included in this study of Tendo Achilles were significantly low with. Percutaneous repair provides excellent function, with a better cosmetic appearance, a lower rate of wound complications, re rupture rate and is also cost effective.

Keywords: Percutaneous, tendo achilles, rerupture, rehabilitation

Introduction

The Achilles tendon is the largest tendon in the human body and has the capacity to withstand high tensional forces created by movements during walking, running and jumping. Despite these qualities the Achilles tendon is remarkably susceptible to injury [1]. Achilles tendon ruptures are most likely to occur in sports requiring sudden stretching, such as sprinting and (racquet) ball sports [2]. Treatment can be classified into surgical repair (open surgical reconstruction or minimally invasive surgical techniques) and conservative treatment (cast immobilization or functional bracing). Traditionally, open surgical repair has been the preferred method of treatment, mainly due to low re-rupture risk compared to conservative treatment by cast immobilization and other surgical modalities as well. But surgery is associated with a high risk of wound healing complications. Minimally invasive surgical repair techniques are designed to reduce this risk and have become increasingly popular.

Material and method

The present study was conducted after the clearance given by ethical committee of MLN medical college, Allahabad. in department of Orthopaedics, from June 2014 to May 2016 in a consecutive series of patients who presented in the Outpatient department(OPD) and Emergency department with acute rupture of Tendo Achilles during the period of 2 year and who satisfied the inclusion criteria.

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Inclusion criteria

- a) Patients with acute rupture of Tendo Achillies of less than 6 weeks duration.
- b) Either partial rupture or complete rupture with gap less than 2 cm.
- c) Patients of age 20 years or more.

Exclusion criteria

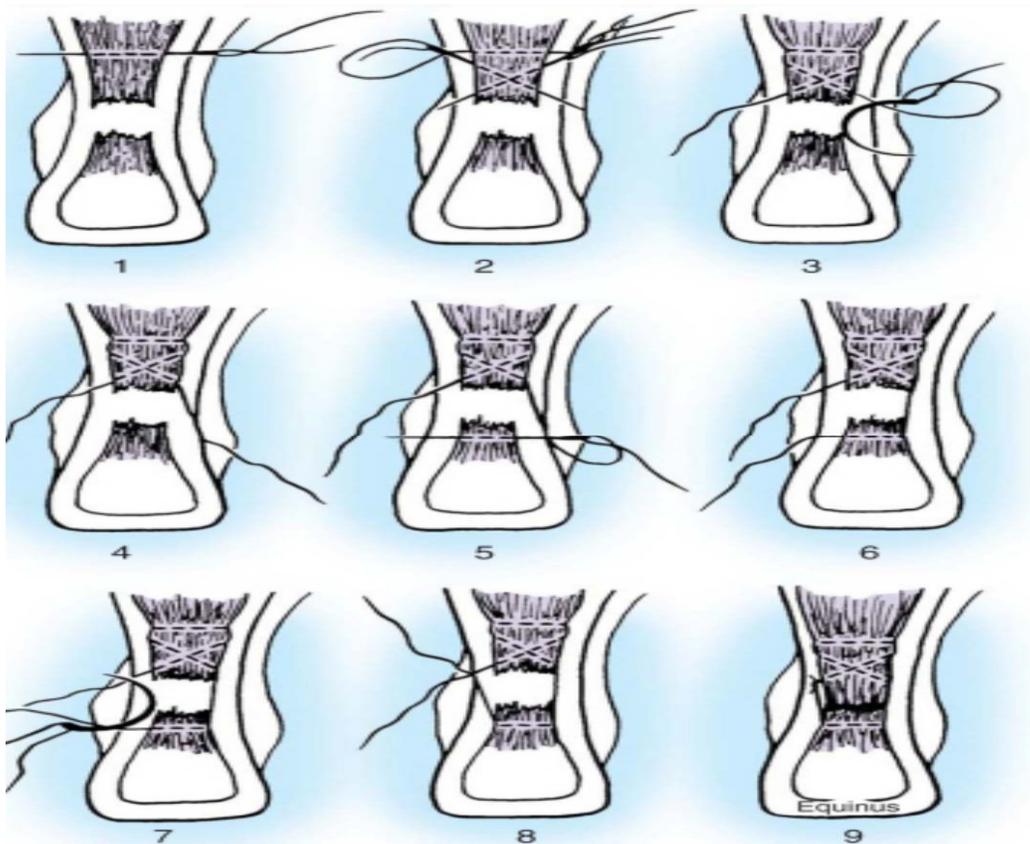
- a) Chronic rupture, of more than 6 weeks duration
- b) Age below 20 years
- c) Patients having systemic illness making then unfit for surgery or not willing to undergo surgery
- d) Open or infected wound
- e) Lack for follow up for at least 6 months

This was a prospective cohort study. A total of 54 patients of Acute Tendo Achillies rupture were admitted, patients were managed operatively by percutaneous method of repair. All operatively managed patient were observed from admission to discharge. Each patient was called upon for follow up at 3 weeks, 6 weeks, 12 weeks, 6 month and 1 year duration but only 50 patients of acute Tendo Achillies rupture were included in the study who turned up for at least 1 year duration. The cases were evaluated clinically, findings were recorded. The results were evaluated clinically and functionally by Leppilahti scoring method [3].

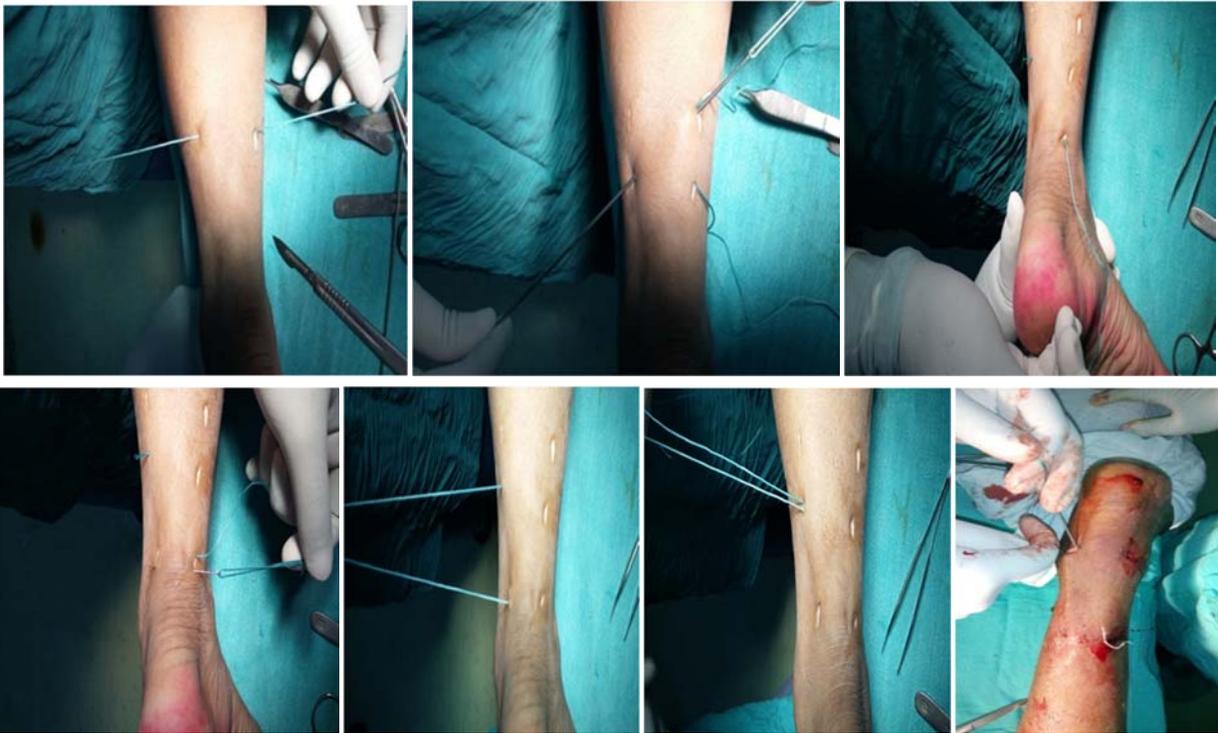
Technique of percutaneous repair

In operating room with patient under spinal anaesthesia, extremity prepared as for open surgery. The tendon defect was palpated and small stab wounds were made on each side of the

Achilles tendon 2.5 cm proximal to the rupture defect. A small hemostat was used to free the underlying tendon sheath from the subcutaneous tissue. A No. 0 or No. 1 non absorbable suture thread passed on a straight needle from the lateral stab wound through the body of the tendon and exit from medial stab wound (Fig., Step 1). With a straight needle on either end of the inserted suture, crisscross the needles within the body of the tendon and skin punctured just distal to the site of tendon rupture. The site of needle puncture was enlarged with a scalpel (Fig., Step 2). The suture was pulled completely through the stab wounds, the suture was snagged within the proximal portion of the ruptured tendon. With the lateral end of suture now threaded on a curved cutting needle, the suture was passed back through the last stab wound to exit at about the mid portion of the distal stump of the ruptured tendon on the lateral side (Fig. Step 3). The hole was enlarged with a scalpel before pulling the suture through. A hemostat was used to free the subcutaneous tissue from the underlying tendon sheath (Fig., Step 4). A straight needle used to pass the lateral end of suture through the body of the distal stump of the tendon, the puncture wound in the skin was enlarged as before (Fig., Steps 5 and 6). A curved cutting needle was used to pass the suture from the distal most stab wound on the medial side, exiting at middle stab wound on proximal part of medial side of the ruptured tendon (Fig., Step 7). With the ankle maintained in equines position, tension to the suture was applied in a crisscross manner which brought the tendon ends brought together. The sutures were tied in this position and with a small hemostat, the knot was buried in depth of the wound (Fig., Steps 8 and 9). The skin was sutured. A sterile dressing to the stab wounds was applied.



Steps of surgery



In this study a modification was done over conventional method of percutaneous repair of acute ruptured Tendo Achilles. After percutaneous repair of ruptured Tendo Achilles with non-absorbable suture, we passed 22 gauge stainless steel wire

through the substance of Tendo Achilles proximally and through the calcaneum distally in neutral position of ankle joint and tied the wire at the site where knot of non-absorbable suture was tied before.





Patient in subsequent follow up at 2 months showing healing of Tendo Achillies with good functional recovery

Post-operative care

- Postoperatively above knee Plaster of Paris slab was applied in full planter flexion at ankle joint and ninety degree flexion at knee joint.
- Antibiotic prophylaxis against infection (cefoparazone – sulbactam for 5 days) was given to all patient,
- Appropriate analgesia was given according to the degree of the pain.
- Stitches were removed on post-operative day 12 and patients were discharged on above knee slab in 30 degree planter flexion at ankle joint and ninety degree flexion at knee joint with written advice to come for follow up after 3 weeks.
- At 3 weeks below knee slab was applied in neutral position at ankle joint, At 6 weeks the slab was removed and walking orthosis given to the patient. The patient was advised partial weight bearing and physiotherapy (heel lift exercise).
- At 9 weeks the walking orthosis was removed and patient was advised to gradually increase weight bearing.

Discussion

Achilles tendon rupture has been related to a relatively hypovascular area of the tendon, 2 to 6 cm above the tendon insertion into the calcaneus. The major blood supply of the tendon is through its mesotendon, with the richest supply through the anterior mesentery. With increasing age, this anterior mesenteric supply becomes reduced. Age-dependent changes in collagen cross-linking result in increased stiffness and loss of viscoelasticity, predisposing to injury. Repetitive micro trauma to this area may make it impossible for the reparative process to keep pace, and a degenerative attrition is

responsible for many Achilles tendon ruptures.

The tendon of one athlete is able to withstand greater stress than that of another due to a various factors, including long-term active and passive tendon tension, which results in more efficient collagen cross-linking, producing better viscoelastic properties and tenocyte viability related to vascular nutrients, genetic factors and hormonal environment, including growth factors, which have been shown to be important in determining scar characteristics.

Another cause of Achilles tendon rupture is the failure of inhibiting mechanisms at the musculotendinous unit as a result of fatigue, with resultant eccentric overload. The cause of Achilles tendon rupture probably is a combination of a relatively hypovascular area and repetitive microtrauma that causes an inflammatory reparative process that is unable to keep up with the stresses because of decreased vascularity. A mechanical overload completes the rupture.

The decision to treat acute tendo achilles rupture conservatively or operatively is somewhat controversial.

Indications of conservative treatment are:

1. A gap (between the ruptured end of tendo achilles) of less than 5 mm with maximum planter flexion
2. A gap of less than 10 mm with foot in neutral position.
3. More than 75% tendon apposition with foot in 20 degree planter flexion.

The rate of rerupture was higher with conservative treatment as compare to operative treatment. Of many studies conducted in this regard, 3 landmark studies WILLITIS K *et al*^[6], WONG J *et al*^[5] AND KOCHER *et al*^[7]. showed that rerupture rate was significantly lower with operative (open surgical) treatment as compare to conservative treatment but to be associated with higher complication rate related to surgery like skin necrosis, adhesion, infection etc.

Of the many studies conducted to compare the outcome and complication rate of percutaneous versus open surgical repair of ruptured tendo achilles, 3 landmark studies CARMONT MR *et al* [8], CRETNIK A *et al* [9], LIM J *et al* [4], showed comparable outcome and less complication rate in comparison to open repair.

In the present scenario most common cause of tendo achilles rupture is sports injury. It usually occurs in 30 to 40 years of age group. The goals of management of Achilles tendon ruptures are to minimize the morbidity of the injury, optimize return to full function, and prevent complications.

Percutaneous repair with modification included in this study of acute rupture of tendo achilles is a excellent method to achieve the outcomes of open surgical repair with less complication including less re rupture rate.

Advantage of percutaneous repair

1. Less time taking procedure.
2. Can be done in local anaesthesia as a day care surgery.
3. Less amount of blood loss.
4. Tourniquet is not required.
5. Less complications.
6. Early rehabilitation can be started.
7. Cheaper and more cosmetic.

Results

The mean age in year for males was 36.14±9.33years (27 to 46 year).The mean age in year for females was 38±7.71 years (30 to 46 years). Over all mean age in years was 37.07±8.52 years (29 to 46 year). Out of 50 patients, 32(64%) patients were male and 18(36%) patients were females. In this study the most

common mode of injury was sports injury. Out of 50 patients 35 (70%) patients sustained Tendo Achilles rupture due to sport activity. Remaining 15 patients sustained Tendo Achilles rupture due to age related (senile) and corticosteroid injections. In present study 30 (60%) out of 50 patients withTendo Achilles rupture presented within 7 days of injury. Remaining 20 patients (40%) presented at variable interval after 7 days but before 6 weeks of injury.

Patients treated by percutaneous method of repair were hospitalized for an average period of 7 days ranging from 5 to 9 days.

In present study cases were followed and evaluated at 3 weeks, 6 weeks, 12 weeks, 6 months and 1 year. The results were evaluated clinically and functionally by Leppilahti scoring method.

Leppilahti scoring done at 3 weeks, 6 weeks, 12 weeks 6 months and 1 year follow up. Lippelahti scores are shown in the table.

Table No. 1

Results	Percutaneous repair
Excellent	46(92%)
GOOD	3(6%)
FAIR	1(2%)

Complications

Four (8%) out of fifty patient developed complications in form of superficial infection and sural nerve injury in percutaneous repair of acute rupture of tendo Achilles. Due to less complication rate associated with percutaneous method of repair of acute Tendo Achilles rupture early post-operative rehabilitation physiotherapy was possible.

Table No. 2

Complications	Percutaneous method
1. Infection:- Superficial Deep	2 Nil
2. Rerupture	Nil
3. Skin maceration and tendon exposed	Nil
4. Sural nerve injury	2
5. Adhesion	Nil

Conclusion

The results of our study shows that rate of complications were significantly low with percutaneous repair. We observed good range of motion, calf muscle strength (subjective according to lippelahti score), and single heel raising test. Surgical stress to patients and surgical complications were less with shorter period of recovery with percutaneous repair of acute rupture of Tendo Achilles. Mean time to return to work was 4 months. Healing of ruptured Tendo Achilles was faster in percutaneous repair due to lesser complications and physiotherapy could be implemented earliest. Cosmetic appearance is superior in percutaneous treatment.

Percutaneous repair with modification included in this study provides excellent function, with better cosmetic appearance, lower rate of wound complications including less rerupture rate and is also cost effective.

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