

A REVIEW ARTICLE ON STUDY OF RESULTS OF SURGICAL REPAIR OF TENDOACHILLES RUPTURE

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ABSTRACT

The Achilles tendon is the largest and most powerful tendon and is the 3rd most frequently ruptured tendon. The spectrum of Achilles tendon ruptures includes both acute and chronic injuries. Treatment options includes both operative repair with post operative immobilization, operative repair with accelerated rehabilitation using early weight bearing as well as non-operative treatment. In this article we review the clinical outcome and incidence of post-operative complications after open end to end repair of acute Achilles tendon rupture with Modified Kessler technique. A prospective study of forty cases of surgically managed acute complete Tendo-achilles ruptures treated in our institute from April 2012 to March 2015. The diagnosis of acute rupture was confirmed clinically and ultrasonographically. All the cases were managed by using standard suturing technique of Modified Kessler stitches. All the patients were followed periodically at 6 weeks, 12 weeks, 6 months and then annually, with standard post-operative care and rehabilitation protocols. All the patients were assessed based on the AOFAS (American orthopaedic foot and ankle society scoring system). We had 86% excellent, 10% good and 4% of poor results with minimal post-operative complications. Open repair of acute Achilles tendon rupture remains the gold standard of operative treatment, especially for athletic individuals, because of the low rate of reruptures; high rates of return to sports and decreased complication rate with Modified Kessler technique.

INTRODUCTION

The Achilles tendon is the largest and most powerful tendon in the ankle formed from the fibres of two muscle units: the gastrocnemius & soleus muscle. Achilles tendon rupture was first reported in 1575 [1]. This is the third most frequently ruptured tendon, and is familiar to trauma aspect of orthopedic surgery with a reported incidence of 18 per 100,000 people. These injuries typically occur in males between the ages of 30 & 50yrs and account for approximately 40% of all operative tendon repairs.

The mechanism of injury include sudden forced plantar flexion (equinus) of the foot against resistance (during sporting activity), unexpected dorsiflexion of the foot (e.g during a fall down stairs), violent dorsiflexion of a plantar flexed foot (fall from a ladder), direct cut or lacerated injuries over the tendon. Common injury or closet injury [2,3]. The underlying pathological mechanisms include degeneration of the tendon, adverse influence of steroids [4], antibiotics, exercise induced hyperthermia and mechanical abnormalities of the foot.

Treatment options include operative repair with postoperative immobilization, operative repair with accelerated rehabilitation using early weight bearing as well as non-operative treatment. There have been many studies designed comparing one technique to another as well as some discussion as to whether repair techniques are

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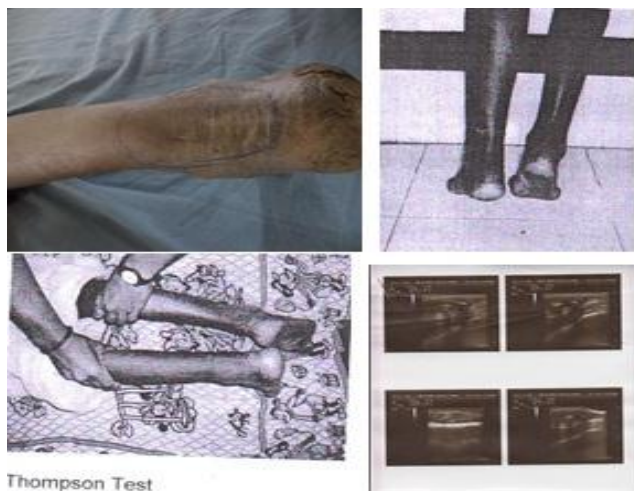


strong enough to withstand early range of motion in the postoperative days following the procedure. The present study aimed to find the simplest, strongest and most efficient suture method to repair tendon.

MATERIALS & METHODS

A prospective study of 40 cases of surgically managed Tendo-Achilles ruptures treated in Mamata General Hospital, Khammam from April 2012 to March 2015. In our series of 40 cases, 34 patients were male, 6 patients were female, open injuries in 18 patients and 22 patients had closed injuries. Out of 18 open injuries 9 cases had closet injury, 6 had road traffic accidents and 3 cut injuries. Out of the 22 closed injuries 6 were spontaneous, 8 from sports activity, 5 closet and 3 cut injury.

The average age of patients with open injuries was 27 years and closed was 45 years. The mechanism of injury includes Sudden unexpected dorsiflexion of ankle in 16 cases, violent dorsiflexion of a plantar flexed foot in 8 cases, pushing of the weight bearing forefoot in 4 cases, cut injury in 6 cases, commode injuries in 2 cases, mechanism unknown in 4 cases. All the cases were diagnosed clinically and confirmed ultrasonographically. 14 cases of open injuries were taken within 24 hours to OT and after antibiotic prophylaxis and thorough debridement. 4 cases were operated after 24hours. All the cases were operated by using Modified Kessler stitches.



SURGICAL TREATMENT

Surgical treatment included a linear posteromedial incision that was extended directly to the level of the paratenon. Care was taken to avoid damage to the soft-tissue envelope. Approximate the ruptured ends of the tendon with No 1 Ethibond suture material using by modified Kessler stitch pattern with the foot placed in plantar flexion to oppose the tear ends. The contralateral extremity was used as a guide for the restoration of proper tendon length. Additional absorbable sutures were placed at the tear site to re-appose any remaining tendon ends as

needed. The paratenon was carefully repaired with non-absorbable sutures. Interrupted Prolene sutures (Ethicon, Somerville, New Jersey) were placed in the skin layer to ensure meticulous closure.



POST-OPERATIVE MANAGEMENT

Postoperatively, above knee pop cast was given for four weeks with ankle in equinus and knee in 30 degree flexion. Sutures were removed between 12 to 14days. After four weeks it was converted to below knee pop cast with ankle in minimal equinus for two weeks. Followed by below knee walking pop with weight bearing and ankle in neutral position for two more weeks. The period of immobilization varied with the merit of the case. None of the patients were immobilized for more than three months. The patients were asked to do active range of motion exercises and strengthening exercises. All the patients were followed up at regular intervals of 4weeks, 8weeks, 12 weeks, 6months and till the end of 1 year.



OUTCOME ANALYSIS

Clinical outcome after operative achilles tendon repair was assessed using the Ankle-Hindfoot scale [5-10] developed by the American orthopaedic foot and ankle society. This consists of pain (40 points), function (50points) and alignment (10 points).

1. A patient with a good result has mild occasional pain,

limitation of recreational but not daily activities, no foot wear restrictions and is satisfied with minor reservations.

2. A patient with a fair result has mild to moderate pain, limitation of recreational and daily activities, moderate footwear restrictions and is satisfied, but with major reservations.

3. A patient with poor result has moderate to severe pain, limitation of recreational and daily activities, severe footwear restrictions and is dissatisfied or had an Achilles tendon re-rupture.

DISCUSSION

Rupture of the Achilles tendon is a common injury among high-level athletes, recreational athletes, and

sedentary individuals, with an estimated incidence of approximately 18 per 100,000 individuals [9,10].

In our study 80% are males and Male : Female ratio is 4:1. The range of age is from 18 to 60yrs. Average age in open injuries is 27 years and in closed injuries 45 years [11]. In our study closed mode injuries were the commonest injury among acute injuries of these 70% injuries were sports related injuries.

Tendo-achilis rupture was confirmed clinically and radiologically, then treated with our technique of end to end suturing by application of Modified Kessler stitches.

Late presentation of an open injury in our series was the cause for poor result which influenced the prognosis according to AOFASS score.

Table 1. According to AOFASS score 34 cases scored more than 90, 4 cases scored between 80 to 90 and 2 cases scored less than 80.

S.No	Score acc to hindfoot ankle score	results	No of cases	percentage
1	>90	Good	34	86%
2	80-90	Fair	4	10%
3	<80	poor	2	4%

An increasingly athletic patient population and improvements in surgical technique have favoured operative intervention in recent clinical studies. Operative repair has been shown to restore tendon length, lower the re-rupture rate and result in better functional outcomes [10]. In a prospective randomized evaluation of 111 patients with acute Achilles tendon rupture comparing operative and non-operative treatment methods, Cetti et al [3] reported that the patients treated operatively had a significantly higher rate of resuming athletic activities at their pre-injury level, a lesser degree of calf atrophy, better ankle range of motion, and fewer complaints 1 year after the tendon rupture. Lo et al reviewed the literature on the treatment of Achilles tendon rupture and identified 742 operative cases and 248 cases managed conservatively.

The overall rate of re-rupture was 3% for those managed operatively and 12% for those managed non-operatively. While the rate of re-rupture in the operative group was lower, the rate of minor and moderate complications associated with operative treatment was up to twenty times greater in some reports. A similar literature review by Cetti et al showed; The mean rate of tendon re-rupture treated operatively was 1.4% (range, 0-- 7.1%) compared to a mean rate of 13.4% (range 3.950%) amongst cases managed non-operatively. Similar findings were also shown by Wong et al [15]. In our study surgical management of acute Achilles tendon rupture shows (table 1) similar results as of Cetti et al and Inglis et al study.

Table 2. In our study infection seen in 3cases, heel ulcer in 1 case, calf atrophy in 3 cases, sural nerve involvement in 2 cases.

complications	No of cases
Superficial infections	02
Deep infections	01
Heel ulcer	01
Calf atrophy	03
Hypothesia(sural nerve distribution)	02
Deep vein thrombosis	00
Re-rupture	00

Beskin et al [9] in an evaluation of the surgical results of 42 patients managed with various operative techniques, demonstrated a 7% incidence of wound complications. The incidence of post-operative complications in the meta-analyses of Khan et al and Wong et al., were higher with pooled rates of 34.1% and 14.6%, respectively [17].

In our series, complication rate was 7.5% wound

infection 5% cases had Hypothesia and 7.5% cases had calf atrophy (Table 2). Which falls in the range of these reported studies. The majority of complications in our series were related to the surgical wound which also falls within the ranges of other clinical series. There are various studies performed that evaluate which types of sutures are the strongest to be used for repair and which incisional approaches, either mini-incision versus open



would result in lesser degree of complication, and which suture technique methods results in the best tension to load with highest load to failure rates. There are many suture techniques ranging from the Krackow, Bunnel, Kessler, triple bundle that are repeatedly studied.

We compared our results to both Watson et al and McCoy and Haddad and found that our Modified Kessler was stronger than Watson's single Kessler, McCoy and Haddad [16] double Kessler weave. McCoy and Haddad simulated their double Krackow to match Watson's simulated Krackow and found that theirs was 1.35 times stronger. Our study employed the single suture 5-locking loops to equate with Watson's double strand 5 locked loops in proximal tendon. We however, employed a total of 5 locked loops in both proximal and distal stumps. McCoy stated they were emulating Watson's double Krackow but did not specify the number of locking loops in the proximal and distal ends. Watson et al used No. 1 Ethibond suture and McCoy used No. 2 polyester Mersilene; whereas, we used No.1 Ethibond in our study.

This supports our findings that the number of locking loops within the tendon may not be the

contributing factor for better load to failure but the number of square knots at the level of the repair.

CONCLUSION

Our study demonstrated that surgical repair of acute Achilles-tendon rupture by Modified Kessler's method provide long term functional outcomes with consistent good to excellent results as demonstrated by AOFAS ankle hindfoot scores. However this high clinical success rate was associated with relatively high postoperative complications. With careful attention to surgical wound and patient adherence to post-operative rehabilitation protocols, operative repair of acute Achilles-tendon rupture is reliable treatment method for active patients.

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CONFLICT OF INTEREST:

The authors declare that they have no conflict of interest.

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