



## Surgery

## FUNCTIONAL OUTCOMES AFTER TENDOACHILLES REPAIR – OUR EXPERIENCE IN ATERTIERY HEALTH CARE SYSTEM OF EASTERN INDIA

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**ABSTRACT** Achilles tendon rupture is one of most common emergencies encountered by plastic & reconstructive surgeons. It is a vital structure essential for many activities including running & sports activity. Hence a good functional outcome is of paramount importance following repair of the same. Though almost always repaired surgically, it has various approaches including open, semi-open, endoscopic. This study has focussed on assessing functional outcome following open repair of achilles tendon using Achilles tendon total rupture score (ATRS) as a tool and also identifying factors responsible for both favourable and unfavourable outcome.

**KEYWORDS :** Achilles Tendon rupture, open repair, ATRS

**INTRODUCTION :**

Achilles tendon ruptures are most frequently seen amongst men aged 30 to 50 years (1). Though trauma is the most common cause of injury, spontaneous ruptures due to non-specific inflammation and connective tissue disorder are not uncommon (2). One of the most common etiologies of tendon injury which has been seen during this study is the toilet pan injury (3). Surgery is the preferred treatment modality particularly in young individuals leading an active lifestyle (4). Surgical approaches include open, per-cutaneous and semi-open minimal invasive surgery. High rates of adhesions, local infection and wound problems have been reported with open surgery. Although percutaneous surgery technique has lesser wound complications, the incidence of tendon re-rupture and sural nerve trapping have been reported (5,6,7). Semi-open minimal invasive surgical technique enables sufficient exposure for repair without impairing tendon circulation. While sural nerve damage is reduced, complications are not entirely eliminated.

In this study, the open method for surgical repair was incorporated in each patient. This is a prospective observational study, done to evaluate the effects of the open repair technique in Achilles tendon rupture patients under various settings and the assessment of functional outcome using Achilles Tendon Total Rupture Score (ATRS) during the first year with restoration of ankle function. Though there are other scoring modalities available to assess functional outcome, recent studies have shown that the ATRS scoring system is the most effective and objective both for the patient and the investigator (8). The comparison with literature has been attempted with each parameter and discussed in detail in the results and discussion section.

**MATERIAL & METHODS :**

The present work was conducted in the Dept. of Plastic & Reconstructive Surgery of multiple tertiary care hospitals of Kolkata. Study was conducted from 1<sup>st</sup> January 2016 to 31<sup>st</sup> December 2017, a 2 year period. It is a prospective observational study with a sample size of 34. The study was carried out on cases chosen by simple random sampling from all the patients attending in OPD or Emergency with TA rupture. Each patient was subjected to detailed history and clinical examination, supplemented by investigative modalities, surgical management was done according to the accepted standard of care, and findings were noted in detail. Functional outcome was measured at 3, 6 & 12 months using ATRS score

The ATRS is a patient-reported, injury-specific instrument developed in 2007 to specifically evaluate outcome after treatment in patients with ATR (24). This questionnaire is a self-administered instrument, filled out by the patient and scored by the clinician. It consists of ten items evaluating aspects of symptoms and function. Each item has scores ranging between 0 and 10 on a Likert scale. The instrument therefore has a maximum score of 100, which corresponds to no symptoms and full function.

Thanks to its injury-specific nature the ATRS has demonstrated multiple facets of validity for use in the specific ATR patient population (25,28).

The reliability, validity and responsiveness of the ATRS have been evaluated and confirmed outside the developing center and for languages other than that of the original version (26,27).

At present, the best available evidence suggests that the ATRS is the most appropriate outcome measure for evaluating the management of acute ATR

**Table 1**

The Achilles Tendon Total Rupture Score (ATRS).

All questions refer to your limitations/difficulties related to your injured Achilles tendon.											
<i>Mark with an X the number which matches your level of limitation!</i>											
1. Are you limited due to decreased strength in the calf Achilles tendon foot?	0	1	2	3	4	5	6	7	8	9	10
2. Are you limited due to fatigue in the calf Achilles tendon foot?	0	1	2	3	4	5	6	7	8	9	10
3. Are you limited due to stiffness in the calf Achilles tendon foot?	0	1	2	3	4	5	6	7	8	9	10
4. Are you limited due to pain in the calf Achilles tendon foot?	0	1	2	3	4	5	6	7	8	9	10
5. Are you limited during activities of daily living?	0	1	2	3	4	5	6	7	8	9	10
All questions refer to your limitations/difficulties related to your injured Achilles tendon											
<i>Mark with an X the number which matches your level of limitation!</i>											
6. Are you limited when walking on uneven surfaces?	0	1	2	3	4	5	6	7	8	9	10
7. Are you limited when walking quickly up the stairs or up a hill?	0	1	2	3	4	5	6	7	8	9	10
8. Are you limited during activities that include running?	0	1	2	3	4	5	6	7	8	9	10
9. Are you limited during activities that include jumping?	0	1	2	3	4	5	6	7	8	9	10
10. Are you limited in performing hard physical labor?	0	1	2	3	4	5	6	7	8	9	10

Data was analysed by MedCalc version 11.6 [Mariakerke, Belgium: MedCalc Software 2011], GraphPad Prism version 5 [San Diego, California: GraphPad Software Inc., 2007]. The tests used were ANOVA, pearson's correlation coefficient and Pearson's correlation coefficient.

**RESULT :**

In our study, a total of 34 cases were studied in a prospective manner. Each case was followed up for at least 12 months in the post operative period. No patient was lost to follow up.

Among 34 patients, majority (29%) were in 31-40 year age group, followed by 21-30 year (26%), 41-50 year (21%), 10-20 year (15%) & 50 year. (9%). Majority were male (74%).

Majority of the patients were operated within 0-4 days (85%) of injury, 12% were operated within 5-10 days of injury & 3% within 11-15 days of injury.

Most of the patients (65%) were operated with 4 core technique & rest (35%) were operated with 6 core technique.

Most common mechanism of injury was due to inadvertent fall in the toilet pan leading to achilles tendon rupture( 47%). The second commonest mechanism was road traffic accident along with machine injury which accounted for 35% of the total cases. The third cause was spontaneous rupture which were seen in 12% of the population (it included autoimmune disease patients along with sports related

injury). The last and least common mechanism of Injury seen in this study was physical assault (6%).

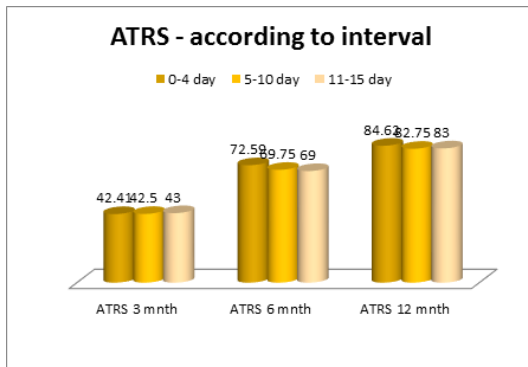
3 out of 34 patients had re-rupture of tendinous repair (about 9%)  
4 out of 34 patients had to be re-operated which accounted for 11.75% of the study population.

Achilles tendon rupture score (ATRS) was measured for each patient at 3, 6 and 12 months.

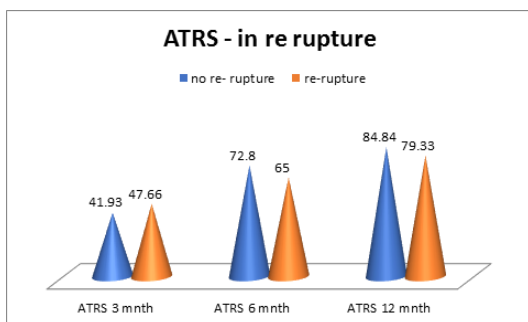
The mean ATRS at 3 month was 42.44. At 6 months it increased to 72.12. It further increased to 84.35 at the end of 12 months.

The median ATRS at 3 months was 42 which increased to 71 at 6 months and to 84.5 at 12 months respectively.

#### CHART 1



#### CHART 2



#### DISCUSSION :

In the present study , for 2 years duration we studied a total of 34 patients with tendoachilles injury. Our aim was to assess the functional outcome after repair of the tendon at 3, 6 and 12 months postoperatively. We also studied the effect of factors like demography, time between injury to repair, wound status and re-rupture rates in our study and their effect on the functional outcome. The patients ranged from 10 to 55 years of age. Most of the patients were in the age group of 30 to 40 years. It is consistent with the literature where the most commonly affected age group is seen to be 29 to 40 years (1). The male: female ratio in our study was 3:1. The known ratio as per literature ranges from 1.67:1 to 6.90:1. The mean male female ratio seen in various studies is 3:1. The interval between injury and surgery seen in this study ranged from 1-15 days. Most patients presented within 5 days of injury and the maximum presentation was seen within 2 days of sustaining injury. There is no study till date which has calculated the most common time of presentation to health care facility, but there have been studies which claim that shorter the duration of seeking treatment after tendon rupture the better and earlier are the functional improvements. Surgical approaches include open, per-cutaneous and semi-open minimal invasive surgery. High rates of adhesions, local infection and wound problems have been reported with open surgery. Although percutaneous surgery technique has lesser wound complications, the incidence of tendon re-rupture and sural nerve trapping have been reported. Semi-open minimal invasive surgical technique enables sufficient exposure for repair without impairing tendon circulation. While sural nerve damage is reduced, complications are not entirely eliminated. In this study, the open method for surgical repair was incorporated in each patient. In repair 4 core and 6 core sutures were used. 19 out of 34 repairs were done by 4

core suture technique and the remaining 15 repairs were done by 6 core suturing technique. There was no difference in outcome in terms of function when evaluated at the said months. This is again consistent with the literature.(29) There were multiple causes of tendon rupture in this study. The most common of them was accidental fall in the toilet pan leading to acute tendon rupture, accounting to 47% of the total injuries (3). Other causes in decreasing order of occurrence were road traffic accidents and machine injury grouped together (35%), spontaneous rupture due to autoimmune diseases and sports injury with an incidence of 12% and physical assault which was the least common amongst all others and was seen in 6% of the total cases. The most common cause of tendon rupture in the western countries as seen in various studies has been due to injury sustained during sports activity. A study was carried out by S.S Chatterjee et al in which toilet pan injuries as a cause of tendoachilles injury were evaluated for the first time in literature. 3 patients out of 34 had a re-rupture of tendon after initial repair.(30,31,32,33) . Among them, one had a spontaneous rupture with h/o steroid ingestion for 15 yrs. Another patient had an incident of fall at home following tendon repair. All of them needed flap coverage ( 2 cases peroneal artery perforator flap & one reverse sural flap) following debridement with tendon reconstruction ( 1 delayed primary repair, 1 flip flap method, 1 repair with fascia lata graft). All of them had low ATRS score initially though they achieved fair score at 12 month. Another patient had wound infection & abscess formation which required debridement with secondary suturing of wound. His ATRS score was close to the mean scores. The mean ATRS score at 3, 6 and 12 months was 42.44, 72.11 and 84.35. There was statistically significant improvement in functional outcome (p < 0.001) with increasing time. This was carried out by one way ANOVA test. Also when there was comparison between the two genders for difference in functional outcome, statistically significant difference in ATRS was not seen. It was evaluated by one way ANOVA test. The groups when evaluated for functional outcome, had no significant difference. The interval of injury to surgery was seen to be an important factor affecting the final functional outcome which was found to be statistically significant. The software used for analysis was GraphPad Prism version 7 [San Diego, California: GraphPad Software Inc., 2007]. The main finding of the present investigation is that patients reported marked limitation of function by 3 months, little limitation of function by 6 months, and a near excellent/good outcome at 12 months following surgery. The greatest improvement in function occurred between 3 and 6 months following surgery. The success of this treatment method is similar in younger and older patients, and early surgery plays an important role in improved functional outcome.

#### CONCLUSION :

Following repair of the Achilles tendon, patients report a marked improvement in function between 3 and 6 months following surgery, with continuing but reduced improvement up to 1 year following surgery. The majority of patients reported excellent or good scores beyond 6 months following repair and an ATRS results of 84.35 at 1 year. However cent percent functional improvement was not seen in any patient. Early surgery (0-4 days) did result in improved early and late outcome as compared to late surgery. The presence of a complication and re-rupture also affected the long term outcome. The surgical management of tendoachilles injury is the well accepted gold standard of treatment and that the most common cause of tendon rupture in eastern India is injury sustained due to fall in lavatory pan. The follow up period of 1 year duration, however seems less to assess the gain in functional outcome as few patients who followed up for nearly 2 year duration had further improvement in functional outcomes and more compliance to physiotherapy and rehabilitation protocols.

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