

Analysis of Abraham and Pankovich Technique as A Treatment option of spontaneous Tendo-Achilles Rupture

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ABSTRACT

Background: The Achilles tendon is the largest and strongest tendon in human body and is composed of the Gastrocnemius and the Soleus muscle to create a musculotendinous complex (Triceps Surae) that crosses the ankle and subtalar joint. It is then inserting primarily on the central middle portion of the posterior calcaneus as well as providing fibers that extend around the heel to blend in with the planter fascia. Achilles tendon is the most injured tendon of athletes in the lower extremities and has been noted to be the most common tendon to rupture spontaneously. The prevalence of Achilles tendinopathy is considerable in a variety of different sports, especially in runners and various ball sports. A ruptured Achilles tendon poses a difficult problem for treatment due to proximal retraction of the tendon. Surgical repair is the current treatment choice because of poor prognosis after conservative management. Many techniques are available for the surgical repair such as end-to-end suture, end-to-end suture with augmentation. Surgeons repair these injuries by different surgical technique in different centers of the country. Abraham and Pankovich techniques for spontaneous rupture are applied in Institute of Applied Health Sciences (IAHS) Hospital Chattogram. This study was performed to evaluate the result of Abraham and Pankovich techniques for degenerative rupture of TA.

Materials and methods: This was a prospective study. Twenty two patients with a degenerative tendo achilles tear were repaired using Abraham and Pankovich technique between May 2021 and January 2023 in IAHS Hospital. 4 patients were lost to follow up. Ankle radiographs were obtained to rule out calcaneal fractures; patients with such fractures were excluded from the study. All patients underwent operative treatment after getting written informed consent. Functional outcome were assessed after 6 months of surgery.

Results: Total 18 patients of degenerative rupture of TA were included for the study, 72% of them were male. Middle 3rd rupture were most common. All underwent surgery after proper evaluation and followed upto 6 months. Functional outcome with Activity Daily Living (ADL) were evaluated after that, 13 patient (72%) having excellent outcome with painless walking without any support. One of the patient had SSI and one with skin slough out, both were treated in IAHS center accordingly.

Conclusion: Results of reconstruction of Achilles tendon ruptures using Abraham and Pankovich techniques show a strong and stable repair that allows early weight bearing and ambulation with favorable clinical results in majority of patients.

Key words: Achilles tendon; Fracture; Surgical repair; Hooker scale.

Introduction

The Achilles tendon is one of the most commonly

ruptured tendons in the body, typically affecting patients between 35 to 60 years old.^{1,3} Achilles tendon ruptures usually are more common in men than in women and occur mostly during sports activities.⁴ Patients typically experience sudden sharp pain and/or a feeling of shot pain behind the leg at injury.⁴ Although clinical examination is sufficient to diagnose Achilles tendon rupture after injury, approximately 10-25% of complete acute ruptures are missed initially and diagnosed later.^{2,5,6} The optimal treatment of chronic Achilles tendon rupture is surgical repair and various techniques have been described.^{5,6,7} It is difficult to treat a chronically ruptured Achilles tendon because there usually is a gap between the ends of the tendon, scarring, retraction of calf muscles and loss of contractility of the triceps surae.^{3,5,8} These problems make the treatment of chronic Achilles tendon ruptures different from that of acute ruptures.^{5,8,9} Reconstruction

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of degenerated ruptures of the tendoachilles is a challenge. Ruptured tendons and the remaining tendon ends are abnormal. A number of methods have been described in literature reconstruct the tendoachilles, but with variable results.¹⁰ The consequences of wound complications after Achilles tendon surgery are considerable and challenging.⁵ Some authors have introduced percutaneous or minimally invasive repair to decrease the incidence of these complications. However, these methods are technically demanding, dependent on special instruments and associated with a higher risk of sural nerve injury.⁶ In addition, the bulky sutures used in other open techniques may irritate the skin over the tendon and result in the patient's discomfort. Operative techniques to repair chronic Achilles ruptures include primary repair and augmentation with fascia advancement, tendon transfer, free tissue transfer, synthetic grafts or allografts.^{10,11}

Clinical and functional outcomes of spontaneous Achilles tendon rupture reconstruction via Abraham and Pankovich technique was investigated through this study.

Materials and methods

This was a prospective study. Total 18 patients (11 males, 7 females, 12 right, 6 left, mean age, 35.2 years, range, 22-42 years) who underwent Tendo achilles reconstruction by Abraham and Pankovich technique for chronic Achilles tendon rupture repair between 2021 and 2023 were included in this study. All patients were diagnosed by physical examination and Magnetic Resonance Imaging (MRI). The chief complaints included significant disability and weakness in performing activities of daily living and limping. On physical examination, there was a gap at the site of the ruptured tendon and the calf squeeze test was positive in all patients. None of them could stand on tip toe.

After surgery all the patients kept in long leg cast with planter flexed position for 4 weeks. Patient was followed up for 6 months. Final outcome evaluated by Hooker scale.

Results

Mean age of patient 35.2 years, 11 of them (61.11%) were male, right side involvement was 66%. The mean interval between injury and surgical reconstruction was 42 days (30 - 60 days) and the mean ruptured gap was 4 cm (3 - 6 cm). The mean calf atrophy was 1.14 cm (0 - 2.5 cm) at the end of follow-up. The mean time for patients to return to daily activity was 3.5 months (2 - 6 months). Post operative infection developed in 2 (0.11%) patients. According to Hooker scale, 72% patient had excellent outcome after surgery.

Table I Demographic variables (n=18)

Attributes	Findings	Remarks
Age	22-42 years	Mean = 35.2 year
Sex	Male	11(61.11%)
	Female	7 (38.89%)
Site of involvement	Right	12(66.66%)
	Left	6(33.34%)

Age of the patients ranged from 22-42 years, 11(61.11%) were male and most occurrences in right side (66.67%)

Table II Hookers assessment scale¹²

Excellent	Satisfactory	Poor
None of patients had symptoms	Patients were free from symptoms but there was weakness of the calf detected or excessive passive dorsiflexion of the ankle.	In addition to the findings of satisfactory, the patients experienced symptoms either of weakness of the ankle or foot or of a limp or pain

Table III Clinical outcome of the patients (n=18)

No of patient	Return to activity (Month)	Tip toe stand	Calf atrophy	Functional outcome	Complication
1	2	Normal	0	Excellent	No
2	2	Normal	0	Excellent	No
3	2	Normal	2	Excellent	No
4	4	Normal	2	Excellent	No
5	6	Normal	2.5	Satisfactory	Yes
6	4	Normal	1	Excellent	No
7	4	Normal	0	Excellent	No
8	3	Normal	0	Excellent	No
9	3	Normal	1	Excellent	No
10	6	Normal	2	Satisfactory	Yes
11	3.5	Normal	2	Satisfactory	No
12	3	Normal	2	Excellent	No
13	4	Normal	1	Satisfactory	No
14	3	Normal	1	Satisfactory	No
15	3.5	Normal	2	Excellent	No
16	3	Normal	0	Excellent	No
17	4	Normal	1	Excellent	No
18	3	Normal	1	Excellent	No

From the Table, it was observed that 2 patients had developed complications. Their return to activity had taken longer time (6 months) calf atrophy were 2.5 and 2. Others had no complication. Functional outcome was excellent in 13(72.22%) cases.



Figure 1 Preoperative thomson test

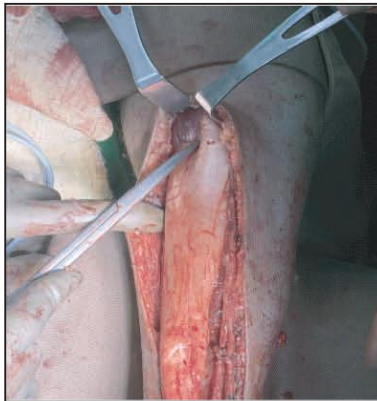


Figure 2 Finding the musculo tendinous junction during surgery



Figure 3 Rupture end of Tendoachilles



Figure 4 V-Y plasty of musculo tendinous junction



Figure 5 Repaired ruptured end of TA



Figure 6 Post repaired view of Tendo-achilles



Figure 7 Postoperative dorsiflexion of ankle

Discussion

Yang et al. had shown surgery of rupture Tendoachilles 4-6 weeks after incidences. Similarly this study reflected mean 42 days after the incidence.¹³ In our study, gap of the rupture end was 3-6 cm where as yang et al. observed gap of 6-9 cm at the rupture end. Ahmed et al. mentioned mean gap of 6 cm at the rupture end in their study.¹⁴ This study has only 6

month post operative follow up whereas yang et al. did 32.8 months of follow up. The study narrated mean calf atrophy was 1.2 cm (Range, 0 - 2.5 cm) at the end of follow-up and mean time for patients to return to daily activity was 3.2 months (Range, 2 - 5 months) where as this study shows mean calf atrophy 1.14 cm and time taken to return to daily activity was 3.5 months.¹³ According to hooker assessment score, Firat et al illustrated 11 out of 13 patient had excellent outcome following surgery where as this study showed 72% excellent outcome. In this study, 2 postoperative infection were observed. Most of the other study didn't face any post operative infection.

In this research, at 6 month follow-up degenerative rupture of Tendo achillis with Abraham and Pankovich technique provided tendon healing and good clinical and functional outcomes. All of the patients had returned to their pre-injury daily activity level in around 3 months. There was no functional deficit and the results were satisfactory and excellent in all patients.

Limitation

This study was limited by the small patient population. Because chronic Achilles tendon rupture case is rare. In addition, evaluation the strength of the plantar flexion of the affected foot compared to the normal side was not done in this research.

Conclusion

In conclusion, based on the findings of the current study, it is recommend reconstruction of the spontaneous Achilles tendon ruptures via the Abraham and Pankovich technique. V-Y plasty can be used in most case of chronic TA rupture. It yields satisfactory functional result and low complication rate. The advantages of the procedure is that it's an easy and economic method without the need for expensive synthetic implants.

Disclosure

All the authors declared no competing in interests.

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