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Unilateral Closed Chronic Achilles Tendon Rupture Treated Surgically with High Strength Pull Out Suture Technique - A Case Study

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Abstract: ***Introduction: The Achilles tendon is a strong and essential structure that connects the calf muscles to the heel bone, allowing for movements such as walking, running, and jumping. Despite its strength, Achilles tendon ruptures (ATR) can occur, commonly observed in men between the ages of 40 to 50 years and can be caused by running, jumping, and other activities that involve explosive contractions. ATR can be managed through various modalities, including the high-strength pull-out suture technique, which is a newer method that has shown promising results in repairing Achilles tendon ruptures. Case Report: A 60-year-old man presented with pain and restricted movement in his left ankle, and MRI revealed a 33mm tear in the Achilles tendon insertion. He underwent surgical repair of the tendon using Krakow's suture technique and was assessed postoperatively using the AOFAS score. The patient's recovery was successful, and he reported improved pain and range of motion. Follow-up imaging confirmed a successful repair, and the patient was able to return to his normal daily activities without pain. Discussion: Conservative management is traditionally sufficient, but surgical intervention is preferred for long-standing cases. The high-strength pull-out suture technique is a low-cost, secure and stable repair method that can withstand high forces and distribute them across a wider area of the tendon. The technique is relatively simple and quick to perform, reducing the risk of complications and speeding up recovery. However, it can be challenging to place the torn end back to its insertion, and there is a risk of infection, which can be controlled with aggressive dressing and antibiotics. Conclusion: This minimally invasive and low cost procedure resulted in a favorable outcome for the patient, with improved pain and function in the affected ankle. Hence this new method might give equal benefits while being more simple and cost-effective than other modalities available.***

Keywords: Achillestendon, tendonopathy, endobutton, pull out suture, Thompson test, ankle surgery, foot and ankle.

1. Introduction

The Achilles tendon, also known as the calcaneal tendon, is a crucial structure in the human body that helps to facilitate movements such as walking, running, and jumping. This tendon connects the calf muscles to the heel bone and is one of the largest and strongest tendons in the body. [1] Despite its strength, Achilles tendon ruptures (ATR) can still occur, leading to significant impairments in mobility and quality of life. ATR is commonly observed in men between the ages of 40 to 50 years. The typical mechanisms of injury include running, jumping, and activities that involve eccentric loading and explosive contractions. Ageing can lead to a predisposition for the injury due to a decline in tendon function, including decreased blood flow and increased stiffness, which reduces the tendon's ability to withstand stress. There are two proposed processes for tendon degeneration and subsequent rupture: noninflammatory tendinosis and chronic tendinopathy. [2]

Sometimes, a tendon rupture can be a full tear, separating the calf muscle from the heel bone. However, there are also instances where a tendon rupture is classified as a unilateral closed chronic rupture, which means the tendon is partially torn and has developed over time. The effects of an Achilles tendon rupture can be severe and long-lasting, affecting a person's ability to perform daily activities and participate in athletic pursuits. In cases of chronic rupture, the healing process is often slow and less successful, leading to increased pain and decreased function. [3]

Achilles tendon rupture can be managed through different modalities, such as tendon grafting, which is a complex surgical procedure, or the use of suture anchors, which can be cost-prohibitive. To address this issue, a more economical alternative is to use high-strength suture material. In this case study, we will focus on the high-strength pull-out suture technique, a newer method that has shown promising results in repairing Achilles tendon ruptures. This case report will provide insight into the surgical experience, the healing process, and the outcomes of this patient who underwent treatment for a unilateral closed chronic Achilles tendon rupture.

2. Case Report

2.1 History

A 60-year-old male presented with pain and restricted movement in his left ankle following a fall four weeks prior. X-rays of the ankle were within normal limits, but an MRI revealed a 33mm tear in the insertion of the Achilles tendon.

2.2 Intervention

As an intervention, the patient underwent a surgical procedure to repair the Achilles tendon. The patient was placedin prone position under spinal anesthesia, and a para-medial incision was made. The torn end of the tendon was identified and debrided, then sutured with Krakow's suture technique using a high-strength, non-absorbable suture material. Canal was made using a 4mm Drill and the suture ends were pulled out through the canal out on the heel. After placing the foot in plantar flexion the suture ends were tensioned and anchored outside on heel with the help of simple raincoat button. The wound was then approximated

and closed. This approach represents a simple yet effective technique for Achilles tendon rupture repair. Postoperatively, the patient was assessed with the American Orthopaedic Foot and Ankle Society (AOFAS) score. The patient was advised to follow up regularly every four weeks, and the cast was gradually adjusted from plantar flexion to dorsiflexion on a regular interval and removed after three months post-operation. The patient was advised to bear weight gradually and the AOFAS score was again assessed two weeks after the cast removal. The AOFAS score pre-operation and post-operation were recorded and are presented in **Table 1**.

2.3 Outcome

The patient's postoperative recovery was uneventful, and follow-up imaging showed a successful repair of the Achilles tendon. The patient reported improved pain and range of motion in the affected ankle. At the final follow-up visit, the patient could ambulate without pain and had returned to his normal daily activities.

3. Discussion

Achilles tendon rupture in common in middle-aged males and can often result from explosive contractions, as sometimes seen during sports. [2] Traditionally, conservative management is sufficient to manage cases, but in long-standing cases (>6 months), surgical intervention is the preferred treatment for ATR. [4] However, there are a number of surgical techniques available (such as Peroneus Brevis Tendon Transfer and Ipsilateral Free Semitendinosus Tendon Graft), each with its advantages and disadvantages. [5-7]

The high-strength pull-out suture technique involves using sutures passed through the tendon and anchored using a screw or button, that helps to hold the tendon in place during the healing process. One of the main benefits of the high-strength pull-out suture technique is that it provides a secure and stable repair of the Achilles tendon that can withstand the high forces and demands of normal activity. This is due to the strength of the sutures which help to distribute the forces across a wider area of the tendon, reducing the risk of re-injury. Additionally, as mentioned earlier, in comparison to Tendon grafting or suture anchors, the technique is a low-cost alternative better suited to the Indian scenario. In addition, the high-strength pull-out suture technique is relatively simple and quick to perform, making it an attractive option for many surgeons. This can reduce the risk of complications and speed up the recovery process for patients.

Pandey et al. (2015) conducted a pull-out suture repair post-V-Y advancement of the gastro-soleus aponeurosis and used a Krackow suture with 2-0 non-absorbable suture in the proximal stump of the Achilles tendon. They anchored the pull-out suture with the tendo-achilles stump over the heel using plastic suture material, with the ankle in 5 to 10° of plantar flexion. [8] This is similar to the procedure adopted in our case, with fixation in plantar flexion, which was gradually adjusted to dorsiflexion over the course of 6 months.

However, there are some disadvantages to this technique as well. For example, it can be more difficult to place the torn end back to its insertion if the gap is significant, which may result in a less-than-optimal alignment of the tendon and a less-than-ideal repair. Additionally, there is a risk of infection which could be adequately controlled with aggressive dressing and oral antibiotics. In conclusion, the high-strength pull-out suture technique is a simple and cost-effective method for repairing an Achilles tendon and it has several advantages, such as a secure and stable repair and a relatively simple and quick procedure.

4. Conclusion

This case demonstrates the successful surgical repair of a unilateral Achilles tendon rupture using the high-strength pull-out suture technique. This minimally invasive and low-cost procedure resulted in a favorable outcome for the patient, with improved pain and function in the affected ankle. Hence this new method might give equal benefits while being simpler and more cost-effective than other modalities available.

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Conflict of Interest
The author declare that they have no competing interests.

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Tables & Figures

Table 1: American Orthopaedic Foot & Ankle Society (AOFAS) Scores

Parameters	Maximum Score	Pre-operative Score	Post-Operative Score
Section 1: Pain	40	30	40
Section 2: Activity limitations, support requirements	10	4	10
Section 2: Maximum walking distance, blocks	5	2	5
Section 2: Walking surfaces	5	0	5
Section 2: Gait abnormality	8	0	8
Section 2: Sagittal motion (flexion plus extension)	8	4	8
Section 2: Hindfoot motion (inversion plus eversion)	6	6	6
Section 2: Ankle-hindfoot stability (anteroposterior, varus-valgus)	8	8	8
Section 3: Alignment	10	0	10
Total Score	100	54	100

Figure 1: Thompson test positive on left side.

Figure 2: Torn end of Achilles tendon.

Figure 3: Torn end of Achilles tendon stitched with Krakow's suture technique (Ethibond) and pulled out of Calcaneum.

Figure 4: Suture material anchored outside using simple Plastic Raincoat button.

Figure 5: Postoperative Day 5 Wound status.

Figure 6 & 7: Post Cast removal Ankle range of motion (Postop 3 months)

Figure 7 & 8: Post Operative follow up after 4 months