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Review Article

OPEN VERSUS PERCUTANEOUS ACHILLES TENDON REPAIR: A REVIEW

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ABSTRACT

Limited incision techniques for acute Achilles tendon ruptures have been developed in recent years to improve recovery and reduce postoperative complications compared with traditional open repair. Open repair of Achilles tendon rupture has been associated with higher levels of wound complications than those associated with percutaneous repair. However, some studies suggest there are higher rerupture rates and sural nerve injuries with percutaneous repair. The purpose of this study is to compare the postoperative clinical and functional results of percutaneous versus open repair of acute Achilles tendon ruptures. The two types of repairs is being compared in terms of (1) function (muscle strength, ankle ROM, calf and ankle perimeter, single heel rise tests, and work return), (2) cosmesis (length scar, cosmetic appearance), and (3) complications. This literature will provide a brief overview on the current scenario of these procedures and will compare the efficacy and safety of these two procedures.

Keywords: Achilles tendon rupture, percutaneous repair, Open repair, complications

INTRODUCTION

The Achilles tendon is the largest and strongest tendon in the human body and its rupture is a common injury with a reported incidence of 18 per 100,000 people.[1, 2]. Its rupture is common in middle-aged active men, especially athletes, with a male to female ratio of 4.8:1 [3].Approximately 75—80% of cases can be attributed to participation in athletic activities, including ball and racquet sports.[4],[5],[6],[7]. The cause of ruptures is multifactorial [8]; 78% of ruptures occur in athletic activities during a sudden acceleration and deceleration [9]. The appropriate management of acute Achilles tendon rupture continues to be a controversial issue in the orthopedic literature, with proponents for both non-operative and operative treatments. On-operative management of acute Achilles tendon ruptures involves either cast immobilization for 6—8 weeks or functional bracing. Clinical evaluations of conservative treatment have demonstrated a re-rupture rate of 10—30%, which is considerably higher than that reported after operative intervention. Additionally, patients treated with immobilization often exhibit decreased plantar flexion strength and endurance compared to those repaired surgically. Recent reports have favored operative treatment of acute rupture of the Achilles tendon in physically active patients, using either open or percutaneous techniques. [4],[2],[10],[11],Operative repair appears to provide superior functional results and a lower rate of re-rupture compared to conservative management, however it is associated with an increased incidence of post-operative complications[9].Complications have been reported to occur in 7—42% of cases and have included difficulty with wound healing, skin necrosis, infection, rerupture and sensory loss. The present study was undertaken to evaluate the long-term clinical outcome and post-operative complication rate associated with the operative repair of acute Achilles tendon ruptures. Complications are a risk with any surgical intervention, but studies have shown increased overall complication rates with open surgery, principally wound infection, breakdown and necrosis, but increased rates of re-rupture and sural nerve injury reported with percutaneous surgery[12, 13]. However, studies comparing open and percutaneous repair have found similar functional outcome and McMahon et al.'s meta-analysis has suggested a threefold increase in patient satisfaction with minimally invasive surgery [14]. Henriquez et al. [15] have recently reported that patients return to work sooner after percutaneous repair compared to open repair.

DISCUSSION

The goals of management of Achilles tendon ruptures are to minimize the morbidity of the injury, optimize return to full function, and prevent complications. Treatment of Achilles tendon includes Nonoperative and operative .there are various type of surgical technique to repair Achilles tendon which include open end-to-end Achilles tendon repair, percutaneous Achilles tendon repair, reconstruction with VY advancement, flexor hallucis longus transfer +/- VY advancement of gastrocnemius.the goal is to compare between close versus percutaneous Achilles repair in terms of (1) function (muscle strength, ankle ROM, calf and ankle perimeter, single heel rise tests, and work return), (2) cosmesis (length scar, cosmetic appearance),

and (3) complications and (4)cost. 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.

Open Achilles tendon repair:

Indication:

- acute ruptures (approximately <6 weeks)

Outcomes:

- decreased rate of re-rupture compared to non-operative management
- new Level 1 evidence has suggested no difference in re-rupture rates with functional rehab protocol
- no significant difference in plantar flexion strength with functional rehab protocol
- Higher rate of infection in compare to percutaneous Achilles tendon repair.
- Longer hospital stays in compare to percutaneous Achilles tendon repair.

Percutaneous Achilles tendon repair:

Indications:

- concerns over cosmesis of traditional scar

Outcomes:

- higher risk of sural nerve damage
- lesser risk of wound complications/infection compared with open repair
- less surgical cost than open repair
- shorter hospital stay in compare to open repair
- in a minimal hospital settings percutaneous repair can be performed

Surgical Techniques:

Open Achilles tendon repair:

All patients should place in the prone position under general or spinal anesthesia, with the use of a pneumatic tourniquet. A longitudinal incision was made 1 cm medial to the Achilles tendon, preserving the lesser saphenous vein and the sural nerve. Dissection should carried directly down to the Achilles paratenon, and a full thickness flap should be created by dissecting between the Achilles tendon and the paratenon.The tendon rupture should be identified and the edges minimally debrided. Repair of the tendon should achieved

using either the Bunnell or modified Kessler method with number five non-absorbable suture and a running epitendinous absorbable 2.0 suture. Careful repair of the paratendon should perform in all cases. The procedure should finish with closure of the subcutaneous tissue and skin and application of a plaster cast in approximately 20 degree of plantar flexion.

Percutaneous Achilles tendon repair:

The percutaneous Achilles reconstruction of Ma and Griffith[16] is popular technique. The Achilles defect should be palpated and a site an inch proximal to the defect was located. In this location, stab wounds should be made (using #15 blades) through the skin on the lateral and medial aspect of the tendon. These stab wounds should pierce the skin and subcutaneous tissue but avoid lacerating tissue and the tendon sheath and turned 360°. This act to separate the sheath from the skin and subcutaneous tissue. A Number 1 nonabsorbable suture, 12 to 14 inches in length, should be threaded on each end with a Keith needle (3 inch straight needle). Beginning at the lateral stab wound, the needle should pass transversely through the stab wound, subcutaneous tissue, and tendon through the medial wound (Fig. 5A). The suture should be manipulated until equal lengths of suture were on the medial and lateral sides. The Keith needles should then inserted through the ipsilateral stab wounds and angulated distally approximately 45° to the long axis of the tendon and should passed through the tendon and skin emerging on the contralateral side. Before bringing the needle through the skin, stab wounds should be placed around the needle hub. Both sides should be done similarly). The ends of the sutures should then pull simultaneously, tightening the proximal portion of the suture. The Keith needle on the lateral side should be replaced with a curved cutting needle. The lateral suture should then passed distally between the subcutaneous tissue and tendon sheath, and brought out at the level of the midportion of the distal segment approximately 1.25 cm from the rupture gap after enlarging the needle hole with a #15 blade, the curved needle should be replaced with a Keith needle. The suture should then passed back through the enlarged lateral skin puncture and transversely through the tendon, and out through the medial side. Again, the medial puncture hole should be enlarged around the Keith needle before pulling it through the skin. The Keith needle should then replace with a curved cutting needle on the medial suture and should inserted back through the distal medial puncture and advanced between the tendon sheath and subcutaneous tissue to exit at the middle puncture (rupture gap level). Thus, two sutures exit from the skin at the middle puncture on the medial aspect of the ankle. Traction should be applied to both of the free ends of the suture in criss-cross manner while the ankle should be placed in maximum equinus. Once the tendon became approximated, noted by direct palpation, the suture should be tied. It is important to tie the suture on the medial side of the tendon to avert possible sural nerve damage. The skin should then close in routine fashion and a short leg cast should be applied with gravity equinus.

CONCLUSION

Modern operative treatment of acute Achilles tendon ruptures allowed successful return to activity in most patients with low complication rates based on results of the review of present study. Similarly successful clinical and functional results are shown after both open and percutaneous repair of acute Achilles tendon ruptures. Repair with the percutaneous Achilles tendon technique provide low surgical cost, low wound infection rate, low hospital stay days, less scar compared with open repair. Further large-scale, prospective clinical trials comparing percutaneous to open Achilles repair techniques treatment are warranted to evaluate potential differences in long-term clinical outcomes and functional results.

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