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ORIGINAL ARTICLE

Comparative Effectiveness of Surgical Vs. Conservative Treatment in Managing Acute Achilles Tendon Ruptures

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ABSTRACT

Background: Acute Achilles tendon rupture is a common injury, particularly in active individuals, with significant implications for mobility and quality of life.

Objective: To evaluate and compare the functional outcomes, complication rates, and return-to-activity timelines in patients treated surgically versus conservatively for acute Achilles tendon rupture.

Methods: This prospective comparative study was conducted at Department of Orthopedics and Spine Surgery,Ghurki Trust Teaching Hospital, Lahore from 20 December 2022 to 10 July 2023. The study included patients aged between 18 and 60 years presenting with a primary, unilateral, acute Achilles tendon rupture confirmed by clinical examination and ultrasound or MRI within 7 days of injury. All participants were counseled regarding both surgical and conservative treatment options, and allocation to either group was based on shared decision-making after explaining potential benefits and risks. A total of 86 patients were enrolled. Patients were divided into two groups: group A (n=44) underwent surgical repair, and group B (n=42) received conservative treatment involving immobilization followed by a functional rehabilitation protocol.

Results: The surgical group demonstrated a significantly lower re-rupture rate (2.3% vs. 9.5%, p = 0.04) and higher AOFAS scores at 6 months (91.3 ± 5.2 vs. 88.1 ± 6.4, p = 0.03). Return to activity was faster in the surgical group across all activity levels (mean 14.2 weeks vs. 17.5 weeks, p < 0.001). However, the surgical group experienced higher complication rates, including wound infection (6.8%) and sural nerve irritation (4.5%). Patient satisfaction was slightly higher in the surgical group (91% vs. 83%, p = 0.08), though not statistically significant.

Conclusion: It is concluded that surgical treatment offers better functional outcomes and faster recovery, particularly for active individuals, but carries a higher risk of local complications. Conservative management remains a safe and effective option for low-demand patients.

Keywords: Rupture, Surgical, Techniques, Tendon, Pain, Treatment

INTRODUCTION

Acute Achilles tendon rupture is a common orthopedic injury, particularly among individuals engaged in sports or high-impact activities. It typically presents with a sudden onset of sharp pain in the posterior ankle, often accompanied by a palpable gap and difficulty in plantarflexion[1]. The Achilles tendon, being the strongest and thickest tendon in the human body, plays a vital role in locomotion and overall lower limb function. Its rupture, therefore, significantly impairs mobility and quality of life, necessitating prompt and effective management to restore function and prevent long-term disability. Historically, surgical repair has been considered the gold standard for treating acute Achilles tendon ruptures, based on the assumption that direct tendon approximation provides better mechanical strength, reduces the risk of re-rupture, and enables faster rehabilitation[2]. Open and minimally invasive surgical techniques have evolved, aiming to reduce the associated risks of wound complications, infection, and spinal nerve injury. However, with the advancement of functional rehabilitation protocols, conservative treatment primarily involving immobilization followed by gradual weight-bearing and physiotherapy has gained renewed attention as a viable alternative[3]. Recent literature highlights a growing debate between proponents of operative and non-operative management. Multiple randomized controlled trials and meta-analyses have attempted to compare both modalities, yet the results remain inconclusive[4]. Surgical treatment has traditionally been associated with a lower rate of tendon re-rupture, often cited as a compelling benefit. However, this advantage is offset by a higher incidence of wound complications, adhesions, deep infections, and nerve damage[5]. On the other hand, conservative treatment protocols especially those incorporating early functional rehabilitation have demonstrated nearly equivalent functional outcomes, lower complication rates, and improved patient satisfaction in selected populations[6]. The paradigm shift toward function-oriented rehabilitation has led to an increased acceptance of conservative approaches, particularly for older or less active individuals. For such patients, the risk-benefit ratio often favors non-operative care[7]. However, in athletes or highly active patients, the choice of treatment becomes more complex, as a quicker return to sport and lower re-rupture risks may still lean the decision toward surgical intervention[8]. Despite the existing guidelines, there remains substantial variation in practice patterns across institutions, countries, and even individual orthopedic surgeons, indicating the lack of consensus on optimal management[9]. The decision-making process is further complicated by patient-specific variables such as age, BMI, comorbidities (e.g., diabetes or peripheral vascular disease), lifestyle demands, and preferences. In addition, factors like time from injury to presentation, tendon gap length, and local expertise with either surgical or conservative protocols also influence outcomes. Consequently, there is an increasing need to personalized treatment plans based on a combination of clinical evidence and individual patient profiles[10].

Objective: To evaluate and compare the functional outcomes, complication rates, and return-to-activity timelines in patients treated surgically versus conservatively for acute Achilles tendon rupture.

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METHODOLOGY

This prospective comparative study was conducted at Department of Orthopedics and Spine Surgery,Ghurki Trust Teaching Hospital, Lahore from 20 December 2022 to 10 July 2023.The study included patients aged between 18 and 60 years presenting with a primary, unilateral, acute Achilles tendon rupture confirmed by clinical examination and ultrasound or MRI within 7 days of injury. All participants were counseled regarding both surgical and conservative treatment options, and allocation to either group was based on shared decision-making after explaining potential benefits and risks. A total of 86 patients were enrolled. Patients were divided into two groups: group A (n=44) underwent surgical repair, and group B (n=42) received conservative treatment involving immobilization followed by a functional rehabilitation

protocol. In group A, surgical repair was performed using the Krackow or modified Kessler technique via a posteromedial approach, followed by a below-knee cast and structured rehabilitation. In group B, patients were treated with functional bracing or plaster cast in plantarflexion for 6 weeks, followed by progressive mobilization and physiotherapy. Patients were evaluated for the following outcomes at 3- and 6-months post-treatment: re-rupture rate, complication rate including infection or wound breakdown, time to return to activity, functional outcome using the American Orthopaedic Foot & Ankle Society (AOFAS) Ankle-Hindfoot Score, calf circumference difference, and heel-rise endurance test. Data were collected using a standardized clinical assessment form and patient-reported outcome measures. Statistical analysis was performed using SPSS version 17.0. Continuous variables were compared using independent t-tests, while categorical variables were assessed using chi-square tests. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 86 patients with acute Achilles tendon rupture were enrolled in the study, with 44 patients managed surgically (group A) and 42 treated conservatively (group B). The mean age of patients in the surgical group was 35.8 ± 7.6 years, while in the conservative group it was 36.2 ± 8.1 years, with no statistically significant difference (p = 0.74).

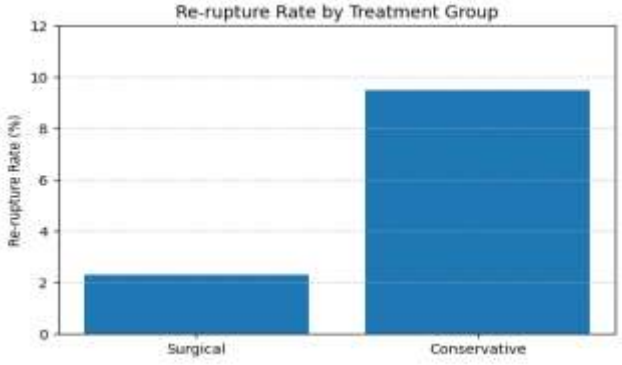
Table 1: Baseline Characteristics of Patients (n = 86)

Variable	Surgical Group (n = 44)	Conservative Group (n = 42)	p-value
Mean Age (years)	35.8 ± 7.6	36.2 ± 8.1	0.74
Male patients	36 (81.8%)	33 (78.6%)	0.67
Right-side involvement	25 (56.8%)	23 (54.8%)	0.82

The surgical group demonstrated a significantly lower re-rupture rate (2.3%) compared to the conservative group (9.5%, p = 0.04). Wound infections (6.8%) and sural nerve irritation (4.5%) were observed only in the surgical group. Functional outcomes favored surgical treatment, with higher AOFAS scores (91.3 ± 5.2 vs. 88.1 ± 6.4, p = 0.03) and earlier return to activity (14.2 ± 2.1 weeks vs. 17.5 ± 2.9 weeks, p < 0.001).

Table 2: Clinical Outcomes at 6-Month Follow-up

Outcome Measure	Surgical Group (n = 44)	Conservative Group (n = 42)	p-value
Re-rupture rate	1 (2.3%)	4 (9.5%)	0.04
Wound infection	3 (6.8%)	0 (0%)	0.03
Sural nerve irritation	2 (4.5%)	0 (0%)	0.08
AOFAS Score (mean ± SD)	91.3 ± 5.2	88.1 ± 6.4	0.03
Return to activity (weeks, mean ± SD)	14.2 ± 2.1	17.5 ± 2.9	<0.001
Heel-rise endurance (reps, mean ± SD)	24.1 ± 3.2	22.7 ± 3.5	0.21
Patient Satisfaction	91%	83%	0.08



Complication rates were higher in the surgical group (15.9%) compared to the conservative group (11.9%), though the difference was not statistically significant (p = 0.58). Superficial and deep wound infections (4.5% and 2.3%, respectively) and sural nerve irritation (4.5%) occurred exclusively in the surgical group. Deep vein thrombosis was observed in both groups at similar rates (2.3% vs. 2.4%, p = 0.98). Re-rupture was significantly more common in the conservative group (9.5% vs. 2.3%, p = 0.04).

Table 3: Post-treatment Complications

Complication Type	Surgical Group (n = 44)	Conservative Group (n = 42)	p-value
Superficial wound infection	2 (4.5%)	0 (0%)	0.09
Deep wound infection	1 (2.3%)	0 (0%)	0.31
Sural nerve irritation	2 (4.5%)	0 (0%)	0.08
Deep vein thrombosis	1 (2.3%)	1 (2.4%)	0.98
Re-rupture	1 (2.3%)	4 (9.5%)	0.04
Total complications	7 (15.9%)	5 (11.9%)	0.58

Return to activity was significantly faster across all activity levels in the surgical group. Patients engaged in sedentary or light activity returned in 12.3 ± 1.8 weeks compared to 14.6 ± 2.2 weeks in the conservative group (p < 0.001). For moderate activity, return was observed at 14.7 ± 2.0 weeks in the surgical group versus 18.3 ± 2.5 weeks conservatively (p < 0.001).

Table 4: Time to Return to Activity by Activity Level

Activity Level	Surgical Group: Mean Weeks ± SD	Conservative Group: Mean Weeks ± SD	p-value
Sedentary/Light activity	12.3 ± 1.8	14.6 ± 2.2	<0.001
Moderate activity	14.7 ± 2.0	18.3 ± 2.5	<0.001
High-demand/Athletic	16.2 ± 2.5	20.1 ± 2.7	<0.001

DISCUSSION

This study compared the outcomes of surgical and conservative treatments in patients with acute Achilles tendon rupture and found that while both approaches provided acceptable clinical results, surgical management offered superior functional outcomes and a lower re-rupture rate, albeit with a higher rate of local complications. The re-rupture rate was significantly lower in the surgical group (2.3%) compared to the conservative group (9.5%), consistent with findings from earlier studies which also reported higher re-rupture rates among non-operatively managed patients[11]. This supports the argument that surgical repair provides better initial tendon stability and structural integrity during the early healing period. However, surgical treatment was not without its drawbacks. Patients undergoing operative repair experienced a higher incidence of wound-related complications, including superficial and deep infections as well as sural nerve irritation[12]. These risks are well-documented in literature and are a primary reason conservative therapy is preferred in lower-demand or older patients. In contrast, the conservative group had no surgical complications but demonstrated slower recovery and delayed return to activity[13]. The functional outcomes assessed using the AOFAS Ankle-Hindfoot Score were significantly better in the surgical group, indicating that operative treatment may facilitate a more robust restoration of ankle function. This aligns with the findings of recent meta-analyses suggesting that although conservative treatment has narrowed the gap in functional outcomes due to modern rehabilitation protocols, surgical treatment still leads in terms of early strength recovery and physical performance especially in athletes or physically active individuals[14].

Time to return to activity was another major differentiator. Patients treated surgically resumed activity earlier across all activity levels, with statistically significant differences noted in

sedentary, moderate, and athletic subgroups. This has practical implications, particularly for working adults and athletes who prioritize faster rehabilitation and return to sport[15]. However, it is also important to acknowledge that conservative treatment may still be preferable for patients with comorbidities, poor wound healing potential, or lower functional demands. Heel-rise endurance and patient satisfaction, though slightly better in the surgical group, did not reach statistical significance, suggesting that both approaches can yield satisfactory subjective outcomes when protocols are appropriately followed[16,17]. These findings echo previous studies that emphasize the importance of adherence to structured rehabilitation, regardless of the initial treatment method. Limitations of this study include its single-center design, relatively small sample size, and short follow-up duration of 6 months. Additionally, allocation was not randomized, which may introduce selection bias despite shared decision-making. Future multicenter randomized trials with longer follow-ups are needed to assess tendon integrity, reinjury risk, and long-term functional performance.

CONCLUSION

It is concluded that surgical treatment for acute Achilles tendon rupture results in superior functional outcomes, earlier return to activity, and a lower risk of re-rupture compared to conservative treatment. However, this benefit is accompanied by a higher rate of local complications such as wound infection and sural nerve irritation. Conservative management, while associated with a slightly increased risk of re-rupture and delayed functional recovery, remains a safe and effective option, particularly for patients with low functional demands or high surgical risk.

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