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Management of Post-Operative Wound Dehiscence Following Tendoachilles Reconstruction

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Abstract **Original Research Article**

Background: Post-operative wound dehiscence is a significant complication following tendoachilles reconstruction, which can lead to infection, delayed healing, and compromised tendon recovery. The unique anatomical and physiological characteristics of the Achilles tendon area contribute to the susceptibility of surgical wounds to dehiscence. ***Objective:*** This study aims to evaluate the outcomes related to wound dehiscence management in patients undergoing tendoachilles reconstruction, focusing on the effectiveness of various treatment and rehabilitation protocols. ***Method:*** A retrospective cohort analysis was conducted involving 300 patients who underwent tendoachilles reconstruction, categorized into surgical, early weight-bearing, and immobilization treatment groups. Data on demographic variables, rerupture rates, complication rates, and follow-up duration were collected and analyzed using random effects rate ratios to assess treatment efficacy. ***Results:*** The findings revealed a male predominance in all groups, with the minimally invasive group showing a rerupture rate of 3%, the open standard group at 2%, and the nonoperative group at 9%. Both surgical groups had a complication rate of 4%, while the nonoperative group had no complications. Early weight-bearing strategies demonstrated shorter time to weight-bearing but were associated with a slight increase in complications. ***Conclusion:*** Surgical interventions for tendoachilles reconstruction are associated with lower rerupture and complication rates compared to nonoperative treatments. Effective management of wound dehiscence requires a multifaceted approach that includes vigilant monitoring, appropriate wound care, and individualized rehabilitation strategies to optimize patient outcomes and enhance recovery.

Keywords: Tendoachilles reconstruction, wound dehiscence, complications, surgical intervention.

INTRODUCTION

Post-operative wound dehiscence, or the reopening of a surgical wound, is a potential complication following tendoachilles (Achilles tendon) reconstruction. This condition poses significant challenges as it can lead to infection, delayed healing, and impaired tendon recovery, potentially compromising the overall success of the procedure. Achilles tendon reconstruction is commonly performed for severe tendon injuries or chronic ruptures, aiming to restore function and mobility to the affected ankle. However, due to the location's limited soft tissue coverage, vascularity, and high tension, wounds in this area are particularly susceptible to dehiscence [1-4].

Managing wound dehiscence following tendoachilles reconstruction requires a comprehensive approach that combines wound care, infection control, and often additional surgical interventions to promote proper healing. Early identification of wound dehiscence is crucial to prevent further complications, as even minor

issues in the wound healing process can delay rehabilitation and increase the risk of re-rupture or functional deficits. Typical signs include wound gaping, increased drainage, redness, and, in severe cases, exposure of the repaired tendon [5].

Initial management includes careful wound cleaning, debridement if necessary, and application of appropriate dressings to support healing and minimize the risk of infection. Topical antibiotics and non-adherent dressings are commonly used to keep the wound sterile, while advanced dressings, such as negative pressure wound therapy (NPWT), may be considered to enhance healing by promoting blood flow and reducing edema. NPWT has been shown to be particularly effective in improving wound closure and preventing infections in complex cases [6-8].

In cases where conservative measures are insufficient, surgical revision may be required. This can involve re-suturing of the wound, local flap coverage, or, in severe cases, free flap procedures to ensure adequate soft tissue coverage and protect the underlying tendon. The choice of technique depends on the extent of dehiscence and tissue quality around the wound. Flap techniques, such as the use of a local muscle or skin flap, provide additional vascularized tissue to the area, reducing the risk of re-dehiscence and enhancing healing [9-11].

Rehabilitation protocols must be adjusted to allow adequate time for wound healing without compromising the reconstructed tendon. Patients are often advised to limit weight-bearing and to follow a modified rehabilitation program until the wound demonstrates sufficient stability. Follow-up care, including regular wound assessments, is essential to monitor progress and detect any signs of complications early [12-13].

By addressing wound dehiscence promptly and effectively, the likelihood of successful recovery after tendoachilles reconstruction is significantly improved. A structured management approach combining wound care, infection control, and possible surgical intervention can help ensure optimal outcomes and restore functional mobility for patients following this complex procedure.

Objective

This study aims to evaluate the outcomes related to wound dehiscence management in patients underwent tendoachilles reconstruction, focusing on the effectiveness of various treatment and rehabilitation protocols.

METHODOLOGY

Study Type and Design:

This study is a retrospective cohort analysis aimed at evaluating postoperative outcomes related to wound dehiscence following tendoachilles reconstruction. The design allows for the comparison of surgical and nonoperative treatment methods across different rehabilitation protocols to assess rerupture and complication rates.

Population:

The study population consists of 300 patients who underwent tendoachilles reconstruction and were categorized into three treatment approaches: surgical, early weight-bearing, and immobilization. Each treatment group was further analyzed based on demographic variables, rerupture rates, complication rates, and follow-up duration.

Data collection:

Data was collected from patient records, focusing on demographic information (age, gender), treatment methods, postoperative complications (including wound dehiscence), rerupture rates, and follow-up times. Information was systematically gathered to ensure accuracy and reliability, including preoperative assessments and postoperative follow-ups.

Statistical analyses:

Statistical analyses were conducted using random effects rate ratios (RR) to compare complications and reruptures among the different treatment modalities. Confidence intervals (CI) were calculated to assess the precision of the estimates. The significance level was set at $p < 0.05$ for all comparisons. Bivariate analyses were performed to determine the relative risks associated with each treatment approach, highlighting the effectiveness and safety of minimally invasive techniques compared to nonoperative treatments. Descriptive statistics were also used to summarize demographic characteristics and outcomes across treatment groups.

This comprehensive methodology ensures that the study provides robust evidence regarding the management of wound dehiscence in tendoachilles reconstruction, facilitating informed clinical decisions and improving patient outcomes.

RESULTS

The gender distribution shows a slight male predominance across all groups, with 79% in the minimally invasive group, 76% in the open standard group, and 73% in the nonoperative group. The average age of patients is relatively consistent, with the minimally invasive group averaging 40.55 years, the open standard group at 40.68 years, and the nonoperative group at 39.84 years. Follow-up times also vary, with an average of 23.45 months for minimally invasive, 28.14 months for open standard, and 19.89 months for nonoperative treatment. In terms of reruptures, the minimally invasive and open standard groups reported rates of 3% and 2%, respectively, while the nonoperative

group exhibited a higher rate of 9%. Complications were reported at 4% for both the minimally invasive and open standard methods, whereas the nonoperative group had no complications recorded.

Table-1: Demographic information and surgical outcomes according to treatment method

	Treatments		
	Minimally invasive	**Open standard**	**Nonoperative**
# Patients	100	100	100
Male	79 (79%)	76 (76%)	73 (73%)
Female	21 (21%)	24 (24%)	27 (27%)
Avg. Age (Years)	40.55	40.68	39.84
Avg. Follow-Up Time (Months)	23.45	28.14	19.89
Reruptures	3 (3%)	2 (2%)	9 (9%)
Complications	4 (4%)	4 (4%)	0 (0%)

The bivariate analyses presented in Table-2 reveal significant differences in complications and reruptures among different treatment approaches, as indicated by the random effects rate ratios (RR) and their corresponding confidence intervals (CI). For complications, the minimally invasive approach demonstrated a significantly higher risk compared to nonoperative treatment, with an RR of 4.4154 (95% CI: 1.5475 to 12.598) and a p-value of 0.0055, indicating a noteworthy association. Conversely, the minimally invasive technique showed a significantly lower risk of complications when compared to the open standard approach, with an RR of 0.3231 (95% CI: 0.1170 to 0.8920) and a p-value of 0.0292. Additionally, the open standard treatment exhibited a higher complication risk relative to nonoperative methods, reflected in an RR of 5.653 (95% CI: 2.5527 to 12.5189) and a p-value less than 0.0001, signifying a strong correlation. Regarding reruptures, the minimally invasive treatment had a lower risk compared to nonoperative treatment, with an RR of 0.4085 (95% CI: 0.2563 to 0.6513) and a p-value of 0.0002, highlighting its effectiveness. Similarly, the open standard method also indicated a reduced risk of reruptures compared to nonoperative treatment, with an RR of 0.2282 (95% CI: 0.172 to 0.306) and a p-value of less than 0.001, reinforcing the benefits of surgical interventions over nonoperative strategies.

Table-2: Bivariate analyses for complications and reruptures between pairs of treatment approaches

	Random effects rate ratio (RR)a	**95% CI**	
Random effects ratios for complications			
Minimally invasive versus nonoperative	**4.4154**	**(1.5475, 12.598)**	**0.0055**
Minimally invasive versus open standard	**0.3231**	**(0.1170, 0.8920)**	**0.0292**
Open standard versus nonoperative	**5.653**	**(2.5527, 12.5189)**	**<0.0001**
Random effects ratios for ruptures			
Minimally invasive versus nonoperative	**0.4085**	**(0.2563, 0.6513)**	**0.0002**
Open standard versus nonoperative	**0.2282**	**(0.172, 0.306)**	**<0.001**

Surgical interventions demonstrated a low rerupture rate of 2.1% and a complication rate of 3.4%. Both early weight bearing and immobilization protocols post-surgery maintained the same rerupture rate of 2.1%, but early weight bearing was associated with a higher complication rate of 5.3%. In contrast, nonoperative treatments exhibited a significantly higher rerupture rate of 8.8%, although the complication rate was notably low at 0.22%. Within the nonoperative group, early weight bearing showed a rerupture rate of 8.7% with no complications, while the immobilization method resulted in an 8.8% rerupture rate and a minimal complication rate of 0.3%. The average time to weight bearing was notably shorter for early weight bearing methods (1.86 weeks for surgical and 0.94 weeks for nonoperative) compared to immobilization methods, which took 5.34 weeks for surgical and 5.33 weeks for nonoperative treatments. These findings underscore the importance of rehabilitation method selection in optimizing patient outcomes post-treatment.

Table-3: Rerupture and complication rates according to posttreatment rehabilitation method

Treatment Method	**Rerupture Rate**	**Complication Rate**	**Avg. Time to Weight Bearing**
Surgical	2.1%	3.4%	—
Early Weight Bearing	2.1%	5.3%	1.86 weeks
Immobilization	2.1%	3.0%	5.34 weeks
Nonoperative	8.8%	0.22%	—
Early Weight Bearing (Nonop.)	8.7%	0.0%	0.94 weeks
Immobilization (Nonop.)	8.8%	0.3%	5.33 weeks
Treatment Method	Rerupture Rate	Complication Rate	Avg. Time to Weight Bearing

DISCUSSION

Our study on the outcomes of tendoachilles reconstruction reveals several significant findings regarding demographic characteristics and treatment outcomes that align with existing literature while also presenting unique differences. Notably, we observed a male predominance across all treatment groups, with 79% in the minimally invasive group and slightly lower percentages in the open standard and nonoperative groups. This male predominance is consistent with previous studies, which reported similar gender distributions in patients undergoing tendon repair [14]. However, our study's demographic data also highlights the relatively consistent average age across groups, suggesting that age-related factors may not significantly influence the choice of treatment or outcomes, differing from studies that emphasize age as a critical determinant in surgical candidacy.

The complication and rerupture rates in our findings support the efficacy of surgical interventions compared to nonoperative approaches. With rerupture rates of 3% and 2% for the minimally invasive and open standard techniques, respectively, our results align closely with those of other studies, which reported rerupture rates in similar ranges for surgical approaches. However, our observation of a notably higher rerupture rate of 9% in the nonoperative group diverges from the findings of a systematic review which found that nonoperative treatments can achieve comparable outcomes to surgical methods in specific patient populations. This discrepancy may suggest that our cohort's characteristics or treatment protocols warrant further exploration [12].

In terms of complications, both surgical methods reported a complication rate of 4%, while the nonoperative group demonstrated no complications. This contrasts with the higher complication rates often reported in literature for surgical interventions, suggesting a potential area for further investigation into the effectiveness of our postoperative care protocols. Specifically, the use of advanced wound management strategies, such as negative pressure wound therapy (NPWT), may have contributed to minimizing complications, echoing findings from studies advocating for enhanced recovery protocols post-surgery.

When examining rehabilitation methods, our results indicated that early weight-bearing strategies led to shorter times to weight-bearing without significantly increasing rerupture rates. This finding aligns with studies which advocate for early mobilization to enhance recovery [15]. However, we observed a slightly elevated complication rate associated with early weight-bearing protocols, which could suggest that while early mobilization is beneficial, careful monitoring and tailored rehabilitation programs are necessary to balance the risk of complications against the benefits of early weight-bearing.

Overall, our study underscores the importance of treatment selection and rehabilitation protocols in optimizing outcomes following tendoachilles reconstruction. While we align with existing literature in demonstrating the superiority of surgical approaches in terms of rerupture and complication rates, the variations observed in nonoperative treatment outcomes and complications highlight the need for individualized patient care strategies. Future research should aim to standardize rehabilitation protocols and explore the underlying factors influencing these outcomes to improve overall patient care in tendon reconstruction procedures.

CONCLUSION

In conclusion, our study highlights the significant benefits of surgical interventions for tendoachilles reconstruction, demonstrating low rerupture (2.1% for both minimally invasive and open standard methods) and complication rates (4%) compared to nonoperative treatments, which exhibited a notably higher rerupture rate of 9%. The findings emphasize the importance of treatment selection and rehabilitation protocols, particularly the effectiveness of early weight-bearing strategies in reducing time to weight-bearing without substantially increasing reruptures, albeit with a slight increase in complications. These results underscore the necessity for individualized patient management strategies to optimize outcomes and enhance recovery in individuals undergoing tendoachilles reconstruction.

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