

Advances in Neuroma Prevention: A Single Institutional Experience with TMR and TMRpni in Lower Limb Amputees

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INTRODUCTION

Osseointegrated (OI) prostheses are porous coated titanium implants that are inserted directly into residual bone. Targeted muscle reinnervation (TMR) is often done concurrently in this population. TMRpni combines TMR with regenerative peripheral nerve interface.

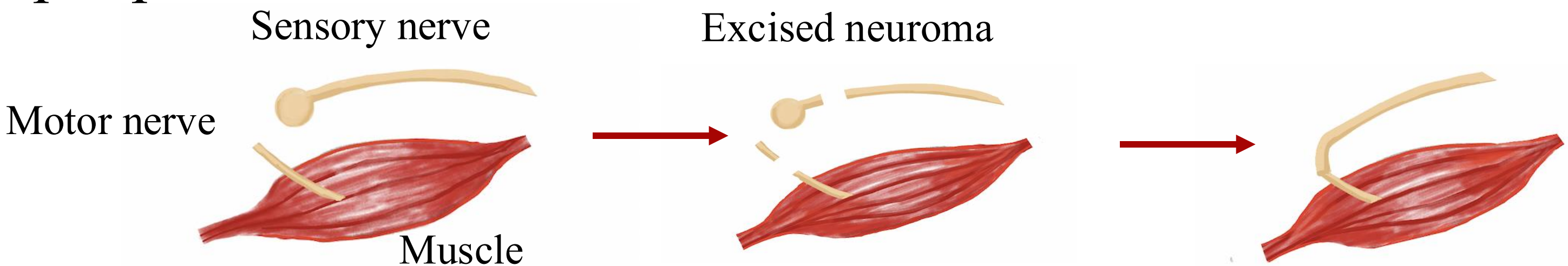


Figure 1: TMR involves coapting damaged or severed peripheral nerves to nearby motor endplates

OBJECTIVE

The aim of this study was to assess the use of TMR and TMRpni in patients with OI prostheses to prevent painful neuroma formation.

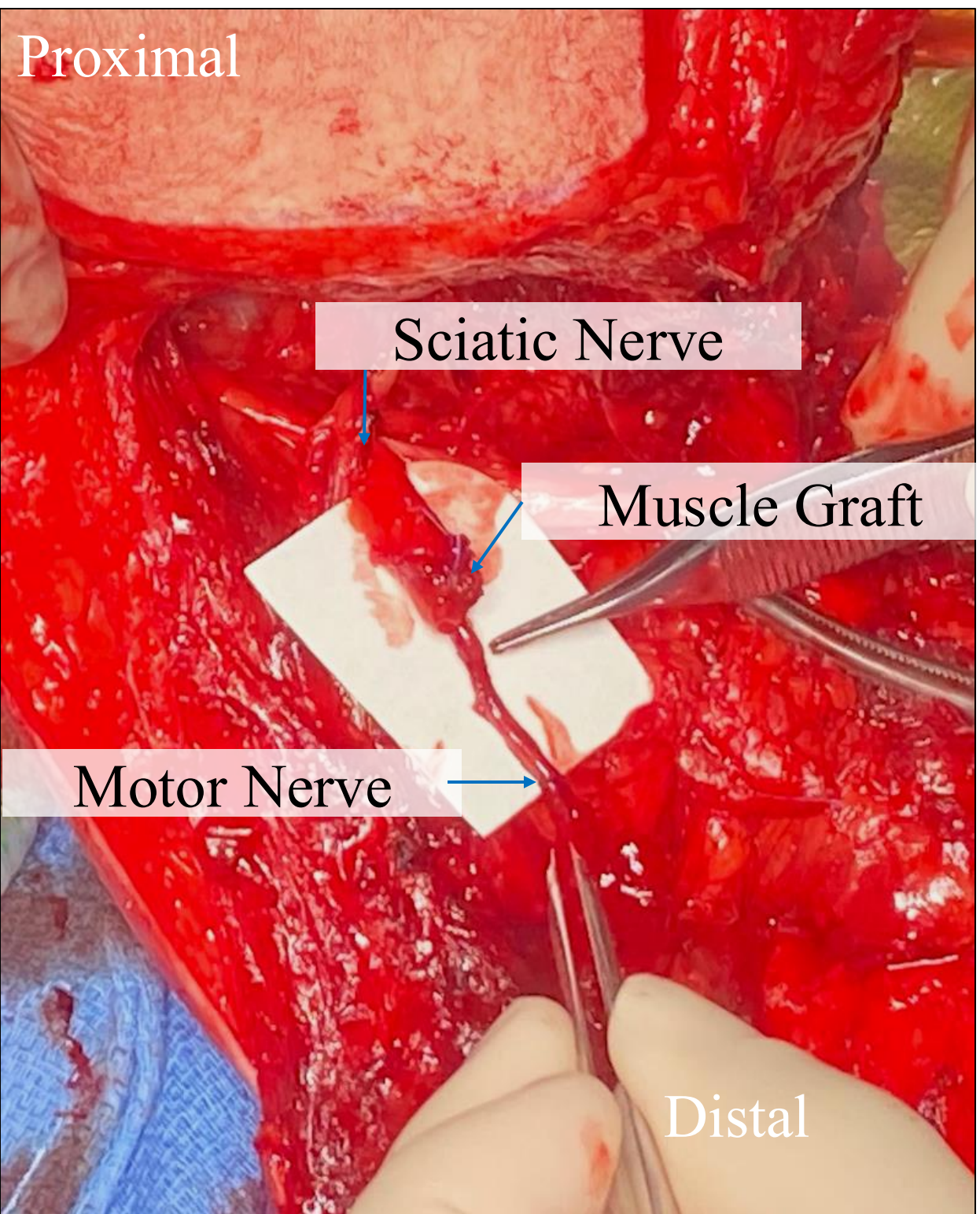


Figure 2: TMRpni in a transfemoral patient showing the final coaptation between the sciatic nerve and a nearby motor nerve with a muscle graft wrapped around the coaptation

METHODS

- Retrospective cohort analysis on patients who received single-stage lower limb OI from 2017-2024
- Patients had at least 12 months of post-op follow-up
- Symptomatic neuromas confirmed with imaging or surgical excision
- One-way ANOVA and Chi-Square test were used, $\alpha=0.05$

RESULTS

	None (n=75)	TMR (n=43)	TMRpni (n=15)	p-value
Age (years)	48.3 (14.5)	45.7 (14.0)	48.8 (11.0)	$p>0.05$
Sex				$p>0.05$
Female	20 (26.7)	16 (37.2)	5 (33.3)	
Male	55 (73.3)	27 (62.8)	10 (66.7)	
BMI (kg/m ²)	28.3 (5.6)	28.3 (5.9)	33.3 (6.7)	$p<0.01^*$
Amputation level				$p>0.05$
Transfemoral	45 (60)	26 (60.5)	9 (60)	
Transtibial	30 (40)	17 (39.5)	6 (40)	
Preoperative pain score	4.0 (3.2)	4 (3.4)	3.1 (3.0)	$p>0.05$

Table 1: Demographic data based on nerve reconstruction techniques including no nerve reconstruction performed (none), TMR alone, or TMRpni. Data presented as mean (SD) for continuous variables and n (%) for categorical variables.

	None (n=74)	TMR (n=43)	TMRpni (n=15)	p-value
Symptomatic Neuromas	12 (16.2)	4 (9.3)	1 (6.7)	$p>0.05$
Time to neuroma from surgery (days)	531 (447-963)	717 (333-1,115)	447	$p>0.05$

Table 2: Symptomatic neuroma outcomes based on nerve reconstruction techniques. Data presented as n (%) for categorical variables and median (IQR) for postoperative time to symptomatic neuroma formation.

CONCLUSIONS

Our pilot study showed fewer symptomatic neuromas in patients who received TMR and TMRpni than in patients with no nerve treatment.

This study demonstrates that TMRpni holds potential for nerve management in patients with lower limb amputations.

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