

Targeted Muscle Reinnervation Following Major Upper Extremity Amputation

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Introduction

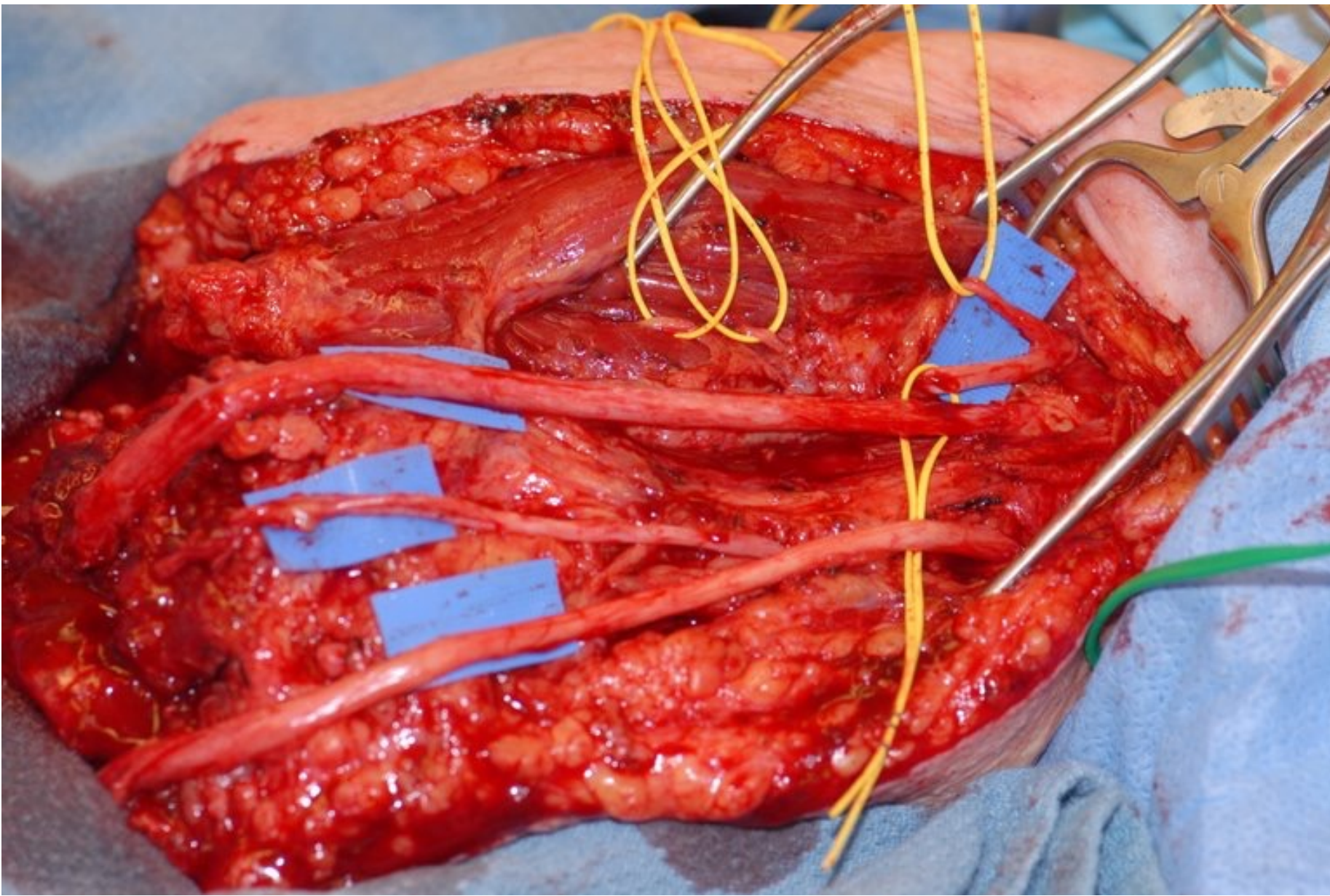
- A total of 200,000 amputations occur annually in the US with ~10,000 being upper extremity (UE) amputations¹
- Over 90% of UE amputations are traumatic in nature²
- Patients are often younger, healthier, and more motivated to return to their pre-injury functional status
- Amputations are accompanied by significant post-op complications such as residual and phantom limb pain
- Targeted muscle reinnervation (TMR)** is a procedure that coapts transected nerve ends to branches of expendable motor neurons → allows axons to interface with a functional neuromuscular junction^{2,3,4}
- Originally created to increase bioprosthetic control but additionally found to reduce neuroma formation and pain
 - Randomized controlled trial revealed significant decrease in neuroma size using MRI⁵

Objectives

- The evaluate national trends in the application of TMR following upper extremity amputation
- Highlight disparities to push for further access to this treatment

Methods

- Retrospective study
- Healthcare Cost and Utilization Project's Nationwide Inpatient Sample
- Identified adult patients who underwent upper extremity amputations with and without subsequent TMR procedures from 2016-2019 using ICD-10 codes
- Statistics: STATA version 16.1



Results: Demographics

- Total upper extremity amputations: n = 8,945 weighted encounters
- 310 patients received TMR (3.5%)
 - 245 males (68.9%), 65 females (21%)

	Total	Did not receive TMR	Received TMR	p-value
	N = 8,945	N = 8,635 (96.5%)	N = 310 (3.5%)	
Age mean (SD)	53.3 (16.9)	53.5 (16.8)	47.0 (19.3)	0.008
Sex n (%)				
Male	6,160 (68.9)	5,915 (68.5)	245 (79.0)	0.063
Female	2,785 (31.1)	2,720 (31.5)	65 (21.0)	

- Patients who received TMR were **younger**
 - Mean age 47 ± 19.3, p<0.008
- No differences found amongst sex, race and income

Results: Geographic Variability

Geographic region			
New England	Reference		
Mid-Atlantic	0.10	0.05 - 0.20	<.0001
East North Central	0.61	0.38 - 0.98	0.041
West North Central	0.23	0.12 - 0.44	<.0001
South Atlantic	0.34	0.21 - 0.55	<.0001
East South Central	0.14	0.07 - 0.28	<.0001
West South Central	0.13	0.07 - 0.22	<.0001
Mountain	0.11	0.05 - 0.22	<.0001
Pacific	0.10	0.06 - 0.18	<.0001
Hospital Control			
Government	Reference		
Private, not for profit	0.44	0.33 - 0.59	<.0001
Private, investor owned	0.43	0.27 - 0.69	0.001

Factors that increased odds of receiving TMR:

- Located in **New England**
- Amputation occurring at **government-controlled hospitals**

Results: LOS & Charges

- Multivariable regression revealed **no significant differences** in hospital length of stay or hospital charges

Conclusion

- Incidence of TMR is low (3.5%)
- Patients who are younger, located in New England and receive care at government-controlled hospitals have a higher odds of receiving TMR
- TMR at time of amputation results in no increased cost or length of stay
- Further research should be directed to highlight the potential benefits of TMR and subsequently broaden patients' access

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