

Targeted Muscle Reinnervation after Transhumeral Amputation during Initial Hospitalization

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Background

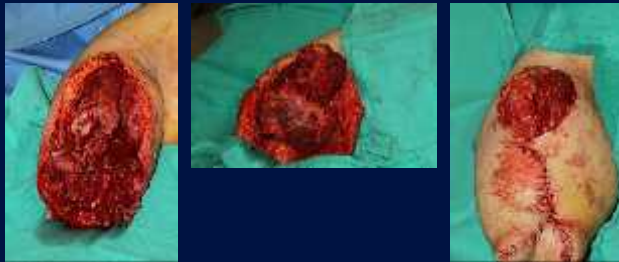
- Targeted Muscle Reinnervation
- Nerve transfers to viable muscles in amputation stumps
- Creates numerous & discrete areas to generate EMG signals
- Myoelectric prosthesis reads multiple signals simultaneously
 - More intuitive prosthetic control
 - Recreation of complex UE movements
 - NN transfers prevent neuroma pain

Case Report

- 35 y/o male involved in MVC rollover
- Presented with near UE amputation
- On presentation:
 - Open midshaft humerus, radius, ulna fractures
 - Nerve avulsions proximal to midshaft of humerus
 - Brachial AA laceration proximally & distally
 - Irreversible ischemic muscle damage
 - Distal avulsion of biceps, triceps, brachialis

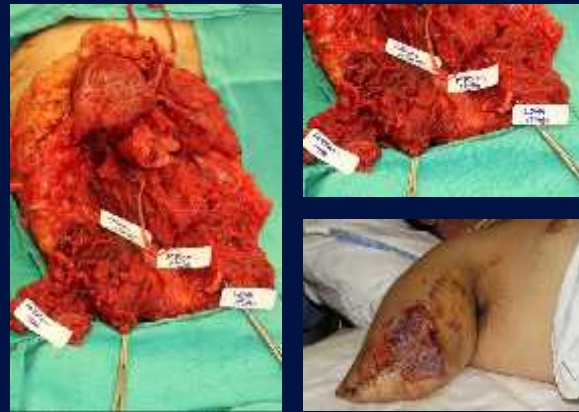
Procedure

- **Initial operation:** transhumeral amputation + xenografting with tagging of structures



Procedure

- **Secondary operation (POD #5): TMR**
 - Findings:
 - Triceps: medial head – no contraction
 - Triceps: long head- contraction but no NN identified
 - Triceps: lateral head – contraction + NN identified
 - Biceps: medial/lateral heads intact
 - Radial N: laceration at midshaft of humerus
 - MC N: branches to biceps intact
 - Median N: level of injury just distal to axilla
 - Nerve transfers:
 - Median NN to medial head of biceps using Neurogen tube
 - Radial NN to lateral head of triceps
 - MC Nerve to cutaneous N of distal skin paddle
 - Adipofascial flap placed between medial/lateral heads of biceps
 - Split-thickness skin graft over defect



Outcomes

- 1 year:
 - No clinical neuroma pain
 - No pain as assessed using the Patient Reported Outcomes Measurement Information System (PROMIS)
 - Successful fitting of patient with myoelectric prosthesis under cortical control



Techniques

- TMR in acute setting
 - Easier identification of structures
 - Ease of surgical dissection
- Neurogen tube
 - Allowed for transfer of median NN despite proximal level injury and gapping
 - Viable alternative if direct nerve coaptation cannot be achieved