



# The Deltoid to Triceps Nerve Transfer: a Novel Approach to Early Salvage of Elbow Extension in Tetraplegia

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## Objectives

- To present a novel surgical approach to restoring elbow flexion in spinal cord injury (SCI): the deltoid to triceps nerve transfer

## Methods: Case Report

### Patient:

- 48 year-old male, previously LHD physician
- 7 months post C6-level SCI
- PMH: DVTs, IVC filter, pressure sore, recurrent UTIs

### Preoperative clinical exam:

Left UE	Manual Muscle Testing	
Shoulder	Deltoid: 5/5 (ant, post, middle)	
Elbow	Biceps: 5/5 Brachialis: 5/5	Triceps: 1+/5
Forearm	Pronation: 3+/5	Supination: 4+/5
Wrist	ECR: 5/5 ECU: 0/5	FCR: 0/5 FCU: 0/5
Hand	No function	

### Preoperative EMG:

- Coexisting lower motor neuron injury to triceps branches of radial nerve
- Acute denervation all 3 heads triceps (+ fibrillations)
- Reinnervation (+ motor unit potentials/volitional control) of long and lateral heads of triceps muscle, but **NOT** the medial head

## Surgical Approach: Axillary to Triceps Nerve Transfer

### 1. EXPOSURE (Posterior Approach, Left):

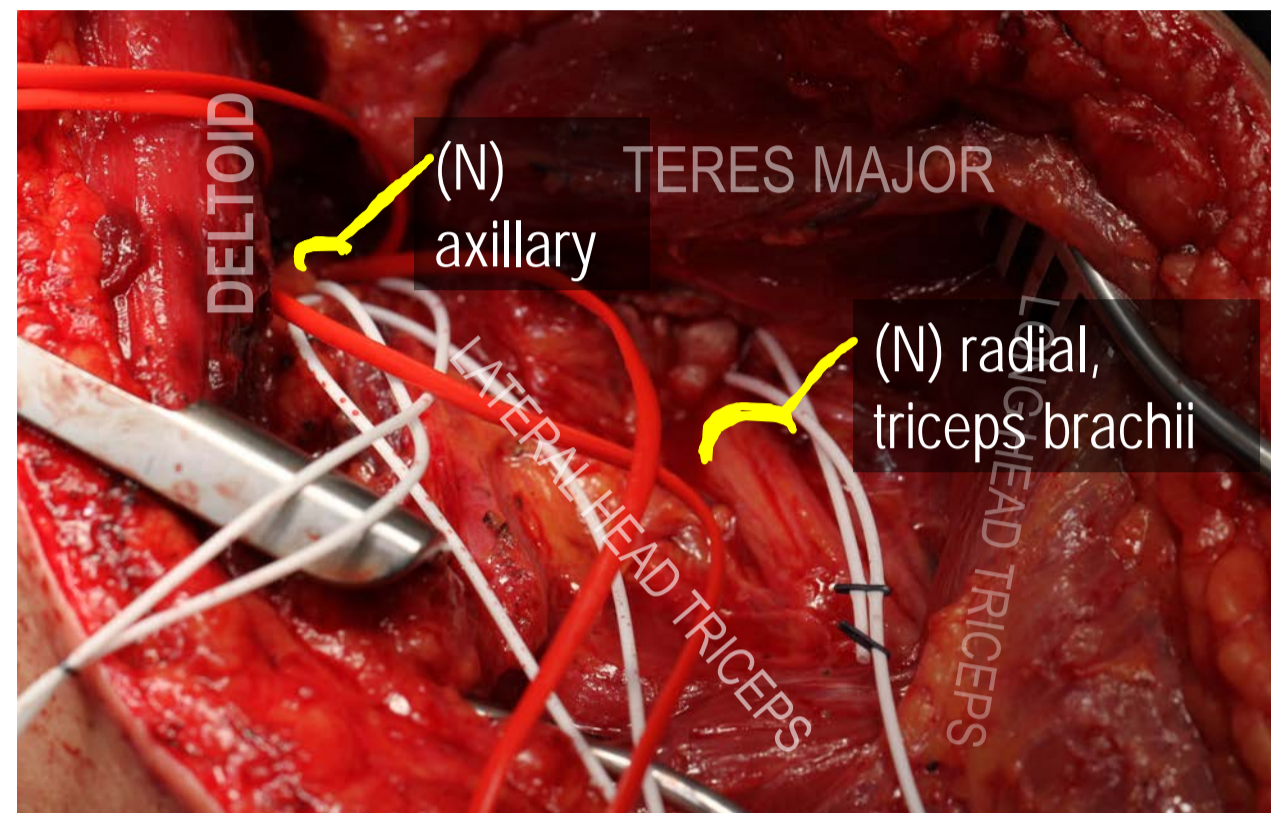
- Longitudinal incision over triceps



## Surgical Approach (cont):

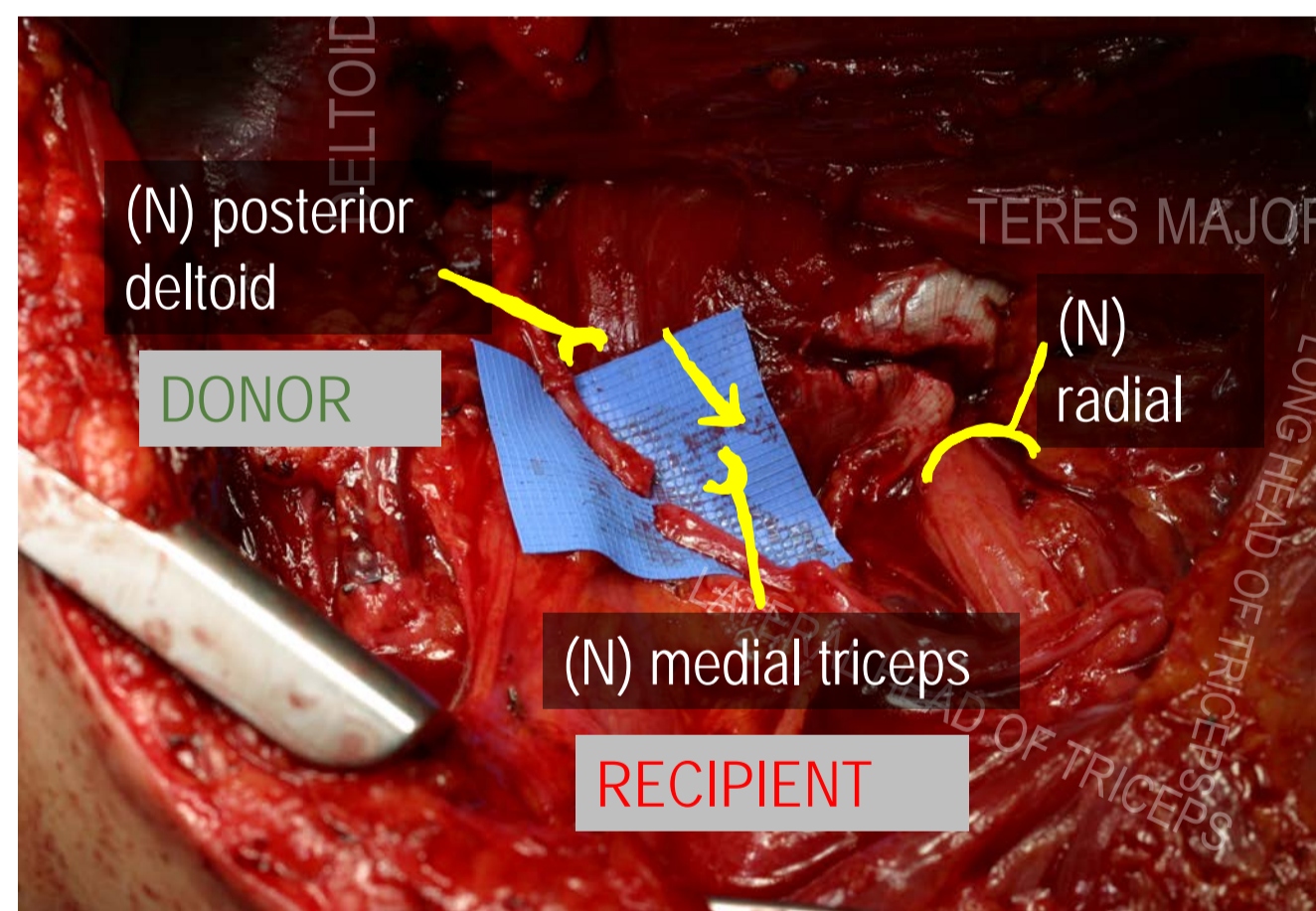
### 2. MEDIAL TRICEPS NERVE BRANCH IDENTIFICATION (RECIPIENT):

- Intraoperative stimulation: No contraction seen



### 4. DIRECT COAPTATION OF POSTERIOR DELTOID TO MEDIAL TRICEPS NERVES:

- “Donor distal, recipient proximal”
- Coaptation within 2 inches of medial triceps muscle
- Simultaneous Brachialis to AIN/FCR nerve transfer performed in the same extremity (left)

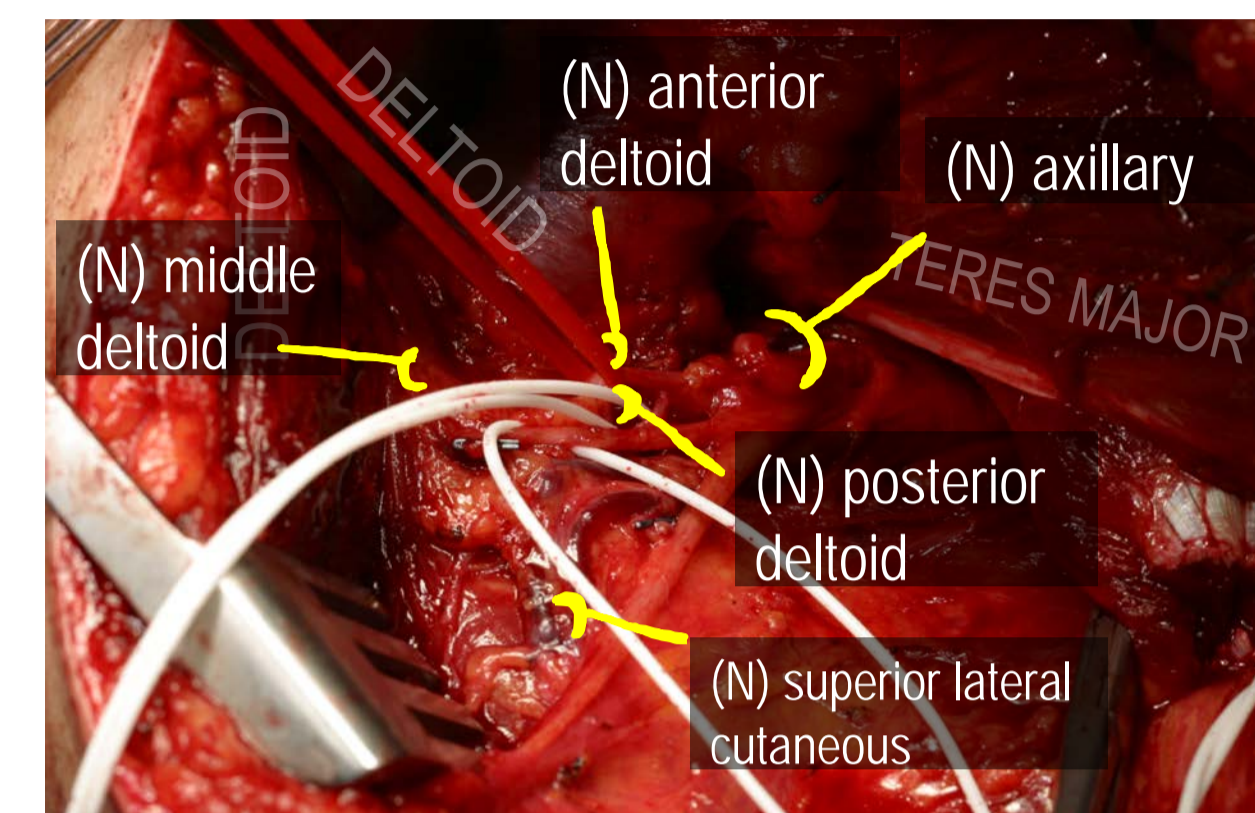


## Conclusions

- Posterior deltoid to medial triceps nerve transfer is a feasible method to restore elbow extension in SCI
- This is an analogous approach to the triceps-to-axillary nerve transfer for brachial plexus injury
- Early reinnervation of the triceps in cases of direct lower motor neuron injury may help to salvage the invaluable function of elbow extension in patients with tetraplegia.

### 3. AXILLARY NERVE - POSTERIOR DELTOID BRANCH IDENTIFICATION (DONOR):

- Intraoperative stimulation: normal



## RESULTS:

### Donor morbidity:

- Postoperative shoulder abduction: 5/5
- Specific testing posterior deltoid: 4/5, normalized by 4 months follow-up

### Outcome: Triceps Reinnervation:

- 10 mo follow-up: improved elbow extension range of motion with gravity eliminated
- Patient notes improved ability to reach out for objects (i.e. medical charts)



## Challenges

- Contribution of nerve transfer to medial triceps vs spontaneous recovery of lateral/long triceps?
- Further define role of “acute” nerve transfer in SCI?
- Appropriate identification of “acute” nerve transfer candidates?