**Introduction**

- Martin-Gruber anastomosis (MGA), from median to ulnar, usually occurs in the forearm, in approximately 20% of the population.
- Axons destined for ordinarily ulnar-innervated thenar, hypothenar, and dorsal interosseous muscles are involved, travelling most of their course in the median nerve instead.
- Muscles receiving mixed innervation can benefit from collateral reinnervation if either source nerve is lost (median or ulnar).
- We present a patient who likely benefited from such an anastomosis, with robust collateral reinnervation after complete loss of ulnar innervation proximally.

**Patient**

36-year-old male with a gunshot to his left arm. The bullet exited posterior medial, 2 inches proximal to the medial epicondyle.

**Clinical Course**

- **Initial Exam**
  - No ulnar-innervated activation
  - Significant weakness in median-innervated muscles
  - MRC 3 FPL, MRC 4 FDS and wrist flexion, and no thenar activation
  - Sensation reduced in an ulnar distribution

- **At 6 months**
  - Six months post-injury, MRC 4 in all ulnar-innervated muscles
  - Full strength elsewhere
  - EMG: borderline CMAP amplitudes in ADM and FDI, stimulating ulnar at wrist and median at elbow
  - No recordable response from proximal ulnar stimulation (above or below elbow)

- **At 9 Months**
  - Nine months post-injury, he had near full strength in all hand and forearm muscles.
  - Decreased sensation remained in the ulnar distribution.

**Discussion**

- In this interesting and fortunate patient, the MGA acted as a natural median to ulnar nerve transfer
- Enough anastomotic axons were present to restore near normal function through collateral reinnervation
- Functional rehabilitation was not required as no axons were repurposed
- If ulnar grafting were pursued, the fate of regrown native ulnar axons on finding their muscle fibers occupied by collateral sprouts is unclear but could be evaluated through motor unit number estimate quantitative neurophysiologic techniques.
- These techniques could also be used to inform on the critical number of anastomotic axons required to restore adequate function and thereby the possibility for early intervention and improved outcomes.

**Median Responses**

**Ulnar Responses**

**EMG of ADM**

**Saved by Martin-Gruber: Anastomosis Restores Function after Complete Ulnar Nerve Injury**

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