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Electrodiagnostic Evaluation of Individuals Implanted With Extracellular Matrix for the Treatment of Volumetric Muscle Injury: Case Series.

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Abstract: BACKGROUND: Electrodiagnosis can reveal the nerve and muscle changes following surgical placement of an extracellular matrix (ECM) bioscaffold for treatment of volumetric muscle loss (VML). OBJECTIVE: The purpose of this study was to characterize nerve conduction study (NCS) and electromyography (EMG) changes following ECM bioscaffold placement in individuals with VML. The ability of presurgical NCS and EMG to be used as a tool to help identify candidates who are likely to display improvements postsurgically also was explored. DESIGN: A longitudinal case series design was used. METHODS: The study was conducted at the McGowan Institute for Regenerative Medicine at the University of Pittsburgh. Eight individuals with a history of chronic VML participated. The intervention was surgical placement of an ECM bioscaffold at the site of VML. The strength of the affected region was measured using a handheld dynamometer, and electrophysiologic evaluation was conducted on the affected limb with standard method of NCS and EMG. All measurements were obtained the day before surgery and repeated 6 months after surgery. RESULTS: Seven of the 8 participants had a preoperative electrodiagnosis of incomplete mononeuropathy within the site of VML. After ECM treatment, 5 of the 8 participants showed improvements in NCS amplitude or needle EMG parameters. The presence of electrical activity within the scaffold remodeling site was concomitant with clinical improvement in muscle strength. LIMITATIONS: This study had a small sample size, and participants served as their own controls. The electromyographers and physical therapists performing the evaluation were not blinded. CONCLUSIONS: Electrodiagnostic data provide objective evidence of physiological improvements in muscle function following ECM placement at sites of VML. Future studies are warranted to further investigate the potential of needle EMG as a predictor of successful outcomes following ECM treatment for VML.