Title: Searching for the Origin: Advances in MR Neurography for Nerve Injury Localization and Surgical Planning

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Abstract

Peripheral nerve injuries often present complex diagnostic and localization challenges, which can result in delays in proper intervention. Magnetic resonance neurography (MRN) has increasingly become a valuable part of the diagnostic and preoperative toolkit. Recent advancements in hardware and software technologies have greatly enhanced MRN's capabilities, turning it into a powerful modality for both preoperative planning and postoperative assessment of persistent neurological deficits.

As an adjunct to electrodiagnostic studies, high-resolution MRN provides a comprehensive overview of the neuromuscular system that enables precise localization of nerve injuries, assessment of severity, and visualization of surrounding muscles and adjacent structures. By directly depicting nerve signal abnormalities, discontinuities, and neuroma formation, MRN empowers clinicians with greater diagnostic confidence and equips surgeons with critical information to plan more effective interventions. Its integration into the surgical workflow can enhance targeting accuracy, allow for personalized surgical approaches, and ultimately lead to improved functional recovery and clinical outcomes.