



MRI Neurography

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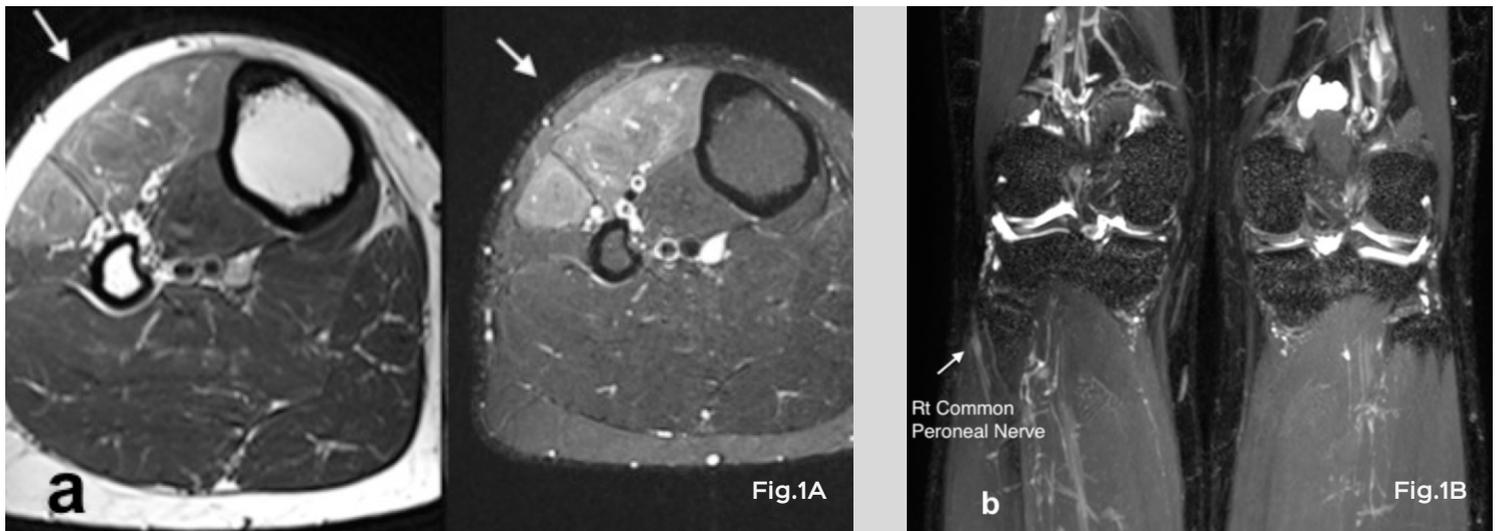
High resolution 3T neurography using SHINKEI [nerve-SHeath signal increased with INKed rest-tissue rare Imaging] sequence is an excellent modality to directly visualise the peripheral as well as deep nerve plexus throughout the body.

Earlier cross-sectional imaging for nerve pathologies was usually aimed at detecting the various compressive lesions/masses along the course of the nerves. Nerve pathologies however include a vast spectrum beyond masses and compression and include traumatic, inflammatory and metabolic, processes. Direct visualisation of nerves to diagnose these pathologies was always a challenge.

Neurography is akin to angiography where we can see the entire nerve course and morphology and accurately comment not only on gross changes like loss of continuity, abnormal course and extrinsic compression but also on microstructural changes in the nerves such as neuropraxia and axotomesis seen as thickening and increased signal of the nerves and distortion of normal fascicular architecture (Fig. 1).

It is therefore useful in differentiating radiculopathy due to structural neural compression (Fig. 2) and plexopathy/neuropathy due to other causes like diabetes, chronic inflammatory demyelinating neuropathy, myositis, lymphoma, endometriosis, nerve injury etc. (Fig. 3).

Detailed anatomic information can also be provided for surgical intervention. Structural variations in nerve like conjoint nerve roots and bifid nerves are also beautifully seen.



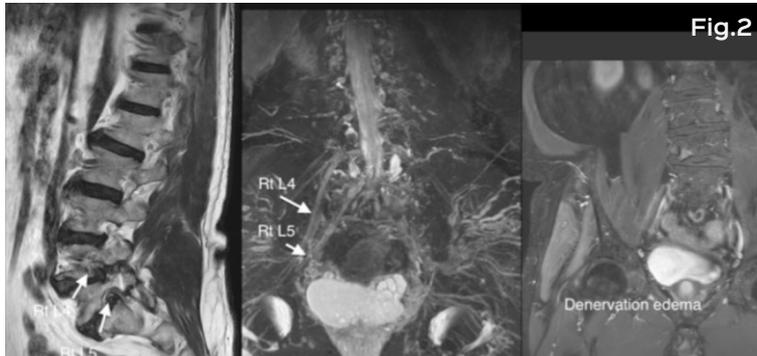
Case 1 (A, B): 23-years old man with a right foot drop. T2W and STIR axial (A) images of the proximal leg show denervation edema of the anterior compartment muscles (arrow) but without an obvious mass or compressive pathology. MRI neurography (B) shows focal thickening with increased signal of the right common peroneal nerve (arrow) as it winds around the fibular head suggestive of functional neuropathy most likely due to repetitive injury from habitual leg crossing/repetitive exercise like cycling.



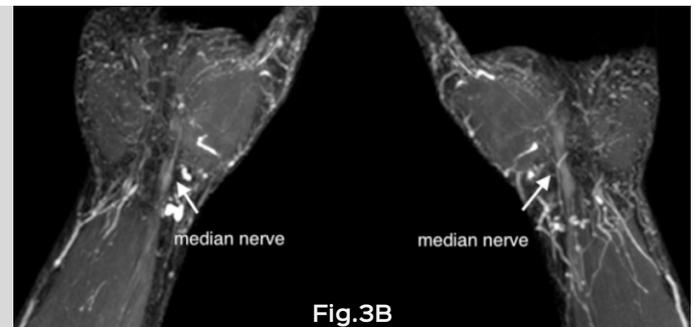
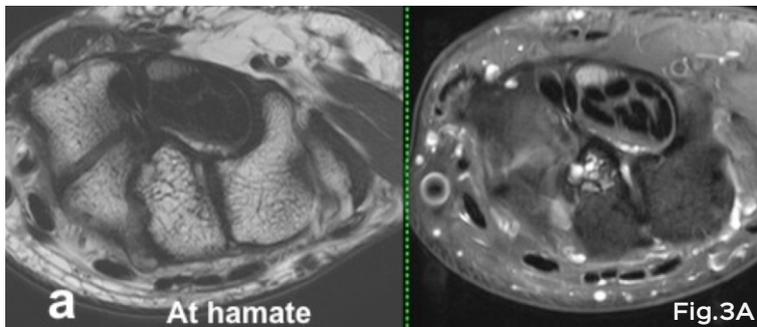
At a glance:

- Nerves can be involved in multiple pathologies.
- Standard MRI imaging shows gross pathology including tumors well

- MRI neurography using newer sequences like SHINKEI shows intrinsic nerve abnormalities that allow us to make a diagnosis in situations where earlier it was difficult or impossible.



Case 2: 74-years old man with weakness in right hip abduction and clinical suspicion of right sided lumbosacral plexopathy. Sagittal T2W image (left) shows severe foraminal stenosis causing compression of the right L4 and right L5 nerve roots. MRI neurography (middle image) shows thickening with increased signal of the right L4 and L5 nerves indicating right superior gluteal nerve involvement. Denervation edema of the right gluteal muscles is also seen (right image).



Case 3 (A, B): 36 years old male surgeon with tingling and numbness in the fingers and clinical suspicion of carpal tunnel syndrome. Axial T2 W and fat-sat PD images (A) at the level of the hamate show mild increased signal in the median nerve but without any focal pathology in the carpal tunnel to suggest compression. MRI neurography (B) clearly shows increased signal in the left median nerve with mild increased signal also in the right median nerve suggestive of moderate and mild functional neuropathy on left and right sides respectively.

The various deep plexuses like the lumbosacral and the brachial plexus as well as the peripheral nerves like the median, peroneal nerves etc. are well visualised.

MR neurography is therefore an excellent non-invasive technique to answer a lot of questions pertaining to the nerves due to the excellent mapping and direct depiction of the nerve course and morphology.

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