

Prospective Study on Radiculopathy: Incremental Value of MR Neurography over Non-contributory Spine MRI

Avneesh Chhabra^{1,2}, Sahar Farahani², Gaurav Thawait², John A Carrino², and Allan Belzberg³

¹Radiology, UTSW, Dallas, Texas, United States, ²Radiology, Johns Hopkins, Baltimore, Maryland, United States, ³Plastic surgery, Johns Hopkins, Baltimore, Ma, United States

PURPOSE: Radiculopathy refers to pain, weakness, numbness, or tingling in the leg or arm with a lifetime incidence of 40% and prevalence of 1.6-43% of the population. MRI is the most common non-invasive modality used in delineation of the site and cause of radiculopathy. However, a clinical dilemma frequently occurs when patient with radiculopathy has normal or minimally abnormal spine MRI. We tested role of 3 Tesla MR Neurography (MRN) in a prospective series of unilateral radiculopathy patients with non-contributory MRI.

METHOD AND MATERIALS: In this ongoing prospective study, 10 subjects (3 men, 7 women; mean age 54 years, range 22-74 years) with unilateral radiculopathy were studied on 3.0 T MR scanner (Trio, Siemens, Erlangen, Germany). All subjects were studied using 2D and 3D anatomic MRN (isotropic 3D TSE imaging for nerves and LS spine) and DTI techniques (single shot EPI, 12 encoding directions; b-values- 0, 800 and 1000 s/mm²), resulting in a total imaging time of 45 minutes. Descriptive statistics were obtained.

RESULTS: The clinical findings included pain (10/10), sensory symptoms (2/10), motor symptoms (5/10), Tinel sign (0/10), trauma (3/10) and previous surgery (2/10). In a blinded evaluation, all 10 studies demonstrated neural and/or neuromuscular abnormality corresponding to site of radiculopathy and no neuromuscular abnormality on the opposite side. The spectrum of abnormalities and variants included split femoral nerve (1/10), femoral neuropathy (2/10), lateral femoral cutaneous neuropathy (2/10), split sciatic (3/10), lumbosacral nerve root abnormality (3/10), sciatic neuropathy (9/10), obturator neuropathy (1/10) and double crush syndrome (1/10). Contributory lumbar disc herniation was seen in 2/10 cases, where conventional lumbar MRI could not pin-point the site of abnormality. Other incidental abnormalities included hip labral tear (1/10), hamstring tear (1/10), prostate hypertrophy (1/10), sacral insufficiency fractures (1/10), renal cysts (1/10), transitional lumbosacral vertebra (1/10), trochanteric bursitis (2/10), ischiofemoral impingement (1/10) and colonic diverticulosis (1/10), out of which only transitional anatomy was apparent on conventional MRI. On DTI tensor images, sciatic neuropathy was easily apparent (Fig. 1).

CONCLUSION: MRN is useful modality for evaluation of patients with non-contributory MRI as it can delineate etiology and provide direct objective and non-invasive evidence of neuromuscular pathology.

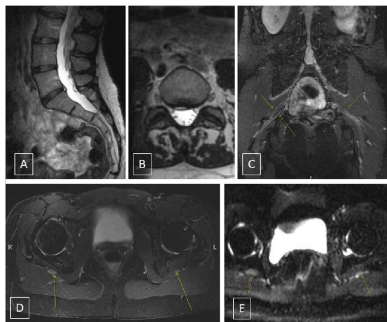


Figure1: Piriformis syndrome: 52-year-old woman with right leg pain and partial foot drop for 2 years. Outside MRI L spine reported negative.

MRN LS plexus. A, B: 3D L5-S1 annular tear. C: 3D LS plexus- Split right sciatic nerve.

D: 2DT2W- Enlarged and bright right sciatic nerve.

E: DTI tensor image- Abnormal right sciatic nerve.