Plexopathy
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
1. Maravilla KR, Bowen BC. Imaging of the peripheral nervous system: evaluation of peripheral neuropathy and plexopathy. *AJNR Am J Neuroradiol.* 1998;19(6):1011-1023.	Review/Other-Dx	N/A	To review imaging of peripheral neuropathy and plexopathy.	Preliminary results of high-resolution MRI are promising—individual normal nerves can be imaged, and features of intraneural topography displayed. The morphology and signal intensity characteristics that distinguish abnormal from normal nerves are shown, but the accuracy, sensitivity, and clinical utility of these findings is unknown.	4
2. Tharin BD, Kini JA, York GE, Ritter JL. Brachial plexopathy: a review of traumatic and nontraumatic causes. *AJR Am J Roentgenol.* 2014;202(1):W67-75.	Review/Other-Dx	N/A	To describe brachial plexus anatomy in the context of key landmarks, illustrates common findings of traumatic and nontraumatic causes of brachial plexopathies, describes symptoms associated with these maladies, and explains how proper diagnosis impacts clinical decisions.	No results stated in abstract.	4
3. Guvencer M, Iyem C, Akyer P, Tetik S, Naderi S. Variations in the high division of the sciatic nerve and relationship between the sciatic nerve and the piriformis. *Turk Neurosurg.* 2009;19(2):139-144.	Review/Other-Dx	50 gluteal regions in 25 male cadavers	To define the level of the sciatic nerve exit and of the sciatic nerve division.	In 52% of the cases, the sciatic nerve exited the pelvis as a whole nerve without any division, whereas in 48% a high division was observed. Branches of the sciatic nerve left the pelvis through the infrapiriform foramen (IP) as 2 separate nerves In 24%. One branch of the sciatic nerve left the pelvis through the infrapiriform foramen and other through a different route in another 24%.	4
4. Smoll NR. Variations of the piriformis and sciatic nerve with clinical consequence: a review. *Clin Anat.* 2010;23(1):8-17.	Meta-analysis	18 studies and 6,062 cadavers; 8 surgical case series with 130 cases of piriformis syndrome	To systematically review and meta-analyses the prevalence of piriformis and sciatic nerve anomalies in humans using previously published literature, and to review the anatomical abnormalities present in surgical case series of procedures for patients suffering from piriformis syndrome.	After pooling the results of 18 studies and 6,062 cadavers, the prevalence of the anomaly in cadavers was 16.9%; 95% CI, 16.0%–17.9%. The prevalence of the piriformis and sciatic nerve anomaly in the surgical case series was 16.2%, 95% CI: 10.7%–23.5%. The difference between the 2 groups was not found to be significant 0.74%; 95% CI: -5.66 to 7.13; *P*=0.824.	M

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
5. Windisch G, Braun EM, Anderhuber F. Piriformis muscle: clinical anatomy and consideration of the piriformis syndrome. *Surg Radiol Anat.* 2007;29(1):37-45.	Review/Other-Dx	112 cadavers	To elucidate the anatomical variations of the piriformis muscle referred to the diagnostic and treatment of the piriformis syndrome.	The distance between the musculotendinous junction and the insertion was measured and the piriformis categorized into 3 types: Type A (71, 63.39%): long upper and short lower muscle belly; Type B (40, 35.71%): short upper and long lower muscle belly; Type C (1, 0.9%): fusion of both muscle bellies at the same level. The diameter of the piriformis tendon at the level of the musculotendinous junction ranged from 3 to 9 mm (mean: 6.3 mm). The piriformis showed the following possible fusions with adjacent tendons. In type 1 (60, 53.57%) a rounded tendon of the piriformis reached the upper border of the greater trochanter. In type 2 (33, 29.46%) it first joined into the gemellus superior tendon and at last both fused with the obturator internus tendon and inserted into the medial surface of the greater trochanter. A fusion of the piriformis, obturator internus and gluteus medius tendon with the same insertion area as above was observed in type 3 (15, 13.39%) and finally in type 4 (4, 3.57%) the tendon fused with the gluteus medius to reach the upper surface of the greater trochanter.	4
6. American College of Radiology. ACR Appropriateness Criteria®: Chronic Neck Pain. Available at: https://acsearch.acr.org/docs/69426/Narrative/.	Review/Other-Dx	N/A	Evidence-based guidelines to assist referring physicians and other providers in making the most appropriate imaging or treatment decision for a specific clinical condition.	N/A	4
7. American College of Radiology. ACR Appropriateness Criteria®: Low Back Pain. Available at: https://acsearch.acr.org/docs/69483/Narrative/.	Review/Other-Dx	N/A	Evidence-based guidelines to assist referring physicians and other providers in making the most appropriate imaging or treatment decision for a specific clinical condition.	N/A	4
8. American College of Radiology. ACR Appropriateness Criteria®: Imaging in the Diagnosis of Thoracic Outlet Syndrome. Available at: https://acsearch.acr.org/docs/3083061/Narrative/.	Review/Other-Dx	N/A	Evidence-based guidelines to assist referring physicians and other providers in making the most appropriate imaging or treatment decision for a specific clinical condition.	N/A	4

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9. Soldatos T, Andreisek G, Thawait GK, et al. High-resolution 3-T MR neurography of the lumbosacral plexus. *Radiographics.* 2013;33(4):967-987.	Review/Other-Dx	N/A	To review the lumbosacral plexus anatomy and the spectrum of diseases that affect the lumbosacral plexus with their corresponding imaging findings at 3T MRN.	In the evaluation of lumbosacral plexopathy, 3T MRN is a valuable adjunct to clinical examination and electrodiagnostic testing because it provides anatomic information that is not obtainable with other modalities and is useful for assessing lesions. Knowledge of the imaging patterns of the lumbosacral plexus and the conditions that affect it may enable radiologists to provide detailed reports and contribute to optimized patient-tailored treatment.	4
10. Tagliafico A, Succio G, Emanuele Neumaier C, et al. MR imaging of the brachial plexus: comparison between 1.5-T and 3-T MR imaging: preliminary experience. *Skeletal Radiol.* 2011;40(6):717-724.	Observational-Dx	30 consecutive patients	To compare 1.5T and 3T MRI of the brachial plexus.	Signal-to-noise and contrast-to-noise ratios were significantly higher on 3T MRI than on 1.5T MRI (Friedman test) for all sequences. Nerve visibility was significantly better on 3T MRI than on 1.5T MRI (paired sign test). Pathological findings (n = 30/30) were seen equally well with both field strengths. MRI diagnoses did not differ for the 1.5- and 3T protocols.	3
11. Tagliafico A, Succio G, Serafini G, Martinoli C. Diagnostic accuracy of MRI in adults with suspect brachial plexus lesions: a multicentre retrospective study with surgical findings and clinical follow-up as reference standard. *Eur J Radiol.* 2012;81(10):2666-2672.	Observational-Dx	157 patients	To evaluate brachial plexus MRI accuracy with surgical findings and clinical follow-up as reference standard in a large multicenter study.	The overall sensitivity and specificity with 95% CIs were: 0.810/0.914; (0.697–0.904). Overall PPV, pre-test probability, NPV, likelihood ratio +, likelihood ratio –, and accuracy: 0.823, 0.331, 0.905, 9.432, 0.210, 0.878. The overall diagnostic accuracy of brachial plexus MRI calculated on a per-patient base is relatively high. The specificity of brachial plexus MRI in patients suspected of having a space-occupying mass is very high. The sensitivity is also high, but there are false-positive interpretations as well.	3
12. ACR Radiology Coding Source™ March-April 2010. Available at: http://www.acr.org/Advocacy/Economics-Health-Policy/Billing-Coding/Coding-Source-List/2010/Mar-Apr-2010/QA.	Review/Other-Dx	N/A	To present Medicare policies with electronic coding publication for diagnostic and interventional radiology, radiation oncology, nuclear medicine and medical physics coding and reimbursement news.	No results stated in abstract.	4
13. Chhabra A, Thawait GK, Soldatos T, et al. High-resolution 3T MR neurography of the brachial plexus and its branches, with emphasis on 3D imaging. *AJNR Am J Neuroradiol.* 2013;34(3):486-497.	Review/Other-Dx	N/A	To illustrate the relevant anatomy and the various common pathologies of the brachial plexus and describe the respective imaging findings at 3T MRN, with emphasis on 3D imaging.	No results stated in abstract.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
14. Torres C, Mailley K, Del Carpio O'Donovan R. MRI of the brachial plexus: modified imaging technique leading to a better characterization of its anatomy and pathology. *Neuroradiol J.* 2013;26(6):699-719.	Review/Other-Dx	N/A	To describe a modified technique used in our institution for the evaluation of the brachial plexus which led to a substantial decrease in scanning time and to better visualization of all the segments of the brachial plexus from the roots to the branches, in only 1 or 2 images, facilitating therefore the understanding of the anatomy and the interpretation of the study.	No results stated in abstract.	4
15. Chalian M, Faridian-Aragh N, Soldatos T, et al. High-resolution 3T MR neurography of suprascapular neuropathy. *Acad Radiol.* 2011;18(8):1049-1059.	Review/Other-Dx	13 patients	To illustrate the imaging findings on high-resolution 3T MRN in patients with suprascapular nerve neuropathy.	2 cases were excluded due to suboptimal imaging related to motion degradation and poor signal-to-noise ratio. MRN depicted asymmetric enlargement and/or abnormal T2 hyperintensity of C5 nerve root (10/13 cases), C6 nerve root (10/13 cases), both C5 and C6 nerve roots (7/13 cases), upper trunk (11/13 cases) and suprascapular nerve (11/13 cases), and other brachial plexus segments involvement (4/13 cases). MR findings of denervation changes in the ipsilateral supraspinatus and infraspinatus muscles were detected in 12/13 cases. In all 7 cases where contrast-enhanced images were available, MRN demonstrated enhancement of the denervated muscles but did not provide any additional information regarding the nerve abnormality. None of the MRN studies revealed a mass lesion along the course of the suprascapular nerve.	4
16. Mallouhi A, Marik W, Prayer D, Kainberger F, Bodner G, Kasprian G. 3T MR tomography of the brachial plexus: structural and microstructural evaluation. *Eur J Radiol.* 2012;81(9):2231-2245.	Review/Other-Dx	N/A	To describe the most common MRN techniques for displaying the brachial plexus.	No results stated in abstract.	4
17. Zhang ZW, Song LJ, Meng QF, et al. High-resolution diffusion-weighted MR imaging of the human lumbosacral plexus and its branches based on a steady-state free precession imaging technique at 3T. *AJNR Am J Neuroradiol.* 2008;29(6):1092-1094.	Review/Other-Dx	N/A	To define structures of the human lumbosacral plexus with 3D DW-SSFP.	3D DW-SSFP clearly revealed detailed anatomy of the lumbosacral plexus and its branches. Results suggest that the sequence based on 3D DW-SSFP can be used for high-resolution MRI of the peripheral nervous system.	4

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
18. Tagliafico A, Succio G, Neumaier CE, et al. Brachial plexus assessment with three-dimensional isotropic resolution fast spin echo MRI: comparison with conventional MRI at 3.0 T. *Br J Radiol.* 2012;85(1014):e110-116.	Observational-Dx	8 patients and 6 healthy volunteers	To determine whether a 3D isotropic resolution fast spin echo sequence has similar image quality and diagnostic performance to a routine MRI protocol for brachial plexus evaluation in volunteers and symptomatic patients at 3 T. Institutional review board approval and written informed consent were guaranteed.	Image quality and nerve visibility did not significantly differ between fast spin echo-cube and the standard protocol ($P>0.05$). Acquisition time was statistically and clinically significantly shorter with fast spin echo-cube ($P<0.05$). Pathological findings were seen equally well with fast spin echo-cube and the standard protocol.	3
19. Delaney H, Bencardino J, Rosenberg ZS. Magnetic resonance neurography of the pelvis and lumbosacral plexus. *Neuroimaging Clin N Am.* 2014;24(1):127-150.	Review/Other-Dx	N/A	To review the advances in MRI that have allowed state-of-the-art high-resolution imaging to become a reality in clinical practice.	No results stated in abstract.	4
20. Du R, Auguste KI, Chin CT, Engstrom JW, Weinstein PR. Magnetic resonance neurography for the evaluation of peripheral nerve, brachial plexus, and nerve root disorders. *J Neurosurg.* 2010;112(2):362-371.	Observational-Dx	191 consecutive patients	To evaluate MRN for the evaluation of peripheral nerve, brachial plexus, and nerve root disorders.	The decrease in abnormal signal detected on subsequent MRN correlated with time from onset of symptoms and the time interval between MRN, but not with resolution of symptoms. 21 patients underwent MRN postoperatively to assess persistent, recurrent, or new symptoms; of these 3 (14.3%) required a subsequent surgery. MRN is a valuable adjunct to conventional MRI and EMG/nerve conduction studies in the evaluation and localization of nerve root, brachial plexus, and peripheral nerve lesions. The authors found that MRN is indicated in patients: 1) in whom EMG and traditional MRI are inconclusive; 2) who present with brachial plexopathy who have previously received radiation therapy to the brachial plexus region; 3) who present with brachial plexopathy and have systemic tumors; and 4) in patients under consideration for surgery for peripheral nerve lesions or after trauma. MRN is limited by the size of the nerve trunk imaged and the timing of the study.	3

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
21. Takahara T, Hendrikse J, Yamashita T, et al. Diffusion-weighted MR neurography of the brachial plexus: feasibility study. *Radiology.* 2008;249(2):653-660.	Review/Other-Dx	11 total patients	To introduce and assess DW MRN for imaging of the brachial plexus.	DW MRN showed a long trajectory of the brachial plexus in all healthy volunteers. In all patients, DW MRN clearly showed the location of the disease. The proposed DW MRN technique can be used to obtain an overview image of the brachial plexus, with excellent conspicuity of the nerves and surrounding structures.	4
22. Yoneyama M, Takahara T, Kwee TC, Nakamura M, Tabuchi T. Rapid high resolution MR neurography with a diffusion-weighted pre-pulse. *Magn Reson Med Sci.* 2013;12(2):111-119.	Observational-Dx	5 patients	To introduce, optimize, and assess the feasibility of a new scheme to rapidly acquire high-resolution volumetric neurographic images using a 3D turbo spin-echo sequence combined with a diffusion-weighted pre-pulse called improved motion-sensitized driven equilibrium: Diffusion-prepared MRN.	A higher b-value of 10 s/mm(2) was better in signal suppression of blood vessels, whereas an intermediate improved motion-sensitized driven equilibrium prep-time of 50 ms provided the best compromise between suppression of muscle signal and minimization of signal loss of nerves. With these parameters, the normal nerve structures showed high signal intensity, while the blood vessels and muscles were effectively suppressed. The optimized Diffusion-prepared MRN sequence clearly showed the 3D trajectory of the brachial plexus, lumbosacral plexus, and cranial nerves.	3

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
23. Pierce SM, Recht A, Lingos TI, et al. Long-term radiation complications following conservative surgery (CS) and radiation therapy (RT) in patients with early stage breast cancer. *Int J Radiat Oncol Biol Phys.* 1992;23(5):915-923.	Observational-Dx	1,624 patients	Retrospective study to examine long-term radiation complications following conservative surgery and radiation therapy in patients with early stage breast cancer.	The incidence of rib fracture was 2.2% (28/1300) among patients treated on a 4 MV linear accelerator, compared with 0.4% (1/276) for patients treated on a 6 or 8 MV machine (P=0.05). Of patients treated on a 4 MV machine, 0.4% (1/279) developed a rib fracture when a whole breast dose of ≤45 Gy was given, 1.4% (10/725) after receiving between 45 and 50 Gy, and 5.7% (17/296) following 50 Gy or higher. Tissue necrosis requiring surgical correction developed in 3 patients (0.18%) 22, 25, and 114 months after treatment. Presumed pericarditis (requiring hospitalization) was seen in 0.4% of women (3/831) who received radiation therapy to the left breast 2, 2, and 11 months after the start of treatment. 3 women (0.18%) developed sarcomas in the treatments field at 72, 107, and 110 months, for a 10-year actuarial rate of 0.8%. 2 of these sarcomas developed in areas of probable match-line overlap. 1 patient (0.06%) developed an in-field basal cell carcinoma at 42 months. In conclusion, the risk of significant complications following conservative surgery and radiation therapy for early stage breast cancer is low.	4
24. Varma DG, Moulopoulos A, Sara AS, et al. MR imaging of extracranial nerve sheath tumors. *J Comput Assist Tomogr.* 1992;16(3):448-453.	Observational-Dx	32 tumors 23 benign and 9 malignant	To retrospectively review MRI of extracranial nerve sheath tumors.	MRI cannot distinguish schwannomas from neurofibromas, and benign tumors may mimic malignant nerve sheath tumors. A target pattern may be visualized in some benign nerve sheath tumors, and evaluation of this sign with assessment of location and growth along nerves may help to avoid confusion with other lesions.	4
25. Duggins AJ, McLeod JG, Pollard JD, et al. Spinal root and plexus hypertrophy in chronic inflammatory demyelinating polyneuropathy. *Brain.* 1999;122 (Pt 7):1383-1390.	Observational-Dx	14 patients	To evaluate MRI on the spinal roots, brachial and lumbar plexuses in patients with CIDP.	Spinal root and plexus hypertrophy may be seen on MRI, especially in CIDP of long duration, and gadolinium enhancement may be present in active disease.	4
26. Van den Bergh PY, Thonnard JL, Duprez T, Laterre EC. Chronic demyelinating hypertrophic brachial plexus neuropathy. *Muscle Nerve.* 2000;23(2):283-288.	Review/Other-Dx	1 patient	To examine a case of chronic demyelinating hypertrophic brachial plexus neuropathy.	MRI disclosed marked brachial plexus hypertrophy.	4

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27. Van Es HW, Van den Berg LH, Franssen H, et al. Magnetic resonance imaging of the brachial plexus in patients with multifocal motor neuropathy. *Neurology.* 1997;48(5):1218-1224.	Review/Other-Dx	9 patients with multifocal motor neuropathy 8 patients with lower motor neuron disease 174 controls	To determine whether MRI of the brachial plexus is useful to distinguish multifocal motor neuropathy from lower motor neuron disease and whether abnormalities resemble those of CIDP.	MRI abnormalities of the brachial plexus in patients with multifocal motor neuropathy resemble those seen in CIDP and may be useful to distinguish multifocal motor neuropathy from lower motor neuron disease.	4
28. Masuda N, Hayashi H, Tanabe H. Nerve root and sciatic trunk enlargement in Dejerine-Sottas disease: MRI appearances. *Neuroradiology.* 1992;35(1):36-37.	Review/Other-Dx	1 patient	Case report on MRI and chest radiographs findings of a 23-year old female with weakness of upper and lower limbs since infancy.	Chest radiograph showed bilateral rounded soft tissue density masses at the apices. MRI showed marked enlargement of cervical and lumbar spinal nerve roots and revealed that the masses seen on chest radiograph were enlarged nerve roots; it also demonstrated enlarged sciatic trunks.	4
29. Tachi N, Kozuka N, Ohya K, Chiba S, Naganuma M. MRI of peripheral nerves and pathology of sural nerves in hereditary motor and sensory neuropathy type III. *Neuroradiology.* 1995;37(6):496-499.	Review/Other-Dx	2 patients	To examine patients with hereditary motor and sensory neuropathy type III based on nerve pathology and MRI of the sciatic nerve.	MRI of the sciatic nerve may be helpful for characterization of demyelinating disease and its prognosis.	4
30. Weiland TL, Scheithauer BW, Rock MG, Sargent JM. Inflammatory pseudotumor of nerve. *Am J Surg Pathol.* 1996;20(10):1212-1218.	Review/Other-Dx	2 cases	To describe cases of inflammatory pseudotumor.	Inflammatory pseudotumors must be included in the differential diagnosis of tumor-like lesions of peripheral nerve.	4
31. Bilbey JH, Lamond RG, Mattrey RF. MR imaging of disorders of the brachial plexus. *J Magn Reson Imaging.* 1994;4(1):13-18.	Observational-Dx	64 consecutive patients	To evaluate the role of MRI in suspected brachial plexus abnormalities.	Follow-up was available for 43 patients. MRI was 63% sensitive, 100% specific and 77% accurate. Sensitivity increased to 81%, and accuracy to 88% (specificity unchanged) when patients with neoplastic and traumatic disorders were considered separately. Study recommends MRI for a wide range of brachial plexus abnormalities.	3
32. Collins JD, Shaver ML, Disher AC, Miller TQ. Compromising abnormalities of the brachial plexus as displayed by magnetic resonance imaging. *Clin Anat.* 1995;8(1):1-16.	Review/Other-Dx	85	Review reports on MRI of the brachial plexus.	MRI and 3-D reconstruction increased the definition of the clinical anatomy and resulted in greater knowledge of patient care management.	4

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33. Posniak HV, Olson MC, Dudiak CM, Wisniewski R, O'Malley C. MR imaging of the brachial plexus. *AJR Am J Roentgenol.* 1993;161(2):373-379.	Review/Other-Dx	N/A	Review MRI of the brachial plexus, anatomy, and illustrate normal and abnormal findings.	The brachial plexus is well indicated by MRI. MRI has direct multiplanar imaging capability and superior soft-tissue resolution.	4
34. Sherrier RH, Sostman HD. Magnetic resonance imaging of the brachial plexus. *J Thorac Imaging.* 1993;8(1):27-33.	Review/Other-Dx	N/A	Describe MR anatomy of the brachial plexus in the axial, coronal, and sagittal planes and review MR characteristics of brachial plexopathy.	MRI has multiplanar capability and ability to differentiate nerves from vessels and surrounding soft tissues.	4
35. Beekman R, van den Berg LH, Franssen H, Visser LH, van Asseldonk JT, Wokke JH. Ultrasonography shows extensive nerve enlargements in multifocal motor neuropathy. *Neurology.* 2005;65(2):305-307.	Observational-Dx	21 patients	To evaluate how US can show extensive nerve enlargements in multifocal motor neuropathy.	US and electrophysiologic studies showed more abnormalities than expected on purely clinical grounds. Moreover, US revealed nerve enlargement without clinical or electrophysiologic abnormalities.	3
36. Cash CJ, Sardesai AM, Berman LH, et al. Spatial mapping of the brachial plexus using three-dimensional ultrasound. *Br J Radiol.* 2005;78(936):1086-1094.	Observational-Dx	10 volunteers	To map the orientation of the brachial plexus in relation to the first rib, carotid and subclavian arteries, using 3D US.	3D reconstructions showed the plexus, changing its orientation from a vertical alignment in the interscalene region to a more horizontal alignment in the supraclavicular fossa. Spatial mapping of the brachial plexus is possible with 3D US using the subclavian artery and first rib as landmarks.	3
37. Graif M, Martinoli C, Rochkind S, et al. Sonographic evaluation of brachial plexus pathology. *Eur Radiol.* 2004;14(2):193-200.	Observational-Dx	28 patients	To examine the role of preoperative US in recognizing lesions in the brachial plexus and comparing them to surgical findings.	Abnormal US findings were detected in 20/28 patients. US depicted a spectrum of lesions of traumatic, neoplastic, and inflammatory nature in the brachial plexus. It provided useful information regarding the lesion site, extent, and anatomic relationships.	3
38. Gruber H, Glodny B, Galiano K, et al. High-resolution ultrasound of the supraclavicular brachial plexus--can it improve therapeutic decisions in patients with plexus trauma? *Eur Radiol.* 2007;17(6):1611-1620.	Observational-Dx	12 patients 168 plexus elements	Prospective, observational study to evaluate the impact of high-resolution US on recruitment for non-delayed surgery in patients with plexus trauma.	Major plexus lesions were correctly detected by high-resolution US in 9 patients (20 plexus elements). Analysis revealed PPV (1.0) and NPV (0.92) for the grading of traumatic plexus lesions. 9/11 patients with objective major lesions would have undergone early surgery based on high-resolution US findings alone.	3
39. Chhabra A, Lee PP, Bizzell C, Soldatos T. 3 Tesla MR neurography--technique, interpretation, and pitfalls. *Skeletal Radiol.* 2011;40(10):1249-1260.	Review/Other-Dx	N/A	To highlight the relative advantages and disadvantages of 3T MRN in the evaluation of peripheral neuropathies and to describe the high-resolution MRN technique on 3T MRI, along with the approach to its interpretation that has evolved at one institution.	No results stated in abstract.	4

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40. Millesi H. Brachial plexus injuries: management and results. In: Terzis JK, ed. *Microreconstruction of nerve injuries.* Philadelphia, Pa: WB Saunders; 1987:347-359.	Review/Other-Dx	N/A	Textbook.	N/A	4
41. Bertelli JA, Ghizoni MF. Use of clinical signs and computed tomography myelography findings in detecting and excluding nerve root avulsion in complete brachial plexus palsy. *J Neurosurg.* 2006;105(6):835-842.	Observational-Dx	32 patients	To investigate the usefulness of preoperative evaluation based on clinical testing and CT myelography in differentiating root rupture (that is, graftable root) from root avulsion in total brachial plexus palsy.	The combination of a positive Tinel sign and a positive shoulder protraction test accurately predicted the presence of a graftable root in 93.7% of the cases. A 96.8% rate of accuracy was attained if the results of the CT myelography were considered together with the clinical signs. The presence of Bernard-Horner syndrome and hand pain accurately indicated avulsion of the lower roots in 93.7% of the patients. CT myelography accurately predicted the condition of the lower roots in 100% of the cases. Total avulsion injury was observed in 5 cases (16%). The lower roots were avulsed in 94% of the cases. The C-5 and C-6 roots were grafted 40 times, and a suitable root stump for grafting lay in a retroscalenic position in 18 (45%) of the 40 cases. Preoperative assessment based on clinical examination and CT myelography allowed correct surgical planning in more than 90% of the cases.	3
42. Carvalho GA, Nikkhah G, Matthies C, Penkert G, Samii M. Diagnosis of root avulsions in traumatic brachial plexus injuries: value of computerized tomography myelography and magnetic resonance imaging. *J Neurosurg.* 1997;86(1):69-76.	Observational-Dx	135 cervical roots	Prospective study to determine the value of CT myelography and MRI in the diagnosis of root avulsions in traumatic brachial plexus injuries.	CT myelography-based diagnosis was 85%. MRI had accuracy of 52%. CT myelography using 1-3 mm axial slices is the most reliable method to evaluate preoperatively the presence of complete or partial root avulsion in traumatic brachial plexus injuries.	3
43. Aagaard BD, Maravilla KR, Kliot M. MR neurography. MR imaging of peripheral nerves. *Magn Reson Imaging Clin N Am.* 1998;6(1):179-194.	Review/Other-Dx	N/A	To describe appearance of normal peripheral nerves together with imaging characteristics of various types of nerve pathology.	MRN techniques permit imaging detection of peripheral nervous system pathology that in some cases allow earlier and more accurate diagnosis.	4

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44. Binder DK, Smith JS, Barbaro NM. Primary brachial plexus tumors: imaging, surgical, and pathological findings in 25 patients. *Neurosurg Focus.* 2004;16(5):E11.	Observational-Dx	25 consecutive patients	Retrospective review of imaging, surgical, and pathological findings in patients with primary brachial plexus tumors. Compared findings with those obtained in similar series.	Signs and symptoms revealed were palpable mass (60%), numbness/paresthesias (44%), radiating pain (44%), local pain (16%), and weakness (12%). Primary tumors arising in the brachial plexus are rare. Treatment can be improved by careful workup, surgical technique, and attention to pathological diagnosis.	3
45. Britz G, West G, Daily A, et al. Magnetic resonance imaging in evaluation and treating peripheral nerve problems. *Perspect Neuro.* 1995;6:53-66.	Review/Other-Dx	N/A	Review MRI in evaluation and treating peripheral nerve problems.	MRI can help to assess the location, extent and grade of a peripheral nerve injury.	4
46. Saifuddin A. Imaging tumours of the brachial plexus. *Skeletal Radiol.* 2003;32(7):375-387.	Review/Other-Dx	N/A	Review imaging features of brachial plexus tumors with emphasis on MRI.	Benign neurogenic tumors are well characterized with preoperative MRI. Benign non-neurogenic tumors, such as lipoma and fibromatosis, are also well characterized by MRI.	4
47. de Verdier HJ, Colletti PM, Terk MR. MRI of the brachial plexus: a review of 51 cases. *Comput Med Imaging Graph.* 1993;17(1):45-50.	Review/Other-Dx	51 cases	To retrospectively review cases of MRI of the brachial plexus.	T1-weighted sequences and double-echo (intermediate- and T2-weighted) spin-echo images. 20 had proven pathological brachial plexus involvement. 31 no brachial plexus involvement. 4 MRIs were not in agreement.	4
48. Adachi Y, Sato N, Okamoto T, et al. Brachial and lumbar plexuses in chronic inflammatory demyelinating polyradiculoneuropathy: MRI assessment including apparent diffusion coefficient. *Neuroradiology.* 2011;53(1):3-11.	Observational-Dx	13 consecutive patients 11 normal volunteers	To clarify the MRI characteristics of the brachial and lumbar plexuses in patients with CIDP using various kinds of sequences, including DWI.	In the patient group, diffuse enlargement and abnormally high signals were detected in 16/24 plexuses (66.7%) on STIR, a slightly high signal was detected in 12/24 plexuses (50%) on T1-weighted images, and a high-intensity signal was detected in 10/18 plexuses (55.6%) on DWIs with high ADC values. Contrast enhancement of the plexuses was revealed in 6/19 plexuses (31.6%) and was mild in all cases. There were statistically significant differences between the ADC values of patients with either swelling or abnormal signals and those of both normal volunteers and patients without neither swelling nor abnormal signals. There were no relationships between MRI and any clinical findings. STIR is sufficient to assist clinicians in diagnosing CIDP. T1-weighted images and DWIs seemed useful for speculating about the pathological changes in swollen plexuses in CIDP patients.	2

Plexopathy
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
49. Tsuchiya K, Fujikawa A, Tateishi H, Nitatori T. Visualization of cervical nerve roots and their distal nerve fibers by diffusion-weighted scanning using parallel imaging. *Acta Radiol.* 2006;47(6):599-602.	Observational-Dx	13 subjects	To report a technique developed for visualization of cervical nerve roots and their distal nerve fibers by DWI using parallel imaging. A maximum intensity projection for a stack of isotropic axial DWI obtained with parallel imaging applying a motion-probing gradient in 6 directions with a b-value of 500 s/mm^2 was performed.	Method was useful for visualizing the spinal cord and majority of the nerve roots, the dorsal root ganglia, and proximal peripheral nerves.	4
50. Zhang Z, Song L, Meng Q, et al. Morphological analysis in patients with sciatica: a magnetic resonance imaging study using three-dimensional high-resolution diffusion-weighted magnetic resonance neurography techniques. *Spine (Phila Pa 1976).* 2009;34(7):E245-250.	Observational-Dx	137 patients 32 controls	To investigate the effectiveness of 3D DW-SSFP in the diagnosis of sciatica.	Compared with the control group, the presence of nerve root compression or increased T2 signal intensity changes can be observed in all patients. The mean score of certainty of identifying the sciatic nerve and main branches was 1.76 +/- 0.4, which indicate that the sciatic nerve and main branches can be identified with certainty. The 3D DW-SSFP MRI with high spatial and sufficient contrast is an excellent technique to define the nature of sciatica and assists in prognostication and possibly in management.	3
51. Yuh EL, Jain Palrecha S, Lagemann GM, et al. Diffusivity measurements differentiate benign from malignant lesions in patients with peripheral neuropathy or plexopathy. *AJNR Am J Neuroradiol.* 2015;36(1):202-209.	Observational-Dx	23 patients	To characterize and compare the diffusivities of these lesions and demonstrate significant differences among benign and malignant peripheral nerve tumors and postradiation changes.	Both ANOVA and Kruskal-Wallis tests demonstrated a statistically significant difference in ADC values across the 3 groups (*P*=.000023, *P*=.00056, respectively). Post hoc pair-wise comparisons showed that the ADC within malignant tumors differed significantly from that within benign tumors and postradiation changes. ADC within benign tumors and postradiation changes did not differ significantly from each other.	3

Plexopathy
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
52. Tagliafico A, Calabrese M, Puntoni M, et al. Brachial plexus MR imaging: accuracy and reproducibility of DTI-derived measurements and fibre tractography at 3.0-T. *Eur Radiol.* 2011;21(8):1764-1771.	Observational-Dx	40 patients	To estimate intrastudy, intraobserver and interobserver reproducibility of DTI-derived measurements and fibre tractography at 3.0 T MRI in subjects without known brachial plexus pathology.	Minimum and maximum percent variability were 6% and 20% for fractional anisotropy (85%–93% reproducibility). For ADC minimum and maximum percent variability were 6% and 18% (86%–97% reproducibility). Quality of fibre tract was rated equal in 80% and slightly different in 20% of subjects. Minimum detectable differences between limb were 37% for fractional anisotropy and 32% for ADC. Intra- and inter-observer agreement was good. Evaluating the combined influence of the observer and of the repeated measurements the reproducibility was 81%–92%.	4
53. van der Jagt PK, Dik P, Froeling M, et al. Architectural configuration and microstructural properties of the sacral plexus: a diffusion tensor MRI and fiber tractography study. *Neuroimage.* 2012;62(3):1792-1799.	Review/Other-Dx	10 healthy volunteers including 1 patients	To demonstrate the feasibility of DTI and fiber tractography of the nerves of the sacral plexus in healthy volunteers.	There were no significant differences in any of the estimated diffusion measures between the right and left sided nerves or between the nerves L4 to S3 on an intra-subject basis. Furthermore, clinical feasibility of DTI and tractography in a child having spina bifida and neurogenic bladder dysfunction is demonstrated. The architectural configuration of the child's sacral plexus was comparable with the healthy volunteers and no significant disrupted nerve fibers were observed.	4
54. Vargas MI, Viallon M, Nguyen D, Delavelle J, Becker M. Diffusion tensor imaging (DTI) and tractography of the brachial plexus: feasibility and initial experience in neoplastic conditions. *Neuroradiology.* 2010;52(3):237-245.	Observational-Dx	6 volunteers 12 patients	To assess the feasibility and potential clinical applications of DTI and tractography in the normal and pathologic brachial plexus prospectively.	Reconstructed DTI (17/18) were of good quality (1 case could not be reconstructed due to artifacts). In all volunteers and in 11 patients, the roots and the trunks were clearly delineated with tractography. Mean fractional anisotropy and mean ADC values were as follows: 0.30 +/- 0.079 and 1.70 +/- 0.35 mm2/s in normal fibers, 0.22 +/- 0.04 and 1.49 +/- 0.49 mm2/s in benign neurogenic tumors, and 0.24 +/- 0.08 and 1.51 +/- 0.52 mm2/s in malignant tumors, respectively. In patients with fiber displacement alone, surgery confirmed the tractography findings, and excision was successful without sequelae. The preliminary data suggest that DTI with tractography is feasible in a clinical routine setting.	3

Plexopathy
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
55. Thyagarajan D, Cascino T, Harms G. Magnetic resonance imaging in brachial plexopathy of cancer. *Neurology.* 1995;45(3 Pt 1):421-427.	Observational-Dx	71 patients	Retrospectively review clinical records of patients with cancer and brachial plexopathy who had an MRI of the brachial plexus. MRIs were reevaluated in a blinded fashion. MRI was compared with CT.	MRI was highly predictive of tumor infiltration. MRI was very sensitive for brachial plexus abnormalities. MRI is better than CT.	2
56. Wittenberg KH, Adkins MC. MR imaging of nontraumatic brachial plexopathies: frequency and spectrum of findings. *Radiographics.* 2000;20(4):1023-1032.	Observational-Dx	195 patients 247 MRI studies	Retrospective study to evaluate the frequency and findings of MRI in patients with nontraumatic brachial plexopathy.	Findings: thickening and diffuse enhancement of the brachial plexus without focal mass and soft-tissue changes with low signal intensity on both T1- and T2-weighted images.	4
57. Wouter van Es H, Engelen AM, Witkamp TD, Ramos LM, Feldberg MA. Radiation-induced brachial plexopathy: MR imaging. *Skeletal Radiol.* 1997;26(5):284-288.	Observational-Dx	2 patients	To describe the MRI appearance of radiation-induced brachial plexopathy.	Radiation fibrosis can have either low or high signal intensities on T2-weighted images.	4
58. Hathaway PB, Mankoff DA, Maravilla KR, et al. Value of combined FDG PET and MR imaging in the evaluation of suspected recurrent local-regional breast cancer: preliminary experience. *Radiology.* 1999;210(3):807-814.	Observational-Dx	10 patients	To assess the performance and potential clinical effects of combined FDG-PET and MRI of the axilla and brachial plexus in patients suspected of having local-regional breast cancer metastases.	9 patients had local-regional breast cancer metastases. MRI was diagnostic for tumor in 5 patients and was indeterminate in 4 patients with axillary or chest wall metastases. With FDG-PET, metastatic tumor was positively identified in all 9 patients. MRI was useful for determining the relationship of metastatic tumor to axillary and supraclavicular neurovascular structures. FDG-PET helped confirm metastases in patients with indeterminate MRI findings and depicted unsuspected metastases outside the axilla. MRI and FDG-PET are complementary in detecting and characterizing local-regional breast cancer metastases. Combined FDG-PET and MRI provide useful treatment-planning data for patients clinically suspected of having recurrent axillary or supraclavicular breast cancer.	4

Plexopathy
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
59. Planner AC, Donaghy M, Moore NR. Causes of lumbosacral plexopathy. *Clin Radiol.* 2006;61(12):987-995.	Review/Other-Dx	N/A	Review focusing on diseases and disorders affecting the pathway as demonstrated by MRI and CT.	Review stresses the need to review the lumbosacral plexus in patients with nonspecific symptoms such as back, hip, pelvic pain, and in those who present with sciatica unaccompanied by demonstrable intervertebral disc prolapse. This review also illustrates that the imaging appearances may be nonspecific and re-enforce the importance of the clinical history and the use of tissue sampling to achieve an accurate diagnosis.	4

Evidence Table Key

Study Quality Category Definitions

- *Category 1* The study is well-designed and accounts for common biases.
- *Category 2* The study is moderately well-designed and accounts for most common biases.
- *Category 3* There are important study design limitations.
- *Category 4* The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:
  a) the study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
  b) the study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
  c) the study is an expert opinion or consensus document.
- M = Meta-analysis

Dx = Diagnostic

Tx = Treatment

Abbreviations Key

ADC = Apparent diffusion coefficient

CI = Confidence interval

CIDP = Chronic inflammatory demyelinating polyneuropathy

CT = Computed tomography

DTI = Diffusion tensor imaging

DWI = Diffusion-weighted imaging

DW-SSFP = Diffusion-weighted steady-state free precession imaging

EMG = Electromyography

FDG-PET = Fluorine-18-2-fluoro-2-deoxy-D-glucose-positron emission tomography

MRI = Magnetic resonance imaging

MRN = Magnetic resonance neurography

NPV = Negative predictive value

PPV = Positive predictive value

STIR = Short tau inversion recovery

US = Ultrasound