



MR imaging in cervical radiculopathy

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There are many indications for imaging of the cervical spine including trauma, osteoarthritis, myelopathy, radiculopathy and pain but this article will be limited to the assessment of radiculopathy.

Contributing factors to patients who have radiculopathy include the following:

- Instability
- Posterior and postero-lateral osteophyte formation
- Neurocentral joint osteophyte formation narrowing the neural foramina
- Postero-lateral disc herniation
- Foraminal disc herniation
- Other unexpected causes such as tumour

In practice, the assessment of radiculopathy in the cervical region in the vast majority of patients is effectively an assessment of postero-lateral and foraminal osteophyte formation and disc herniation although it is very important to exclude the occasional unexpected cause such as tumour.

Readily available techniques include plain film, CT and MRI.

Table 1 outlines the basic advantages and disadvantages of each of these technologies.

Modality	Instability	Postero-lateral and neurocentral joint osteophyte formation	Postero-lateral disc	Foraminal disc	Non-compressive / other causes
Plain film including flexion and extension	++	+	-	-	-
CT	-	++	+/-	-	-
MRI	-	++	++	++	++

Advantages of MRI in the cervical spine include the following:

- Imaging in multiple planes.
- Zero radiation exposure.
- Ability to manipulate the image e.g. T1 and T2 and gradient echo imaging with different tissue intensity characteristics.
- Excellent soft tissue contrast enabling the advantages outlined in Table 1.

Figures 1-4 demonstrate normal appearances in the cervical spine and illustrate the advantages of MRI as outlined previously.

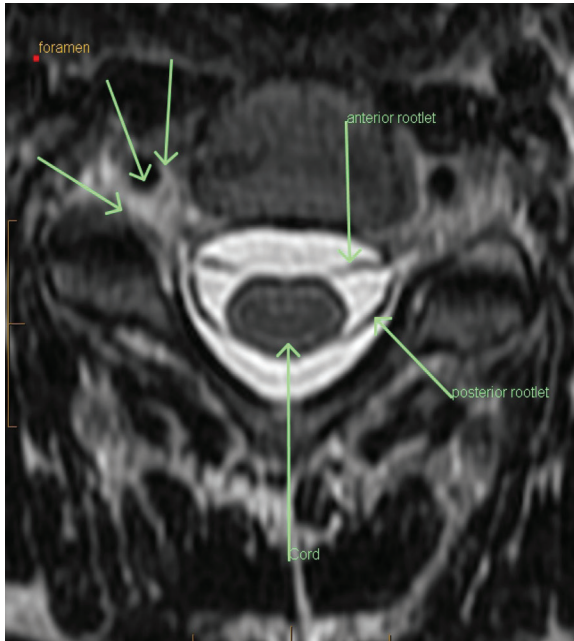


Figure 1:
Demonstrates axial T2 weighted imaging through the cervical spine. Note excellent visualisation of cervical rootlets (both anterior and posterior), and excellent foraminal detail. The cord is also well seen.

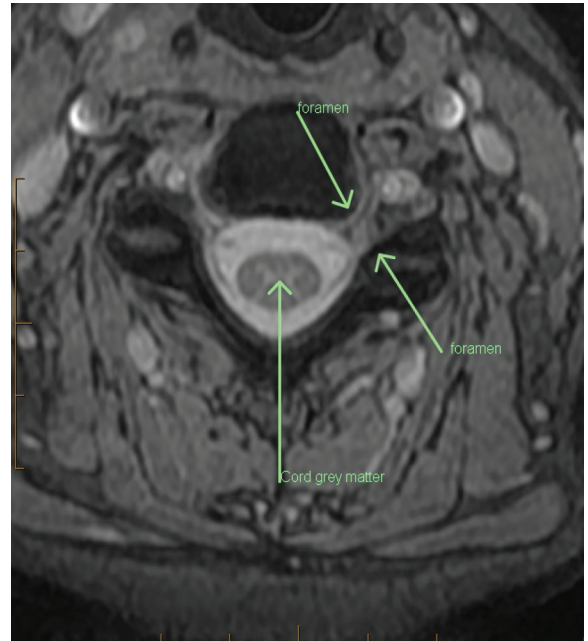


Figure 2:
Demonstrates axial gradient echo imaging through the cervical spine demonstrating similar soft tissue contrast with particularly good visualisation of the neural foramina containing nerve roots and surrounding CSF sleeves. The cord is particularly well seen and it is easy to differentiate between central grey and peripheral white matter.

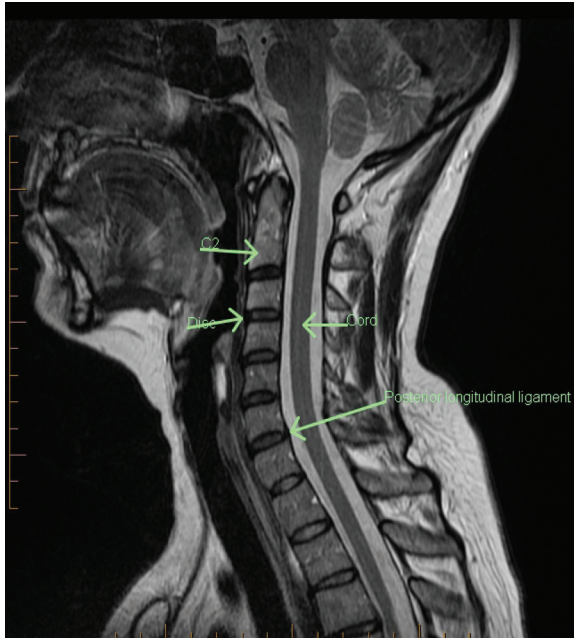


Figure 3:
Demonstrates sagittal T2 weighted imaging through the cervical spine demonstrating excellent visualisation of discs, CSF and cord.

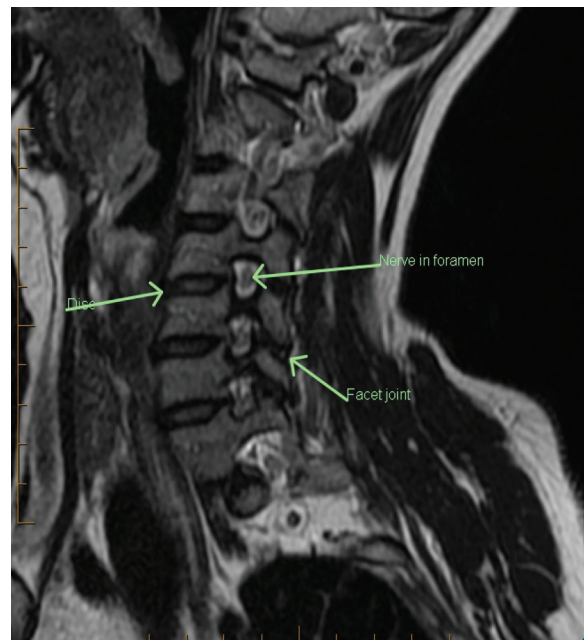


Figure 4:
Demonstrates oblique reconstruction showing excellent foraminal detail. Note excellent visualisation of nerve roots with no suggestion of compression.

Figures 5-11 demonstrate abnormal features in the cervical spine in patients with radiculopathy.

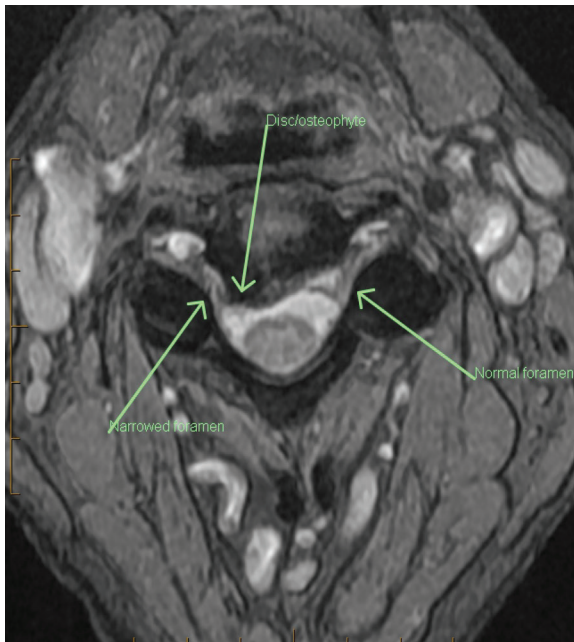


Figure 5:
Demonstrates substantial right postero-lateral disc and osteophyte formation narrowing the medial portion of the foramen. The opposite foramen is widely patent.

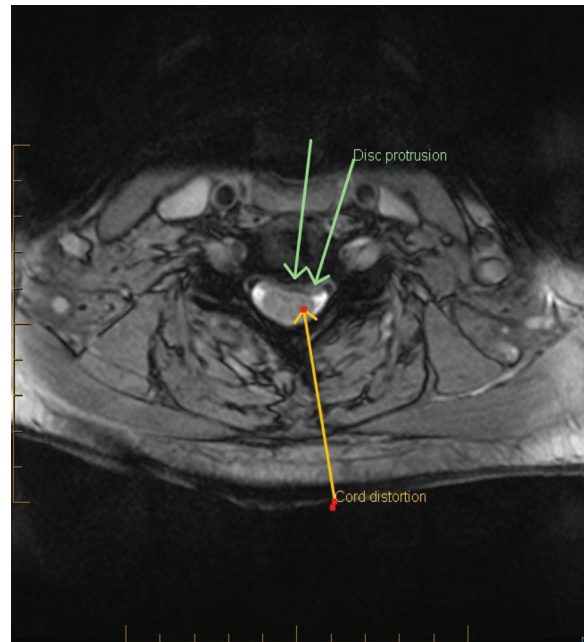


Figure 6:
Demonstrates moderate central and left postero-lateral disc protrusion minimally indenting the cord.

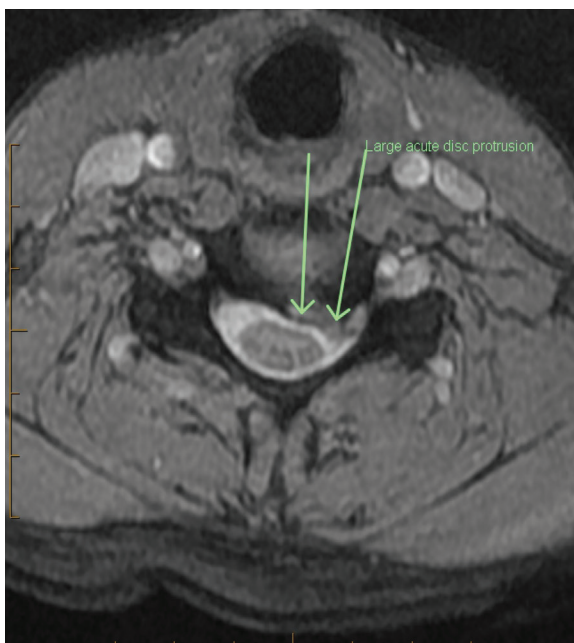


Figure 7:
Demonstrates substantial hyperintense acute left postero-lateral disc protrusion with medial foraminal narrowing and mild cord indentation.

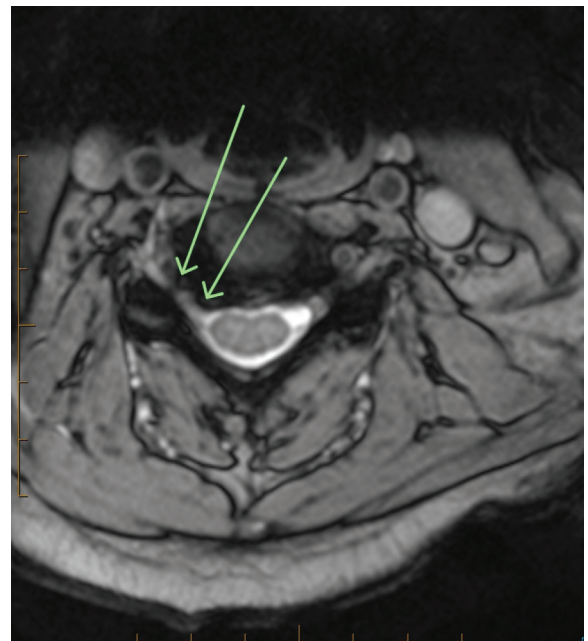


Figure 8:
Demonstrates right postero-lateral osteophyte formation and some neuro-central joint osteophyte formation resulting in significant bony foraminal compromise.

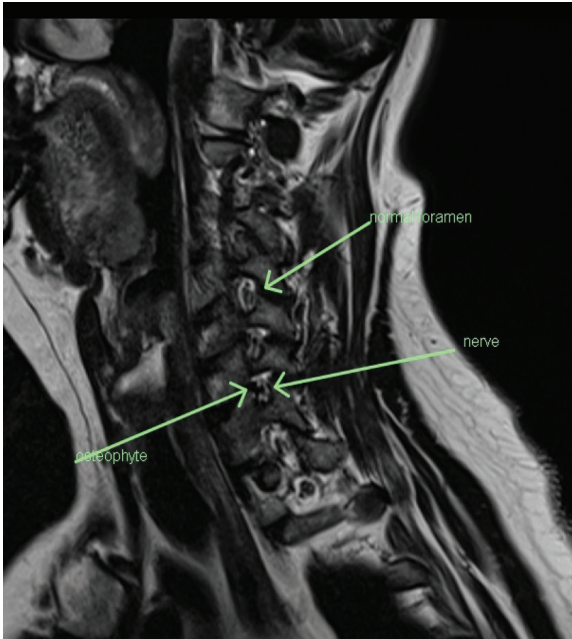


Figure 9:
Demonstrates an oblique reconstruction. The upper foramen is normal. The lower arrowed foramen demonstrates osteophyte formation anteriorly from the neuro-central joint resulting in nerve root compression.

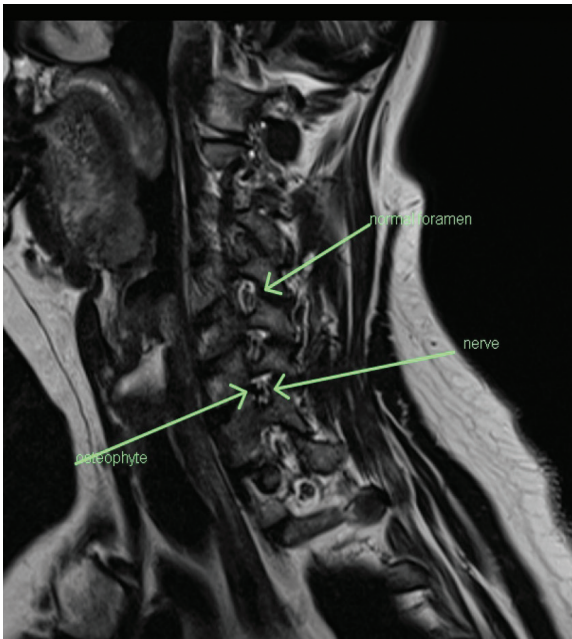


Figure 11:
Demonstrates significant central cord compression. This patient would not present with radiculopathy but clearly this is a very important diagnosis to make and MR is exquisitely sensitive for these changes.



Figure 10:
Demonstrates disc and osteophyte related lower cervical neural foraminal narrowing with a normal foramen above this. Two foramina are affected.

Summary

MR imaging is now reasonably widely available and is the examination of choice in patients who present with suspected cervical radiculopathy.

The reasons for this are outlined above but essentially, the modality demonstrates excellent soft tissue contrast with good visualisation of nerve roots and accurate assessment of all the common causes for nerve root compression, yielding appropriate pre-surgical information.



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Dr Nick Gelber has worked with I-MED since 2001, having previously worked at East Melbourne Radiology, mainly as clinic director at Mercy Radiology. He is an experienced general radiologist with a special interest in Neuroradiology and in particular MRI. He also does all general interventional procedures. Dr Gelber is on the RANZCR College Council.



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