

Diagnostic Imaging Pathways - Neck Pain (Non-Traumatic)

Population Covered By The Guidance

This pathway provides guidance on the imaging of adult patients with non-traumatic neck pain.

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Quick User Guide

Move the mouse cursor over the **PINK** text boxes inside the flow chart to bring up a pop up box with salient points.

Clicking on the **PINK** text box will bring up the full text.

The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

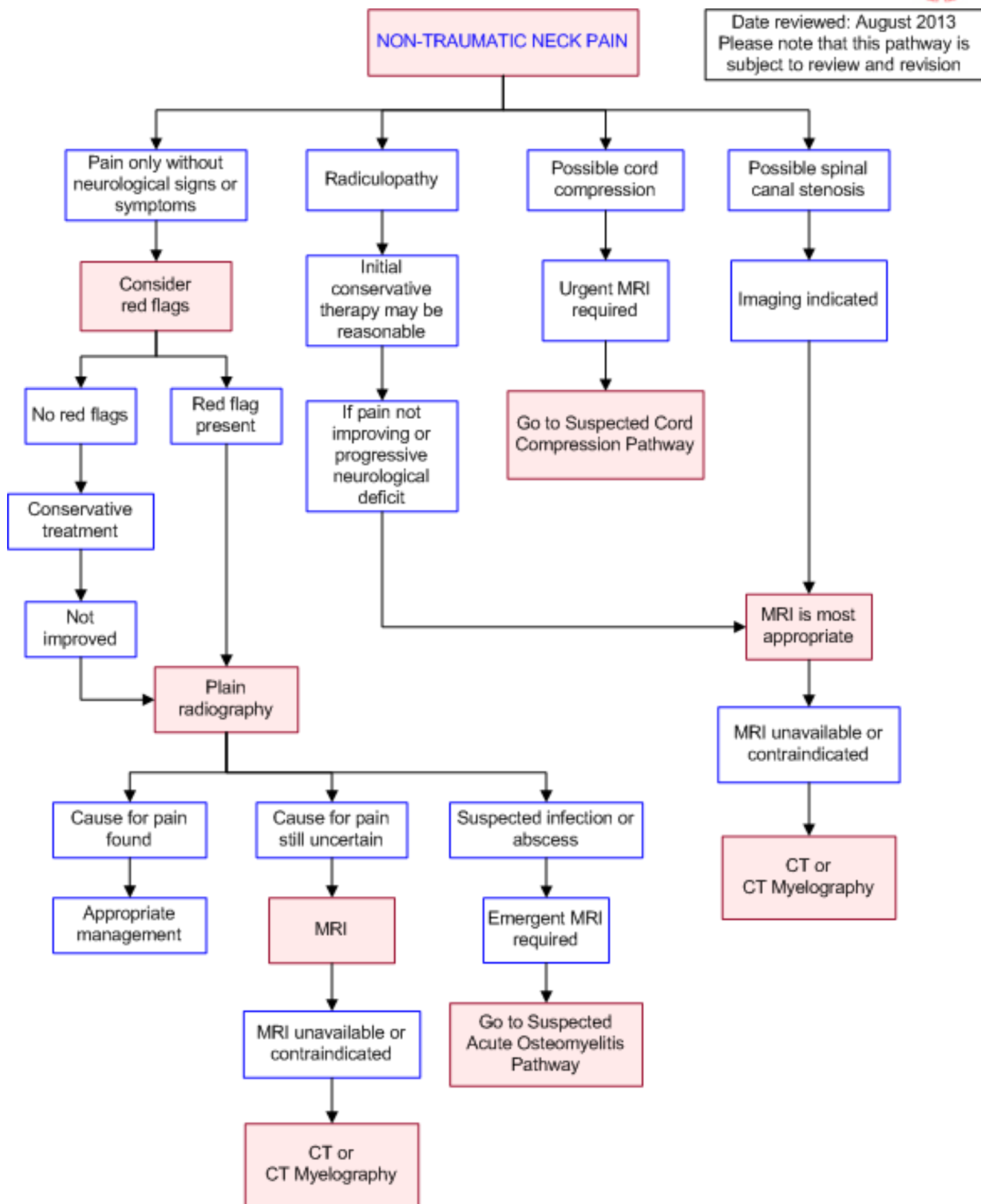


Image Gallery

Note: These images open in a new page

1a



Osteoarthritis

Image 1a and 1b (Plain Radiograph): Degenerative changes are seen in the mid cervical spine most marked at C4,5,6 with anterior and posterior osteophytes and loss of disc height. There is marked collapse of the C6 vertebral body (arrow) with approximately one third loss of vertebral body height. There is no subluxation on flexion or extension.

1b



Teaching Points

- 'Red flags' that prompt imaging are signs and symptoms that suggest neurological conditions, infection, malignancy, fracture or haemorrhage and include the development of neurologic signs and symptoms, unexplained weight loss, fever, history of malignancy or immunosuppression, intravenous drug use, presence of a rheumatological condition, age > 50, severe headaches, dysphagia, nausea and vomiting
- The diagnostic yield of plain radiography for the assessment of non-traumatic neck pain is low
- If there are neurological symptoms or signs, MRI is indicated
- Multidetector CT or CT myelography are alternatives to MRI when it is contraindicated or unavailable

Neck Pain

- Neck pain is extremely common. It is the second most common musculoskeletal presenting complaint [1](#) and the twentieth most common overall presenting complaint [2](#) in the primary care setting
- The evidence base mainly studies imaging modalities in the evaluation of traumatic neck pain and whiplash-associated disorders, outside the scope of this review

Red Flags for the Investigation of Non-Traumatic Neck Pain

- These clinical features may help to increase the yield of cervical spine radiography and have been adapted from criteria proposed for low back pain, as many risk factors are common to both presentations [3-5](#)
 - Constitutional symptoms e.g. fever, night sweats



- Immunosuppression
 - Intravenous drug use
 - History of malignancy or unexplained weight loss of insidious onset
 - Age >50 years
 - Prolonged use of corticosteroids, osteoporosis
 - Suspected or diagnosed rheumatological condition
 - Neurological signs or symptoms e.g. headache, dysphagia, vomiting, focal neurologic deficit
- There is no convincing evidence that the sensitivity and specificity of these red flags is sufficient to exclude serious underlying disease but they may help to reduce unnecessary use of plain radiography

Plain Radiography

- Plain radiography serves poorly either as a diagnostic or screening test in non-traumatic neck pain. Most patients with non-traumatic neck pain have either normal cervical spine radiographs or age-related degenerative changes that are often unrelated to symptoms [3,6-8](#)
- Plain radiography is not indicated for the investigation of non-traumatic neck pain unless 'red flag' features suggestive of serious underlying disease are present or symptoms have persisted for more than 6 weeks [3,6,7,9](#)
- A normal radiograph should not preclude further work-up if 'red flag' features are present [10](#)

Magnetic Resonance Imaging

- Preferred first-line advanced imaging for the patient with non-traumatic neck pain
- MRI should be performed if there are neurologic signs or symptoms, regardless of radiographic findings [7](#)
- There is a paucity of evidence for the appropriate timing of MRI, but emergent MRI is suggested for suspected cord compression, cauda equina syndrome, abscess or infection. It may be appropriate to trial a period of conservative care prior to MRI for patients with cervical radiculopathy [11,12](#)
- Advantages [10](#)
 - Better soft tissue contrast - allows for evaluation of soft tissue and osseous abnormalities in one test
 - No ionising radiation
- Disadvantages compared to CT include [10](#)
 - Cortical bone lesions are not as well visualised – if bony anatomy is critical, CT may be preferred
 - Claustrophobia
 - Longer scanning time needed
 - Contraindicated in the presence of a ferromagnetic substance, e.g. Pacemaker, aneurysm clip, cochlear implant, ocular foreign body, spinal cord stimulator and some stent materials
- MRI is recommended for vertebral inflammatory and infectious processes. It can detect osteomyelitis as early as 3-5 days after onset of infection and is reported to have a sensitivity of 96% and a specificity of 92% for the detection of spinal infections, more accurate than both plain radiography and bone scan [13,14](#)
- The sensitivity of MRI to detect cervical soft disc herniation is 94% [15](#)
- MRI is the most accurate modality for detecting suspected malignancy and vertebral metastasis, and determining disease extension around the spinal cord [16,17,18](#)



- High accuracy, sensitivity and specificity in detecting vertebral compression fractures and can provide clues to differentiate malignant, osteoporotic and infective causes [19-21](#)
- Abnormalities such as disc degeneration, spondylosis, disc herniation, bulging disc and foraminal stenosis can be seen on MRI in asymptomatic individuals and any causal attribution should be made after strict correlation with clinical signs and symptoms, particularly in older patients [22-26](#)
- Diffusion-weighted imaging, diffusion tensor imaging and fibre tractography show added sensitivity in detecting intrinsic cord damage and are a developing area of research [10](#)

Computed Tomography, CT Myelography

- CT provides superior bony detail compared to MRI [27](#) and is less sensitive to patient movements, but is associated with ionising radiation. It can be useful where bony anatomy is critical or in surgical planning
- Like other imaging tests, CT abnormalities including herniated discs and degenerative changes are detected in asymptomatic individuals, reducing its specificity
- CT myelography is an invasive procedure that involves injecting the thecal sac with iodinated contrast material allowing accurate measurements of central and foraminal canal diameters. When MRI is contraindicated or unavailable, CT myelography is an alternative investigation for patients with suspected cord involvement, radiculopathy or spinal stenosis [4,7](#)

Cervical Discography

- Cervical provocation discography, which includes disc stimulation and morphological evaluation, has been occasionally used to distinguish a painful cervical disc from other potential sources of pain
- There is limited evidence for the diagnostic accuracy of cervical discography [28](#)
- A recent study suggested that discography may cause accelerated degenerative changes in tested discs [29](#)

References

Date of literature review: April 2013

The search methodology is available on request. [Email](#)

References are graded from Level I to V according to the Oxford Centre for Evidence-Based Medicine, Levels of Evidence. [Download the document](#)

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