



Andrew J Teichtahl
Geoffrey McColl

An approach to neck pain for the family physician

Background

Neck pain is a common presentation in general practice. Nevertheless, recommendations for the investigation and management of neck pain lack a strong evidence base and are predominantly extrapolated from low back pain studies.

Objective

This review provides an investigation and treatment paradigm to help primary care physicians assess and manage cervical spine pain.

Discussion

Although sinister causes of neck pain are rare, clinicians must be mindful of red flags that may indicate serious pathology. The medical interview, rather than the physical examination, remains the most critical step in determining the likely cause of cervical spine pain, whereas biochemical tests and imaging are not part of routine assessment. The classification of neck pain into acute or chronic patterns, extrapolated from the low back pain literature, may help stratify the need for intervention and the likely prognosis of neck pain. A more concerted research effort is needed to help better understand and develop evidence-based guidelines for the management of neck pain.

Key words

neck pain; cervical; investigation; treatment; spine



Epidemiology of neck pain

Neck pain accounts for 15% of soft tissue problems seen in general practice¹ and imparts a significant socioeconomic burden of disease.² More than 75% of the total cost of neck pain is attributable to indirect costs such as disability and work absenteeism.³

Most people will have experienced neck pain in their lifetime⁴ and first episodes are not uncommon in childhood or adolescence.^{2,5,6} Population studies have estimated that the 1-year incidence of neck pain ranges from 10.4–21.3%,⁷ while the recurrence rate in general practice settings are estimated to be just less than 50%.⁸ The mean overall prevalence of neck pain tends to be greater in females than males, and is also greater in higher-income countries and in urban rather than rural areas.⁷

Assessment of neck pain

Medical interview

1. Determine the potential for underlying sinister pathology

Although infrequently encountered, factors suggestive of significant and potentially life-threatening diseases associated with neck pain are listed in *Table 1*. In the correct clinical context, such findings necessitate immediate investigation, management and/or specialty referral.

2. Is the pain acute, sub-acute or chronic?

The temporal pattern of the patient's neck pain should be determined to help distinguish acute from chronic pathology, identify individuals at risk of chronic neck pain and determine whether certain treatment strategies, such as physical therapy, are indicated.

Neck pain of less than 6 weeks duration is termed 'acute'. Acute neck pain may be attributable to an inciting event. For instance, acute neck pain in a discrete range of movement that feels 'locked' after quickly rotating the neck is typical of acute torticollis or the 'wry neck' phenomenon. Acute neck pain is anecdotally thought to carry a favourable prognosis. However, a recent systematic



Table 1. Neck pain red flags

Red flag	Potential pathological process
Significant trauma (eg. fall in osteoporotic patient, motor vehicle accident)	Bony/ligamentous disruption of the cervical spine
History of rheumatoid arthritis	Atlanto-axial disruption
Infective symptoms (eg. fever, meningism, history of immunosuppression or intravenous drug use)	Infection <ul style="list-style-type: none"> • epidural abscess • discitis • subarachnoid haemorrhage • mycotic aneurysms
Constitutional symptoms (eg. fevers, weight loss, anorexia, past or current history of malignancy)	Malignancy/infiltrative process Rheumatological disease <ul style="list-style-type: none"> • polymyalgia rheumatica • giant cell arteritis
Neurology (eg. signs or symptoms of upper motor neuron pathology)	Cervical cord compression Demyelinating process
Ripping/tearing neck sensation	Arterial dissection (carotid/vertebral)
Concurrent chest pain, shortness of breath, diaphoresis	Myocardial ischaemia

review demonstrated that the resolution of idiopathic neck pain is not necessarily maintained.⁹ This pattern is similar to that seen in studies of patients with low back pain, where recovery was observed in 33% of patients within the first 3 months,¹⁰ but 1 year after onset, 65% of patients were still reporting back pain.

Neck pain persisting for 6 weeks to 6 months is considered 'sub-acute'. Determining causal associations for progressing from acute to sub-acute neck pain are unclear. In the small number of studies examining the temporal pattern of neck pain, most have focused on either acute or chronic patterns, with minimal focus on sub-acute pain. Nevertheless, a better understanding of sub-acute neck pain may help to stop the transition to chronic pain. Yellow flags, which are discussed later in this review, may be important to address, to reduce the transition from acute to sub-acute or even chronic neck pain.

Neck pain that has persisted for at least 6 months is termed 'chronic'. What contributes to pain chronicity is unclear, with most evidence derived from whiplash studies. The most important predictor of chronic neck pain after whiplash injuries was the severity of pain at the time of the acute event and the presence of a compensation claim.¹¹ Women were also more at risk than men for developing chronic neck pain,¹² whereas chronic neck pain rarely developed in children and adolescents.¹³

3. Is the pain of a somatic or neurogenic origin?

The type of pain experienced may provide clues to the underlying anatomical structure(s) involved, as well as the primary disease process.

Somatic pain can either be superficial or deep. Superficial somatic pain is activated by nociceptors in superficial structures around the neck, including skin, and is clearly localised, sharp and well defined. By contrast, deep somatic pain is poorly localised and is of a dull aching quality, activated by nociceptors in ligaments, tendons, bones and blood vessels. Examples of pathological processes at the neck that give rise to deep somatic pain are described below.

- Spondylosis – degenerative radiographic changes in the cervical spine are common in people over the age of 30 years.¹⁴ There is a continuum of these changes from normal ageing to pathological states. Attributing spondylosis as the cause of a patient's pain is difficult, as radiographic changes are only weakly correlated with pain.¹⁴
- Discogenic – disc disease is also common and is again poorly correlated with patient symptoms.^{15–17} Axial pain is more severe than extremity pain in cervical discogenic pain. Only the outer third of the annulus fibrosus is innervated, and therefore prolapse of the nucleus pulposus to this region is required before somatic pain can be experienced.
- Facet joint pain – pain is often midline or slightly paraspinal and somatic referral to the shoulders, scapular, upper limb or head are not uncommon.
- Myofascial pain – this is a syndrome associated with trigger points. Characteristic features of trigger points include pressure sensitivity with reproduction of pain on palpation, taut muscle bands on palpation and limited range of movement following approximately 5 seconds of sustained trigger point pressure.¹⁸

Radicular pain is neurogenic pain that radiates along the sensory distribution of a nerve (dermatome), caused by irritation of a nerve root by processes such as compression or surrounding inflammation. Radicular pain is characteristically sharp and cutting, with potential dysaesthesia or paraesthesia. Examples of pathological processes at the neck that give rise to neurogenic pain are described below.

- Spondylotic myelopathy – degenerative changes that narrow the spinal canal, resulting in neurological compromise. Symptoms may include weakness, gait disturbance and bowel and/or bladder dysfunction. Optimal neurological recovery is dependent on early surgical decompression.
- Cervical radiculopathy – causes are predominantly degenerative and include foraminal stenosis, such as those imparted by osteophyte encroachment from spondylosis. Another common cause includes posterolateral cervical disc herniation, compromising abutting exiting nerve roots.



4. Are there yellow flags?

Psychosocial factors that are predictive of chronicity and disability are termed yellow flags. These include such factors as an attitude that spinal pain is potentially severely disabling, social or financial problems, reduced activity levels, and the presence of a compensation claim. While not formally studied in large randomised controlled trials, addressing some of these yellow flags may help to reduce the risk of acute neck pain progressing to sub-acute and even a chronic temporal pattern. This has recently been studied in low back pain, whereby the Keele STarT Back Screening Tool (SBST) has been validated as a screening tool to prognosticate recovery.¹⁹ High-risk individuals were thought to have psychological obstacles to recovery, while medium risk individuals were considered to have physical obstacles to recovery.

Physical examination

Physical examination of the cervical spine infrequently contributes further diagnostic information. Nevertheless, this interaction provides the clinician the chance to assess pain behaviour and fear-avoidance patterns. General observation examining posture, symmetry, muscle bulk and previous scars should be part of the observation. Full assessment of cervical range of movement in all planes of movement should be performed. Palpation of the cervical spine may elicit focal tenderness, which in the appropriate clinical context may increase the clinician's suspicion for sinister pathology. A neurological examination of the upper limbs should be performed when extremity pain or neurological symptoms (eg. dysaesthesia) are reported. Emphasis should be on discerning any upper (eg. cord compression) or lower (nerve root) motor neuron involvement and potential myotomal or dermatomal involvement to localise an anatomical level. Provocative manoeuvres, such as neck compression and upper limb tension tests do not have adequate sensitivity or specificity to be recommended as routine practice.^{20,21}

Investigations

Imaging

In non-traumatic neck pain, imaging should generally be avoided, unless any of the risk factors outlined in *Table 2* are present.

The choice of imaging modality is dependent on the clinical

indication. All imaging should begin with plain radiography, whereby different views enable different anatomical abnormalities to be identified. However, degenerative radiographic changes in the cervical spine are common in people over the age of 30 years, and such changes are only weakly correlated with pain.¹⁴ Clinicians must therefore be mindful that radiography alone is non-diagnostic and should be used as an adjunct to history taking in diagnosing neck pain.

Magnetic resonance imaging (MRI) and computerised tomography (CT) are indicated when malignancy, infection, spinal cord compression and disc herniation are suspected. CT better delineates bony pathology, whereas MRI is superior at imaging soft tissue abnormalities and, in particular, potential neurological compromise, such as cord or nerve root compression.

Other investigations

When extremity, rather than cervical pain, is more severe with dysaesthesia then nerve conduction studies may also be useful.

Treatment

There is a paucity of evidence examining the effectiveness and cost-effectiveness of non-specific neck pain treatment.^{22,23}

Randomised controlled trials have examined the short- and long-term effect of once weekly manual therapy (mobilisation techniques), twice weekly physical therapy (exercises) and continued general practitioner care (analgesia, counselling and education). At 7 weeks, clinical success (patient report of being completely recovered or much improved on an ordinal 6-point scale) was achieved in 68.3% for manual therapy, 50.8% for physical therapy and 35.9% for continued care. Pain and disability scores also favoured manual therapy.²³ However, longitudinal follow up demonstrated that by weeks 13 and 52, the differences between treatment groups decreased and lost statistical significance.²⁴ Similarly, manual therapy has also been shown to be more effective than exercise programs or care by the general practitioner at 26, but not 52 weeks.²⁵ However, the total costs of manual therapy were approximately one-third of the costs of an exercise program supervised by physiotherapists and general practitioner care.²⁵ Nevertheless, a systematic review has concluded that the limited number of heterogenous studies warrants no definite conclusions on the cost-effectiveness of conservative treatments for non-specific neck pain.²⁶

Another trial examining people with sub-acute and chronic neck pain randomised participants to brief physiotherapy (1–3 sessions) using cognitive behaviour principles to encourage self-management and return to normal function or usual physiotherapy.²⁷ At 1 year, patients with usual physiotherapy had small but significant improvements in neck pain questionnaires, compared with patients in the brief intervention group. However, although it was noted that the brief intervention was shown to be inferior than usual physiotherapy, the confidence intervals were wide and the effect could be in the non-inferiority range.²⁷

Table 2. Indications for imaging in the presence of neck pain

- Age >50 years with new symptoms
- Constitutional symptoms (loss of weight, anorexia, fevers)
- Infection risk (eg. immunosuppressed, intravenous drug use)
- Moderate to severe neck pain lasting more than 6 weeks
- Neurological findings
- History of malignancy



Apart from exercise and physiotherapy, there is little evidence to support other conservative measures. In several randomised controlled trials, acupuncture has been shown to be efficacious at treating chronic neck pain in the short term, with only limited evidence for long-term effects.^{28,29} A large study with 80% pain relief as the criterion end-point demonstrated that injection of a perpetrating facet joint relieved pain in 39% of cases³⁰ and has been suggested to be part of a diagnostic algorithm for neck pain.³¹ However, there is a lack of supporting evidence for cervical intra-articular facet joint injections and cervical epidural injections are not without risk.³²

Pharmacologically, non-opioid based analgesics (eg. paracetamol and non-steroidal anti-inflammatory drugs) should be considered first-line therapies. Controlled-release opioid preparations for frequent acute or chronic episodes of neck pain in people refractory to non-opioid treatments have also been shown to be efficacious.³³ Nevertheless, it is recommended that analgesic management of neck pain be reserved only for refractory presentations, be used short term and as an adjunct to other conservative measures, and be medically supervised.

Finally and arguably the most important treatment strategy for the management of neck pain is addressing psychosocial barriers to improvement. Extrapolating from chronic low back pain data, by using a validated tool to prognosticate recovery,¹⁹ appropriate treatment strategies can be implemented.

Key points

- Despite the high frequency of cervical pain presentations to general practice, there is a paucity of evidence-based guidelines to inform diagnostic and treatment algorithms.
- The medical interview, rather than the physical examination or imaging, is the most important part of the assessment of neck pain.
- Extrapolating from lumbar spine literature by classifying neck pain into acute or chronic patterns may help stratify the need for intervention and the likely prognosis of neck pain.
- Complete resolution of acute neck pain is not as common as previously reported, and the efficacy of conservative therapies such as physical therapy and exercise attenuates with time.

Authors

Andrew J Teichtahl MBBS (Hons), BPhysio (Hons), Advanced Rheumatology Trainee, Department of Rheumatology, The Royal Melbourne Hospital, Melbourne, VIC. andrew.teichtahl@mh.org.au

Geoffrey McColl MBBS, BMedSc, FRACP, MEd, PhD, Consultant Rheumatologist, Department of Rheumatology, The Royal Melbourne Hospital and The University of Melbourne, Department of Medicine, Melbourne, VIC

Competing interests: None.

Provenance and peer review: Commissioned; externally peer reviewed.

References

- Hackett GI, Bundred P, Hutton JL, O'Brien J, Stanley IM. Management of joint and soft tissue injuries in three general practices: value of on-site physiotherapy. *Br J Gen Pract* 1993;43:61–64.
- Hogg-Johnson S, van der Velde G, Carroll LJ, et al. The burden and determinants of neck pain in the general population: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine* 2008;33(4 Suppl):S39–51.
- Borghouts JA, Koes BW, Vondeling H, Bouter LM. Cost-of-illness of neck pain in The Netherlands in 1996. *Pain* 1999;80:629–36.
- Haldeman S, Carroll L, Cassidy JD. Findings from the bone and joint decade 2000 to 2010 task force on neck pain and its associated disorders. *J Occup Environ Med* 2010;52:424–27.
- Stahl M, Mikkelsen M, Kautiainen H, Hakkinen A, Ylinen J, Salminen JJ. Neck pain in adolescence. A 4-year follow-up of pain-free preadolescents. *Pain* 2004;110:427–31.
- Vikat A, Rimpela M, Salminen JJ, Rimpela A, Savolainen A, Virtanen SM. Neck or shoulder pain and low back pain in Finnish adolescents. *Scand J Public Health* 2000;28:164–73.
- Hoy DG, Protani M, De R, Buchbinder R. The epidemiology of neck pain. *Best Pract Res Clin Rheumatol* 2010;24:783–92.
- Hill J, Lewis M, Papageorgiou AC, Dziedzic K, Croft P. Predicting persistent neck pain: a 1-year follow-up of a population cohort. *Spine* 2004;29:1648–54.
- Hush JM, Lin CC, Michaleff ZA, Verhagen A, Refshauge KM. Prognosis of acute idiopathic neck pain is poor: a systematic review and meta-analysis. *Arch Phys Med Rehabil* 2011;92:824–29.
- Itz CJ, Geurts JW, van Kleef M, Nelemans P. Clinical course of non-specific low back pain: a systematic review of prospective cohort studies set in primary care. *Eur J Pain* 2013;17:5–15.
- Pobereskin LH. Whiplash following rear end collisions: a prospective cohort study. *J Neurol Neurosurg Psychiatry* 2005;76:1146–51.
- McLain RF, Kapural L, Mekhail NA. Epidural steroid therapy for back and leg pain: mechanisms of action and efficacy. *Spine J* 2005;5:191–201.
- Carroll LJ, Hogg-Johnson S, van der Velde G, et al. Course and prognostic factors for neck pain in the general population: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine* 2008;33(4 Suppl):S75–82.
- Teresi LM, Lufkin RB, Reicher MA, et al. Asymptomatic degenerative disk disease and spondylosis of the cervical spine: MR imaging. *Radiology* 1987;164:83–88.
- Okada E, Matsumoto M, Ichihara D, et al. Aging of the cervical spine in healthy volunteers: a 10-year longitudinal magnetic resonance imaging study. *Spine* 2009;34:706–12.
- Boden SD, McCowin PR, Davis DO, Dina TS, Mark AS, Wiesel S. Abnormal magnetic-resonance scans of the cervical spine in asymptomatic subjects. A prospective investigation. *J Bone Joint Surg Am* 1990;72:1178–84.
- Schellhas KP, Smith MD, Gundry CR, Pollei SR. Cervical discogenic pain. Prospective correlation of magnetic resonance imaging and discography in asymptomatic subjects and pain sufferers. *Spine* 1996;21:300–11; discussion 11–12.
- Bennett R. Myofascial pain syndromes and their evaluation. *Best Pract Res Clin Rheumatol* 2007;21:427–45.
- Hill JC, Dunn KM, Lewis M, et al. A primary care back pain screening tool: identifying patient subgroups for initial treatment. *Arthritis Rheum* 2008;59:632–41.
- Tong HC, Haig AJ, Yamakawa K. The Spurling test and cervical radiculopathy. *Spine* 2002;27:156–59.
- Wainner RS, Fritz JM, Irrgang JJ, Boninger ML, Delitto A, Allison S. Reliability and diagnostic accuracy of the clinical examination and patient self-report measures for cervical radiculopathy. *Spine* 2003;28:52–62.
- Gross AR, Kay T, Hondras M, et al. Manual therapy for mechanical neck disorders: a systematic review. *Man Ther* 2002;7:131–49.
- Hoving JL, Koes BW, de Vet HC, et al. Manual therapy, physical therapy, or continued care by a general practitioner for patients with neck pain. A randomized, controlled trial. *Ann Intern Med* 2002;136:713–22.
- Hoving JL, de Vet HC, Koes BW, et al. Manual therapy, physical therapy, or continued care by the general practitioner for patients with neck pain: long-term results from a pragmatic randomized clinical trial. *Clin J Pain* 2006;22:370–77.
- Korthals-de Bos IB, Hoving JL, van Tulder MW, et al. Cost effectiveness of physiotherapy, manual therapy, and general practitioner care for neck pain: economic evaluation alongside a randomised controlled trial. *BMJ* 2003;326:911.



26. Driessen MT, Lin CW, van Tulder MW. Cost-effectiveness of conservative treatments for neck pain: a systematic review on economic evaluations. *Eur Spine J* 2012;21:1441–50.
27. Klaber Moffett JA, Jackson DA, Richmond S, et al. Randomised trial of a brief physiotherapy intervention compared with usual physiotherapy for neck pain patients: outcomes and patients' preference. *BMJ* 2005;330:75.
28. Irnich D, Behrens N, Molzen H, et al. Randomised trial of acupuncture compared with conventional massage and "sham" laser acupuncture for treatment of chronic neck pain. *BMJ* 2001;322:1574–78.
29. Liang ZH, Di Z, Jiang S, et al. The optimized acupuncture treatment for neck pain caused by cervical spondylosis: a study protocol of a multicentre randomized controlled trial. *Trials* 2012;13:107.
30. Manchukonda R, Manchikanti KN, Cash KA, Pampati V, Manchikanti L. Facet joint pain in chronic spinal pain: an evaluation of prevalence and false-positive rate of diagnostic blocks. *J Spinal Disord Tech* 2007;20:539–45.
31. Manchikanti L, Helm S, Singh V, et al. An algorithmic approach for clinical management of chronic spinal pain. *Pain Physician* 2009;12:E225–64.
32. Falco FJ, Erhart S, Wargo BW, et al. Systematic review of diagnostic utility and therapeutic effectiveness of cervical facet joint interventions. *ibid.* 2009;12:323–44.
33. Ma K, Jiang W, Zhou Q, Du DP. The efficacy of oxycodone for management of acute pain episodes in chronic neck pain patients. *Int J Clin Pract* 2008;62:241–47.