



Pain Mechanism Classification Clinical Pearl

Part 3: Neuropathic Pain

Introduction

This Clinical Pearl is the third in our series on the mechanism-based approach to pain ([Part 1](#), [Part 2](#)). We will focus on neuropathic pain, which can be classified as central or peripheral.¹ For the purposes of this Clinical Pearl, we will focus specifically on peripheral neuropathic pain. The discussion will include the clinical presentation and treatment strategies related to peripheral neuropathic pain.

The International Association for the Study of Pain (IASP) defines peripheral neuropathic pain as “Pain caused by a lesion or disease of the peripheral somatosensory system.”² It is estimated that 6.9-10% of the global population is impacted by peripheral neuropathic pain.³ A peripheral nerve impairment can stem from ischemia or mechanical factors (i.e. nerve entrapment or compression). Neuropathic pain can also be a sequelae of other clinical conditions, including viral infection, metabolic disease, and cancer, and can continue despite treatment or resolution of the original disease.^{1,4,5}

Diagnosis

Clinical Presentation

Patients may describe neuropathic pain as tingling, numbness, burning, or loss of sensation in the affected region.⁶ There may be a clear history of nerve damage or pathology, and if combined with symptoms in a dermatomal distribution, it is a strong indicator of neuropathic pain.⁷ Neuropathic pain can be aggravated by activities that place the nerve in a loaded position. Patients can also experience hyperalgesia or allodynia as a result of neuropathic pain.¹ As previously noted, past medical history can provide the clinician with insight into the likely mechanism of pain – for example, a patient who has a history of cancer and received chemotherapy treatment who now presents with tingling in their hands and feet is likely experiencing neuropathic pain.⁵ Recently, a 2022 systematic review and meta-analysis reported that a cohort of patients with whiplash-associated disorder have characteristics consistent with neuropathic pain.⁸

painDETECT

[painDETECT](#) is a 9-item patient questionnaire originally developed for utilization by physicians to determine if a patient is experiencing neuropathic pain. The questionnaire assesses pain descriptors, pain pattern, and presence of radicular pain. Scores range from -1-38 points, with scores greater than or equal to 19 points indicating a likely neuropathic pain component. This

questionnaire has good reliability and validity as a screening tool for neuropathic pain, but is not useful as a functional outcome measure.⁹

Neurodynamic Assessment

Neurodynamic tests assess how our nervous system responds to load, known as mechanosensitivity. Neurodynamic assessments are established for the upper extremity (median, ulnar, and radial nerve) and the lower extremity (sciatic nerve and its distal branches, and femoral nerve). A 2012 study by Smart et al found that in patients with low back pain, symptom provocation with neurodynamic testing was predictive of peripheral neuropathic pain.⁷ These tests can be performed passively (clinician moving patient's limb into testing position) or actively (patient actively moving their limb into testing position). Active testing is recommended for patients who are highly sensitive. Neurodynamic assessment can almost always elicit discomfort, which may or may not be a clinically relevant finding.¹⁰ A clinically relevant finding includes reproduction of the patient's symptoms or an observable difference in neural mobility compared to the uninvolved side. These findings will be most valuable towards guiding treatment if there is also an associated functional limitation that is being limited as a result.¹⁰ Of note, it is important to consider that these assessments can also elicit sensations such as muscle tightness or joint pain. Adding additional loading techniques (i.e. cervical sidebending away from testing side) can assist with differentiating between a local impairment and a nerve impairment. It is important for the clinician to use their differential diagnosis skills to evaluate the symptom response and its likely origin. Finally, results from neurodynamic testing can be correlated with other objective testing data. For example, sensory testing may reveal a dermatomal pattern to the patient's symptoms, or can indicate if there is a mechanical entrapment at a specific location along that nerve's pathway. Manual Muscle Testing can indicate if motor involvement is present in a specific myotome.^{10,11}

Treatment

Neurodynamic Exercise

Neurodynamic exercise is a treatment strategy to address neural sensitivity. A 2017 meta-analysis found that this intervention is recommended in neuropathic-related low back pain, neuropathic-related neck/arm pain, tarsal tunnel syndrome, and plantar heel pain.¹² There was insufficient evidence for its use in carpal tunnel syndrome, post-operative lumbar surgery rehabilitation, and in cubital tunnel syndrome.¹² Neurodynamic exercise can be categorized into gliders (or sliders) and tensioners.

A nerve glide is intended to glide the nerve, typically from its origin at the spinal level all the way to the periphery. This is done through moving two adjacent joints of the body simultaneously to "glide" the nerve along its pathway with reducing strain on the neural structures.¹³ A cadaver study demonstrated that for the median nerve, wrist extension with elbow flexion allowed for 30% more gliding movement compared to wrist extension with elbow extension.¹³ It is recommended that gliders are performed in a range where symptoms are no worse so as to not cause more irritation to these structures. Some have suggested that the decreased intraneural vascular flow associated with nerve compression can be countered with neurodynamic exercise, although limited evidence is available to bolster this hypothesis.^{10,14}

A nerve tensioner is intended to place increased mechanical load on the nerve – typically, two regions of the body are moved in opposition to create this load. Tensioner exercises can be performed as a progression from nerve glides once the sensitivity in that nerve is lessened. It is expected that the patient will feel some increase in symptoms with tensioners, as the neural structures are being placed under increased mechanical load.

Nerve glides can be beneficial as a starting point for addressing neural tension and sensitivity, particularly in acute cases, whereas nerve tensioners are appropriate to progress to as a means to address inflammation and circulation within that nerve per patient tolerance.¹³

Exercise

Various types of exercise are beneficial for those with peripheral neuropathic pain. A 10-week strength and aerobic conditioning exercise program demonstrated improvement in neuropathy symptoms in those with diabetes.¹⁵ Similarly, patients with cancer receiving chemotherapy experienced less tingling/numbness and decreased sensitivity to hot/cold temperatures in their hands and feet after participation in a six-week strength and aerobic conditioning program.¹⁶ Tai Chi has been shown to improve physical functioning in those with peripheral neuropathy, with improvements observed in 6 Minute Walk Test, Timed Up and Go, and leg strength after participation in six weeks of Tai Chi.¹⁷

The 2017 Clinical Practice Guidelines (CPG) for Neck Pain recommend that for acute cervical radiculopathy, interventions including mobilization and stabilization exercise, laser therapy, and short-term use of a soft collar (if patient is not responding to other treatment strategies) are supported with weak evidence available. For chronic cervical radiculopathy, moderate evidence supports the use of intermittent cervical traction, cervical and thoracic mobilization/manipulation, stretching and strengthening, as well as educational interventions.¹⁸

Related to low back pain, moderate evidence exists for the use of neurodynamic exercise in patients with chronic low back pain with radiating leg pain. Some studies included in the 2021 Low Back Pain CPG support the use of neurodynamic exercise when combined with other interventions (i.e. manual therapy, exercise, or patient education).¹⁹

Clinical Pearls

- Peripheral neuropathic pain arises from an impairment in the peripheral nerves and can be due to mechanical factors or sequelae from other medical conditions.
- When assessing a patient with neuropathic pain, it is important to ascertain pain descriptors and pain pattern. painDETECT is a written screening questionnaire that can be implemented to screen for neuropathic pain. Neurodynamic assessment can evaluate mechanosensitivity or symptom exacerbation in the peripheral nervous system.
- Neurodynamics (gliders or tensioners) are an effective intervention for patients with neuropathic pain and can be progressed according to the functional movements that the patient needs to perform.
- Other treatment techniques, such as cardiovascular conditioning, strength training, Tai Chi, and manual therapy can also be utilized for those with neuropathic pain

About the Author

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References

1. Scholz J, Finnerup NB, Attal N, et al. The IASP classification of chronic pain for ICD-11: chronic neuropathic pain. *Pain* 2019; **160**(1): 53-9.
2. International Association for the Study of Pain. Terminology - Peripheral Neuropathic Pain. 2011 2011 (accessed November 13 2022).
3. van Hecke O, Austin SK, Khan RA, Smith BH, Torrance N. Neuropathic pain in the general population: a systematic review of epidemiological studies. *Pain* 2014; **155**(4): 654-62.
4. Nijs J, Apeldoorn A, Hallegraeff H, et al. Low back pain: guidelines for the clinical classification of predominant neuropathic, nociceptive, or central sensitization pain. *Pain Physician* 2015; **18**(3): E333-46.
5. Fallon MT. Neuropathic pain in cancer. *Br J Anaesth* 2013; **111**(1): 105-11.
6. Chimenti RL, Frey-Law LA, Sluka KA. A Mechanism-Based Approach to Physical Therapist Management of Pain. *Phys Ther* 2018; **98**(5): 302-14.
7. Smart KM, Blake C, Staines A, Thacker M, Doody C. Mechanisms-based classifications of musculoskeletal pain: part 2 of 3: symptoms and signs of peripheral neuropathic pain in patients with low back (+/- leg) pain. *Man Ther* 2012; **17**(4): 345-51.
8. Fundaun J, Kolski M, Baskozos G, Dilley A, Sterling M, Schmid AB. Nerve pathology and neuropathic pain after whiplash injury: a systematic review and meta-analysis. *Pain* 2022; **163**(7): e789-e811.
9. Freynhagen R, Baron R, Gockel U, Tolle TR. painDETECT: a new screening questionnaire to identify neuropathic components in patients with back pain. *Curr Med Res Opin* 2006; **22**(10): 1911-20.
10. Boyd B, Butler D, Coppieters M, Nee R. Mobilization of the Neuroimmune System; 2017.
11. Kolski M, O'Connor A. A World of Hurt: A Guide to Classifying Pain. St. Louis, MO: Thomas Land Publisher; 2015.
12. Basson A, Olivier B, Ellis R, Coppieters M, Stewart A, Mudzi W. The Effectiveness of Neural Mobilization for Neuromusculoskeletal Conditions: A Systematic Review and Meta-analysis. *J Orthop Sports Phys Ther* 2017; **47**(9): 593-615.
13. Coppieters MW, Butler DS. Do 'sliders' slide and 'tensioners' tension? An analysis of neurodynamic techniques and considerations regarding their application. *Man Ther* 2008; **13**(3): 213-21.
14. Rempel D, Dahlin L, Lundborg G. Pathophysiology of nerve compression syndromes: response of peripheral nerves to loading. *J Bone Joint Surg Am* 1999; **81**(11): 1600-10.

15. Kluding PM, Pasnoor M, Singh R, et al. The effect of exercise on neuropathic symptoms, nerve function, and cutaneous innervation in people with diabetic peripheral neuropathy. *J Diabetes Complications* 2012; **26**(5): 424-9.
16. Kleckner IR, Kamen C, Gewandter JS, et al. Effects of exercise during chemotherapy on chemotherapy-induced peripheral neuropathy: a multicenter, randomized controlled trial. *Support Care Cancer* 2018; **26**(4): 1019-28.
17. Li L, Manor B. Long term Tai Chi exercise improves physical performance among people with peripheral neuropathy. *Am J Chin Med* 2010; **38**(3): 449-59.
18. Blanpied PR, Gross AR, Elliott JM, et al. Neck Pain: Revision 2017. *J Orthop Sports Phys Ther* 2017; **47**(7): A1-A83.
19. George SZ, Fritz JM, Silfies SP, et al. Interventions for the Management of Acute and Chronic Low Back Pain: Revision 2021. *J Orthop Sports Phys Ther* 2021; **51**(11): CPG1-CPG60.