Assessment of neuropathic pain

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Key points

Neuropathic pain is initiated or caused by a primary lesion or dysfunction of the nervous system. A consensus regarding the classification and assessment of neuropathic pain has yet to be reached. The diseases responsible for neuropathic pain are diverse; the clinical presentation of pain can vary widely between individuals despite the same underlying aetiology. Common features of neuropathic pain include spontaneous and evoked pains. Investigations may help to identify evidence of nerve dysfunction but it cannot be assumed that it is necessarily the cause of their pain.

Neuropathic pain is defined as ‘pain initiated or caused by a primary lesion or dysfunction of the nervous system’. It can be a debilitating and difficult condition to treat and is often resistant to simple analgesics, requiring additional analgesic approaches. Recent estimates suggest that up to 8% of the general population suffer with pain that is associated with neuropathic features and, when it persists, it impacts significantly on patients’ lives affecting physical, psychological and social functioning. It is not only devastating for patients but also places considerable demands on society, including financial burdens relating to healthcare costs, workplace disruption, disability and benefits.

This article focuses on the identification and assessment of neuropathic pain. It will describe the key features, causes and mechanisms and guide clinicians in their assessment of neuropathic pain.

Classification of pain

Traditionally, pain has been classified as either nociceptive or neuropathic. Nociceptive pain originates in the presence of normal pain pathways. Noxious stimuli stimulate peripheral nociceptors and messages are then relayed via the dorsal horn to higher brain centres to warn of impending or ongoing tissue damage. In contrast, neuropathic pain occurs when there is abnormal activation of these pain pathways as a result of damage or dysfunction within the nervous system itself. In many cases the damaged nerves heal and the pain resolves; however, for some, pain persists despite healing of the damaged tissues. Pain persisting for longer than 3 months is regarded as chronic.

Categorizing a patient’s pain as either nociceptive or neuropathic is not always straightforward and may not reflect the true clinical picture. Different mechanisms often appear to coexist. Even in conditions such as osteoarthritis, where pain has previously been considered as a purely nociceptive syndrome, recent research on animal models has suggested that neuropathic mechanisms may also be involved. Clinical studies support a spectrum of syndromes where pain is either more or less neuropathic in nature. A better understanding of the complexities of pain syndromes may help to provide more effective management of chronic pain problems which often challenge clinicians.

Causes of neuropathic pain

Nerve damage or dysfunction can result from various insults including physical, infectious, metabolic, ischaemic, toxic, neoplastic, degenerative and immune mediated processes. The commonest cause is probably as a result of traumatic nerve injury (either from an accident or surgery). Other commonly cited causes of neuropathic pain include syndromes associated with diabetes, post-herpetic neuralgia, trigeminal neuralgia and post-stroke pain. Table 1 contains examples of clinical neuropathic pain. Establishing the cause is not always straightforward but in some cases clinical findings will fit with a well defined neuropathic pain syndrome such as carpal tunnel syndrome or post-herpetic neuralgia. There remains some controversy as to whether or not other entities with similar characteristics but no identifiable cause (such as complex regional pain syndrome) should be classed as neuropathic pain.

Neuropathic pain mechanisms

The mechanisms underlying neuropathic pain are complex and not yet fully understood. It is clear that the nervous system is capable of significant plasticity with various peripheral and central changes occurring in response to injury or experience, altering both structure and function. Peripheral changes include sensitization of nociceptors resulting in reduced thresholds for activation and enhanced responses to stimuli, abnormal neuronal sprouting leading to enlargement of receptive fields and ectopic firing in Aδ and C fibres in the dorsal root ganglion.
 Increased expression of abnormal sodium and calcium channels appear to be instrumental in the generation of spontaneous discharges from damaged neurons.

 Central changes induced by peripheral nerve damage include sensitization of spinal cord neurones resulting in ‘wind-up’ with loss of central inhibitory mechanisms and enhanced nociceptive transmission, despite reduced peripheral input. Up-regulation and activation of central N-methyl-D-aspartic acid (NMDA) receptors have been shown to play an important role centrally.

 Other important findings include the discovery of facilitatory descending pathways and the potential relevance of genetic factors with clear differences between individuals in both pain sensitivities and in the nature of their pains.7, 8

 Increased understanding of the underlying mechanisms has allowed the identification of new pharmacological targets and the development of new neuropathic medications but, at present, this has not helped to work out which patients are likely to respond to individual treatments.

### Clinical features of neuropathic pain

Clinical experience has highlighted a number of features that are common in neuropathic pain syndromes including symptoms and signs of spontaneous and evoked pains (Fig. 1). None are pathognomonic but their presence may point to a diagnosis of neuropathic pain. It is important to actively seek out these features, especially in patients with pain that has been difficult to manage.

Spontaneous pains can be continuous or paroxysmal and occur with no apparent stimulation. Examples of spontaneous pains that are continuous in nature include unpleasant or abnormal sensations felt in the skin (dysaesthesias) described as burning, tingling, itching or pins and needles. Deeper pains may be described as aching, gnawing, cramping or crushing. Paroxysmal elements are often described as stabbing, shooting or electric shock-like pains.

 Evoked pains where an ordinary physical stimulus produces an unusual or exaggerated sensation of pain include allodynia or hyperalgesia. Allodynia describes pain that is experienced from a stimulus that would normally go unnoticed, such as skin contact with clothing or a cold breeze. Hyperalgesia is an exaggerated painful sensation after a painful stimulus.

 Other symptoms that may support a diagnosis of neuropathic pain include descriptions of areas of numbness or symptoms of concurrent motor or autonomic nerve involvement.

### Co-morbidities

Many of the patients presenting with neuropathic pain syndromes have co-morbidities. Neuropathic pain usually requires multimodal treatment and it is important to assess the appropriateness of all potential treatments for each individual patient as certain treatments will be contraindicated for some patients.

### Psychosocial history

Poorly controlled pain can have far reaching consequences for patients and their families and can impact on activity, fitness, independence, mood, sleep and social functioning. These may in turn become some of the obstacles to achieving improved pain control. Assessing and managing the impact of the pain on the individual is central to achieving a good outcome and certain approaches may be preferred, or conversely not tolerated, because of their additional effects on factors such as sleep or mood.

 The patient’s beliefs, attitudes and behaviours will also influence outcome and it is important to assess the patient’s understanding of their pain, the meaning of their pain, and their expectations and goals. Views of previous management and treatments that have failed also need to be explored.

### Examination

Examination may reveal visible skin changes, an abnormal sensitivity of the painful site or other associated neurological deficits.
Bedside tests

Simple bedside tests can help identify sensory abnormalities although used alone they have a low power of distinguishing neuropathic pain from non-neuropathic pain. One method of detecting allodynia is to lightly brush a piece of cotton wool over the site of pain. The production of pain or an unpleasant sensation in the affected area, but not in a control site, demonstrates allodynia. Hyperalgesia can be assessed with pin-prick testing. A standardized method of doing this involves removing the plunger from a 2 ml syringe and inserting a 23G needle. This ensures that the same amount of pressure is applied to both the affected and the control sites (Fig. 2). If a patient reports exaggerated pain in the affected site this would suggest that hyperalgesia is present. Allodynia and hyperalgesia often coexist and clinically it can be difficult to differentiate them.

Other sensory phenomena which may be demonstrated by simple bedside testing include hyperpathia (increased reaction to a stimulus with subsequent prolongation of painful sensations after the stimulus is removed) and dyslocalization (a stimulus in one area produces pain in another area) and radiation of pain.

Additional tests and investigations

The clinical history is often supplemented with the use of pain rating scales and questionnaires. Use of rating scales to quantify aspects such as the intensity of pain can help the clinician to monitor the response to treatments. A number of different unidimensional scales are available including visual analogue scales, numerical rating scales and verbal rating scales. Questionnaires
are also available to evaluate associated symptoms, functioning and quality of life. The brief pain inventory includes assessments of the impact of the pain on general activity, walking ability, mood, work, relations, sleep and enjoyment of life.\textsuperscript{11}

Sometimes the clinical findings fit with a well defined neuropathic pain syndrome such as post-herpetic neuralgia. In other situations, where it is less clear, further investigations may be needed to find corroborating evidence of nerve dysfunction.

Simple investigations may be useful to diagnose treatable causes such as painful neuropathy secondary to vitamin B\textsubscript{12} deficiency. CT and MRI scans can also facilitate diagnoses by identifying causes of nerve compression or infiltration that may require further treatment. Nerve conduction studies and somatosensory-evoked potentials can confirm a neuropathy but only measure function in large myelinated fibres. Newer neurophysiological tests such as quantitative sensory testing can detect small-fibre neuropathies by measuring sensory responses to thermal and electrical stimuli; however, they are expensive and, as yet, not widely available. Other investigations which are not used in routine practice but may be useful in certain cases include biopsies/skin punch biopsies which can help to assess small-fibre neuropathies.\textsuperscript{10}

Some procedures, such as functional neuroimaging, microneurography to assess peripheral nervous system responses and laser-evoked potentials which test central responses to laser evoked stimuli in the periphery are currently only used in research.\textsuperscript{10}

If investigations do identify a neuropathy, it cannot be assumed that it is necessarily the cause of the patient’s pain. It is also important to remember that pain with neuropathic features can still occur without any identifiable nerve damage.\textsuperscript{10}

**Screening tools for neuropathic pain**

A number of tools have been developed which include neuropathic pain descriptors; they are reviewed in detail elsewhere.\textsuperscript{12} These include the neuropathic pain scale, Leeds assessment of neuropathic symptoms and signs (LANSS), neuropathic pain questionnaire, painDETECT, ID-pain and the Douleur neuropathique (DN4). The LANSS has been shown to be suitable for assessing neuropathic pain in range of clinical contexts including chronic pain populations and has shown good validity and reliability. It comprises five symptom and two examination items (allodynia and pin-prick testing). It has also been developed into a patient self-report tool (S-LANSS).\textsuperscript{13} Screening tools are not designed as diagnostic tools but they can be useful in highlighting the need for a more detailed clinical assessment.

**References**


Please see multiple choice questions 11–13