

Diagnosis and assessment of neuropathic pain

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Abstract

Neuropathic pain and pain that has a predominant neuropathic component can be difficult to diagnose in primary care. Several screening questionnaires that incorporate patient symptoms and signs have been developed, and some are supplemented with simple bedside clinical tests for nerve dysfunction. These tools should enable a more rapid and confident diagnosis by the nonspecialist and the earlier start of appropriate treatment.

Introduction and context

Neuropathic pain is defined by the International Association for the Study of Pain (IASP) as 'pain initiated or caused by a primary lesion or dysfunction in the nervous system' [1]. There are many different causes of nerve damage, and the presence or severity of pathology does not correlate with the presence of pain [1]. Neuropathic pain can be difficult to diagnose and is often missed in primary care [2]. Also, there is a growing consensus that a significant number of common pains consist of a mixture of neuropathic and nociceptive pain [3]. There is a need to improve the diagnosis and to document changes over time more easily to allow assessment of natural progression or response to interventions. Clinical tests or the completion of questionnaires (or a combination) are the key tools. The Neuropathic Pain Special Interest Group, known as NeuP SIG, has proposed that the IASP definition be replaced by the following wording: 'pain arising as a direct consequence of a lesion or disease affecting the somatosensory system' [4]. These two changes reflect the concept that in neuropathic pain an aberrant somatosensory processing that goes beyond the normal plasticity of the undamaged nociceptive system is inferred. This proposal allows neuropathic pain to be separated into 'definite' and 'probable' and so adds relative and objective support to making the diagnosis (see Figure from [4] for a flow chart of the grading system for neuropathic pain).

The clinical importance of making a rapid and correct diagnosis of neuropathic pain is that appropriate and timely treatment will be started earlier [5]. For example, less time will be lost trying the drugs commonly used for nociceptive pain, such as paracetamol, anti-inflammatories, and step 2 opioids, which have not been shown to be effective for neuropathic pain.

Recent advances

Examination-based approaches

The correlation of neurological disease pathology with pain experience is generally poor. A more common approach is to look at changes in function of the nervous system. Detailed laboratory tests are too time-consuming and expensive for routine clinical use [6].

Skin biopsy has several advantages over nerve biopsies (cost, repeatability, and ability to look at smaller fibres) [7], but this looks at pathology only. The same can be said for magnetic resonance neurography, which can identify small patches of inflammation in peripheral nerves.

Nerve conduction studies and somatosensory evoked potentials may confirm a neuropathy, but they measure function in large myelinated fibres only [6]. Quantitative sensory testing (QST) is a sophisticated neurophysiological technique that tests for loss of function and signs of

abnormal increased function (such as allodynia) in both large and small nerve fibres [7]. However, this test is dependent on the cooperation of the patient, so ultimately it is semi-objective. Results may be affected deliberately by the patient or because of his or her tiredness or lack of understanding about the responses that are being studied [8].

A standardised protocol for QST was recently proposed by the German Research Network on Neuropathic Pain [9] and includes 13 parameters of sensory testing procedures to document the exact somatosensory phenotype of neuropathic pain patients. They confirmed that there were no significant differences between left and right sides of the body, suggesting that this method may be more sensitive than absolute reference data for the detection of changes. They also discovered that QST (thermal and mechanical) thresholds varied with age and body location and that gender affects pain but not QST detection thresholds. However, this is a specialised and time-consuming investigation (30 minutes for each side) that is not easily transferred to primary care.

Some of the more simple individual QST tests can be used to demonstrate neurological dysfunction and to augment questionnaire-based tools. In a small study, measurement of mechanical allodynia with von Frey hairs showed that pain threshold was inversely related to the severity of pain [10]. We have demonstrated in healthy volunteers that a simple device consisting of a blunt needle attached to a pressure gauge demonstrated close correlation with von Frey hairs for detecting the threshold for pain due to application of a pressure [pressure-pain threshold (PPT)]. If this tool were validated in patients, it would be much easier and quicker for nonspecialists to implement than von Frey hairs [11]. Also, a handheld bedside test for cold hypoaesthesia (NeuroQuick; Schweers, Meerbusch, Germany) has been found to have a high specificity but a low sensitivity to identify small-fibre dysfunction [12]. It may be useful to develop this concept further, especially if a standardised stimulus intensity is adopted.

Questionnaire-based approaches

Several scoring systems for pain in general exist, but there are now a variety of screening tools available for neuropathic pain. The recent advances are described below; the first two combine simple clinical tests of nerve dysfunction as a supplement to the questionnaire (Figure 1).

1. Leeds Assessment of Neuropathic Symptoms and Signs

The Leeds Assessment of Neuropathic Symptoms and Signs (LANSS) was the first tool to be developed

and contains five symptom items and two clinical examination items. It has a sensitivity and a specificity ranging from 82-91% and 80-94%, respectively, and has recently been validated as a self-report tool (S-LANSS) [13,14]. Both LANSS and S-LANSS have been validated in a variety of pain clinic settings, but they still need to be validated for use in a primary care setting. LANSS may have sensitivity to detect response to treatment [3,13-15].

2. Douleur Neuropathique en 4 Questions

Douleur Neuropathique en 4 Questions (DN4) has seven items related to symptoms and three related to clinical examination. It is simple to use and has been translated into numerous languages. A sensitivity of 83% and a specificity of 90% have been reported, and the seven sensory descriptors have been used as a self-report tool with similar accuracy [13,14].

3. Neuropathic Pain Questionnaire

The Neuropathic Pain Questionnaire (NPQ) contains 12 items: 10 related to sensations or sensory responses and two related to affect. It has a sensitivity of 66% and a specificity of 74% [13]. The short form of the NPQ maintained similar discriminative properties when used with only three items (numbness, tingling, and pain increase in response to touch). It has previously been found to be a valuable tool in identifying neuropathic pain [16]. However, some feel that it has unacceptably low diagnostic accuracy (68.4% compared with clinical diagnosis) with little improvement in the score, even when a complex statistical analysis was applied [17].

4. painDETECT

This is a self-report questionnaire of seven weighted sensory descriptive items and two items related to the spatial and temporal characteristics. In a comparison against clinical examination, it correctly classified 83% of patients with neuropathic pain and had a sensitivity of 85% and a specificity of 80% [13]. Some believe that the graded answers increase the usefulness compared with the yes/no criteria in other questionnaires [18].

5. ID Pain

This uses five sensory descriptor items and one item relating to the joints which identifies nociceptive pain. The group that invented the scale feel that it is more of a screening tool [13,19].

6. Neuropathic Pain Scale

The Neuropathic Pain Scale (NPS) was developed for monitoring response to treatment and not for establishing the diagnosis [20]. NPS seems to discriminate between neuropathic and non-neuropathic pain, and NPS scores have been shown to correlate well with

Figure 1. Common features within five neuropathic pain screening tools

No. of tools sharing this feature	Features used to assess pain	Screening tools				
		LANSS	DN4	NPQ	painDETECT	IDpain
5	Pricking, tingling, pins and needles	✓	✓	✓	✓	✓
	Electric shocks or shooting	✓	✓	✓	✓	✓
	Hot or burning	✓	✓	✓	✓	✓
4	Numbness		✓	✓	✓	✓
	Pain evoked by light touching	✓		✓	✓	✓
2	Painful cold or freezing pain		✓	✓		
	Brush allodynia ^a	✓	✓			
	Raised pin prick threshold ^a	✓	✓			
1	Pain evoked by mild pressure				✓	
	Pain evoked by heat or cold				✓	
	Pain evoked by changes in weather			✓		
	Temporal patterns		✓			
	Radiation of pain				✓	
	Autonomic changes	✓				
	Raised soft touch threshold ^a		✓			

^aFeatures that involve clinical examination. Features common to five neuropathic screening tools are shown in the central column, with pricking, tingling and pins and needles, electric shocks and shooting, and hot and burning pain being used to assess pain in all of the five tools shown in the diagram. The LANSS and the DN4 both include simple clinical tests of nerve dysfunction as a supplement to the questionnaire. DN4, Douleur Neuropathique en 4 Questions; LANSS, Leeds Assessment of Neuropathic Symptoms and Signs; NPQ, Neuropathic Pain Questionnaire.

scores from S-LANSS [3,20]. However, not all studies have found it to be useful in discriminating between neuropathic and non-neuropathic pain [16]. It is, however, the only tool currently validated for central neuropathic pain [21] and has proven to be a valid and reliable tool for neuropathic pain in multiple sclerosis [22].

7. Brief Pain Inventory

The Brief Pain Inventory (BPI) measures the severity of pain and its interference with daily function but is not specifically for neuropathic pain. However, a modified version of the BPI was found to be a valid and reliable measure for the evaluation of painful diabetic peripheral neuropathy [23].

Implications for clinical practice

Screening tools are not perfect and it would be wrong to suggest that they can replace a good clinical history and examination. However, the biggest benefit will be for screening purposes to assist the nonspecialist in the

identification of neuropathic pain or pain that has a predominantly neuropathic component. We prefer to use the LANSS and DN4 as they both use semi-objective simple bedside tests for abnormal neural function. The combination of history and examination is advantageous. The BPI is very simple as a generic tool to assess the impact of pain. The NPS, the only validated tool for monitoring response to treatment, would be superseded if the LANSS was also found to be effective in this role. The further development of these tools will help to identify patients earlier and so enable appropriate neuropathic analgesic therapy to be initiated as soon as possible. Ideally, these tools will also monitor the response of interventions, so that pain control can be further optimised.

Abbreviations

BPI, Brief Pain Inventory; DN4, Douleur Neuropathique en 4 Questions; IASP, International Association for the Study of Pain; LANSS, Leeds Assessment of Neuropathic Symptoms and Signs; NPQ, Neuropathic Pain

questionnaire; NPS, neuropathic pain scale; QST, quantitative sensory testing; S-LANSS, self-report Leeds assessment of neuropathic symptoms and signs.

Competing interests

The authors declare that they have no competing interests.

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