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Diagnosing postoperative neuropathic pain: a Delphi survey

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Editor's key points

- Diagnosis of neuropathic pain in the postoperative period is a challenge.
- Acute pain specialists underwent the Delphi survey to develop consensus on diagnostic criteria for postoperative neuropathic pain.
- Consensus was reached on nine characteristics for the diagnosis.
- Importantly, postoperative neuropathic pain can have different characteristics to chronic neuropathic pain.

Background. Although postoperative pain is traditionally considered to be nociceptive in origin, a proportion of patients experience a significant neuropathic component to their pain experience. Diagnosing neuropathic pain in this setting is challenging, and there are no published guidelines or screening tools designed for use in the immediate postoperative setting. We hypothesized that acute pain specialists were diagnosing a neuropathic component to acute pain, and this study aimed to obtain an expert agreed list of pain characteristics that could be used to aid diagnosis.

Methods. A three-round Internet-based Delphi survey of acute pain specialists was used to generate a list of acute neuropathic pain characteristics, and achieve consensus on the importance of each item. Items were ranked on a 1–10 scale of importance, with a median score of $\geq$7 considered important and an inter-quartile range of $\leq$3 indicative of consensus. Cronbach's α was used to investigate internal consistency.

Results. Twenty-four items were generated by round 1 of the Delphi survey. Fourteen panellists participated in round 2, and 10 in round 3. After round 3, consensus of opinion was achieved for 13 items, with nine rated as important in the diagnosis of acute neuropathic pain.

Conclusions. The Delphi survey suggests that neuropathic pain in the immediate postoperative period is diagnosed in a different way to chronic neuropathic pain, with items such as response to medications considered more useful than signs such as those representing autonomic changes.

Keywords: acute pain; neuropathic pain; pain measurement; postoperative

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Acute pain after surgery has traditionally been considered to be nociceptive in origin. However, a proportion of patients seem to experience a significant neuropathic component to their post-surgical pain experience.[1–3] Diagnosing a neuropathic component to acute postoperative pain is challenging, given a significant concurrent nociceptive pain experience. There exist no diagnostic criteria or guidelines on how to diagnose a significant neuropathic component to postoperative pain, and research in this area has used a variety of techniques from existing chronic pain screening tools to response to anti-neuropathic treatments in attempts to quantify the problem.[4 5]

Despite the lack of diagnostic consensus, anti-neuropathic medication are increasingly used in the postoperative period, and there is some evidence that neuropathic pain experienced in this setting is associated with the development of chronic post-surgical pain.[4 5]

Consensus guidelines on the diagnosis of chronic neuropathic pain require confirmatory evidence from a neurological examination, which may be difficult to perform in an acute pain setting.[6]

We hypothesized that acute pain experts were recognizing a neuropathic component to post-surgical pain in clinical practice. Therefore, in this study, we aimed at obtaining an expert agreed list of pain characteristics or investigations that are considered important in the diagnosis of a significant neuropathic pain component to acute pain. This was performed using a three-round Delphi survey of acute pain specialists.

Methods

After ethics committee advice, we conducted a three-round Internet-based Delphi survey. Invitations to participate in the Delphi survey were e-mailed to all members of the British Pain Society acute pain special interest group. In addition, international researchers who have published on the

subject of acute neuropathic pain were identified by literature search and e-mailed directly. Potential participants were taken by an e-mail web link to an information page explaining the objectives of the survey and Delphi process. From this page, participants could access round 1 of the Delphi survey. None of the authors or specialists from their institution participated in any part of the Delphi process.

The Delphi study was conducted via a secure Internet e-mail survey system (http://www.defgo.net).

Round 1 of the Delphi survey asked participants open questions to develop an initial list of symptoms, signs, and investigations that are considered important in the diagnosis of acute neuropathic pain. In addition, potential barriers to the diagnosis of acute neuropathic pain were explored and the degree to which anti-neuropathic pain medications were used in the postoperative setting was assessed. Participants completing round 1 survey were asked to leave e-mail contact details if they wished to become a panellist in further Delphic rounds.

Symptoms, signs, and investigations identified in round 1 were collated and compiled into a new questionnaire. This was distributed as round 2 of the Delphi process to those participants from round 1 who agreed to participate further. Invitations to participate were sent by e-mail that included a web link to the online survey. The round 2 questionnaire asked panellists to rate the importance of each acute neuropathic pain parameter (identified by the round 1 survey) on a numerical rating scale, anchored 1 (not important) and 10 (very important). The importance of each item in diagnosing acute neuropathic pain was rated independently of the other items (so panellists could, if they wished, rate each item as very important) rather than asking participants to rank items in order of importance. A link to the questionnaire was e-mailed to round 1 participants who had agreed to participate further in the Delphic survey.

To identify the strongest parameters in diagnosing acute neuropathic pain, the median of the attributed weights and inter-quartile range (IQR) were calculated. These values were included as feedback to panellists in round 3.

In round 3, a link to the same questionnaire used in round 2, with the addition of the group median and IQR results for each parameter, was e-mailed to panellists completing round 2. In round 3, each panellist was reminded of their round 2 score and given the opportunity to change their score in the light of the group median and IQR results, on the same 1–10 numerical rating scale of importance.

After round 3, the revised median and IQR results were calculated. Expert agreement was defined as an IQR $\leq$3. Parameters were considered important, if the median score was $\geq$7. Cronbach's α was used to investigate internal consistency among experts and also for parameters considered important and achieving agreement. Internal consistency was also calculated for non-important items achieving an IQR $\leq$3. Statistical analysis was performed using IBM SPSS Statistics Version 20 (SPSS Inc., Chicago, IL, USA).

Results

Round 1

Thirty-four e-mail recipients opened the survey, with 24 answering one or more questions. Fourteen participants left e-mail contact details. Of the 14 participants leaving contact details, 13 were practicing in the UK and one from Australia. The results of the initial 'brainstorming' phase to identify symptoms, signs, and tests that are considered important in the diagnosis of acute neuropathic pain were collated and grouped under common categories. This, in conjunction with a literature search, generated the 24 items included in the round 2 questionnaire.

Half (n=7) of the respondents used current screening tools in the diagnosis of acute neuropathic pain. Examples given included the LANSS, PainDetect, and locally developed questionnaires. A number of obstacles to identifying acute neuropathic pain were identified, including distinguishing it from nociceptive postoperative pain, lack of awareness of the problem, cross-cultural communication difficulties, and lack of agreed diagnostic criteria.

Eight of the 15 respondents used anti-neuropathic pain medications in the immediate postoperative period, with six using them on a weekly basis. Many respondents used anti-convulsants (n=6), anti-depressants (n=4), and/or *N*-methyl-D-aspartate receptor antagonists (n=3).

Round 2

Fourteen participants who agreed to participate further in the Delphic survey were included in round 2. Ten completed the round 2 questionnaire, asking them to rate the importance of individual symptoms, signs, and investigations in diagnosing acute neuropathic pain. The results of the round 2 questionnaire are presented in Table 1.

Round 3

Each of the 10 panellists who completed round 2 were asked to consider changing their rating for each pain characteristic in the light of the group average (median) and IQR. Two panellists changed their scores in the light of the results of round 2 and the recalculated results are presented in Table 1. Items achieving consensus are presented in Table 2.

Internal consistency

Cronbach's α for the nine items considered important and achieving consensus was 0.664. If item 'spontaneous' was deleted, Cronbach's α increases to 0.798. This item correlates poorly with the composite scores from the other items (corrected item−total correlation −0.303). Cronbach's α for the four items considered not important and achieving consensus was 0.0. If item 'Nerve conduction studies' was deleted, Cronbach's α increases to 0.525.

Cronbach's α was also used for evaluating internal consistency among experts. Cronbach's α for round 2 was 0.658 increasing to 0.705 after round 3. The individual panellist-group correlations are presented in Table 3. The

Table 1 Average rating results for pain characteristics in survey rounds 2 and 3

	Round 2					Round 3	
ANP identifier	Valid (*n*)	Missing (*n*)	Median	IQR	Range	Median	IQR
Pins and needles	9	1	9	3.5	4–10	9	3.5
Dysaesthesias	9	1	9	2.5	7–10	9	2.5
Good response to anti-neuropathics	10	0	9	1.5	7–10	9	1.25
Burning	10	0	8.5	3	6–10	8.5	3
Allodynia	10	0	8.5	2.25	7–10	8	2.25
Hyperalgesia	10	0	8.5	2.25	6–10	8.5	2.25
Shooting	10	0	8	2.25	7–10	8	2.25
Unpleasant sensations	9	1	8	3.5	6–10	8	3.5
Difficult to manage	10	0	8	3	4–10	7.5	1.5
Screening tools	10	0	8	4.25	5–10	8	5
Lancinating	10	0	7.5	4	3–10	7.5	4
Hyperpathia	10	0	7.5	4.25	5–10	7.5	4.25
Autonomic features	10	0	7.5	4.25	3–10	7.5	4.25
Poor response to opioids	10	0	7.5	1	6–9	8	1.25
Spontaneous	9	1	7	2.5	4–10	7	2.5
Stabbing	10	0	7	5.5	2–10	7	5.5
Colour	10	0	7	5.75	1–10	7	5.75
Response to i.v. lidocaine	10	0	7	3.5	5–10	7	3.5
Paroxysmal	8	2	6	2.75	2–9	6	2.5
Sharp	10	0	5	5.5	1–10	4.5	5.5
QST	9	1	5	3.5	1–10	5	4.5
Radiology	9	1	5	2.5	0–7	5	2
Nerve conduction	9	1	5	2	4–10	5	3
Pulsing	9	1	3	3.5	1–6	3	2

Table 2 Items achieving consensus after survey round 3

Important	Not important
Spontaneous	Paroxysmal
Shooting	Pulsing
Burning	Radiology
Dysaesthesia	Nerve conduction
Allodynia	
Hyperalgesia	
Difficult to manage pain	
Poor response to opioids	
Good response to anti-neuropathics	

Table 3 Panellist-group correlations for survey rounds 2 and 3

	Panellist-group correlation	
Panellist	Round 2	Round 3
A	0.552	0.616
B	0.278	0.775
C	−0.041	−0.019
D	0.564	0.565
E	0.090	0.1
F	0.260	0.233
G	0.646	0.686
H	0.245	0.269
I	−0.057	−0.079
J	0.574	0.550

panellist-group correlation increased in seven out of 10 instances after round 3, corresponding to the higher Cronbach's α observed.

Discussion

This three-round Delphi survey of acute pain specialists identified neuropathic pain characteristics potentially important in aiding the diagnosis of neuropathic pain in an acute pain setting. Of the initial 24 items identified, agreement was achieved among specialists for 14 items, with nine items ultimately identified as important. An improvement in Cronbach's α between rounds 2 and 3 suggests an improvement in homogeneity of opinion between panellists, although the majority did not change their scores in the light of group median and IQR results.

Although items with a median score of <7 are, by default, not considered important, care should be taken in inferring that all these items are not useful. Although there was consensus that four items (with a median score of <7) were not important enough in diagnosing acute neuropathic pain

(Table 2), this result was not internally consistent. This perhaps reflects the fact that items grouped together under the default definition of 'not important' contain some items which have very low median scores (such as 'pulsing' median=3) and some items with more equivocal median scores (such as 'paroxysmal' median=6), with subsequently low correlation (and covariance) between the individual results. In addition, it may also reflect the lack of familiarity using some diagnostic tests (such as nerve conduction studies) in the acute pain context.

There are problems with the face validity of using existing neuropathic pain screening tools (designed for use in the chronic pain population) in the postoperative period. For example, items identifying an autonomic component to pain by change in the colour of skin may not be a distinguishing feature of neuropathic pain in an area of wound healing. Similarly, relying on confirmatory neurological tests to diagnose neuropathic pain can be confounded by perioperative interventions (such as the use of local anaesthetics) and the availability of equipment used to do this (such as nerve conduction, QST, or electromyography). Nevertheless, some items identified by this Delphi process are also commonly included in chronic neuropathic pain screening tools, specifically, pain described as 'shooting' or 'burning' and symptoms and signs of allodynia.[7] The results of the Delphi survey confirm that autonomic features such as colour change and neurological testing are, however, not an important part of the current clinical diagnosis of neuropathic pain in the acute pain setting.

Interestingly, the two items identified as important in the survey with the highest level of agreement (lowest IQR) were 'poor response to opioid analgesics' and 'good response to anti-neuropathic analgesics'. This suggests that in the acute pain setting, an important component of neuropathic pain diagnosis is made retrospectively according to the individual's response to medications. This contrasts with chronic pain, where a prospective clinical diagnosis of neuropathic pain is made on the basis of history, examination, and confirmatory testing, followed by appropriate drug therapy. This may reflect the difficulty in teasing out a neuropathic component to acute pain by history and examination, in a setting where there is a confounding barrage of nociceptive stimulation. However, using this approach is not supported by evidence from a chronic pain setting. For example, in the chronic pain population, evidence suggests that neuropathic pain responds well to opioids (with a lower number needed to treat than gabapentin).[8]

Delphi is a well-recognized, structured process designed to achieve a group consensus on a given topic. Delphi as a technique is capable of acquiring agreement in areas of uncertainty or lack of empirical evidence, and has been used in the development of diagnostic criteria in the healthcare setting.[9–11] The advantages of using this technique include its ability to include individual panellists across diverse clinical and geographical locations without the need for face-to-face meetings.[12] The anonymous nature of the Delphi process ensures that no single expert can dominate the consensus process.[12] Disadvantages of the Delphi technique include an inability of panellists to meet and discuss uncertainties or ambiguities in, for example, the construction or wording of the questionnaires used.[13] Not allowing participants to discuss issues could be seen as a weakness of this form of consensus methodology.[13]

The success or otherwise of the Delphi process depends on the panel of experts chosen to participate. There are no universally agreed criteria for selecting experts, nor agreement on the minimum or maximum number needed.[12] We identified panellists with an interest in acute pain management via their registration with the acute pain special interest group, within the British Pain Society. In addition, active researchers in the field were identified by a literature search. The resulting number participating in rounds 2 and 3 of the survey were relatively small; however, it is not uncommon for Delphi surveys to use sample sizes of this nature.[10 14]

A variety of statistical techniques have been used to define consensus within the context of a Delphi study, although again no agreed guidelines exist. Most Delphi studies report an aggregate of group judgements and a move towards a level of central tendency.[14] We used predetermined levels of consensus (based on the IQR) previously used in Delphi surveys on diagnostic criteria.[10] The use of pre-determined levels of consensus may reduce researcher bias.[15]

It is important to note that the existence of consensus from a Delphic exercise is not a replacement for scientific reviews or original research, and any conclusions reached should be further tested against observed data. In this regard, the Delphi process provides a starting point for further clinical investigation of the difficulties in diagnosing acute neuropathic pain.

Declaration of interest

None declared.

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