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Entrapment neuropathies

Abstract

Entrapment neuropathies are common in patients with advanced diseases including cancer. They may cause severe pain that is resistant to the treatment with known analgesics. This article reviews the syndromes of entrapment neuropathies relevant to palliative care. It also proposes simple treatment and aftercare. Being able to diagnose entrapment neuropathies and to treat them effectively, potentially, may decrease the doses of opioids needed to treat the pain.

Key words: entrapment neuropathy, pain in cancer, breakthrough pain, steroid injection, nerve compression, nerve trunk pain

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Introduction

Entrapment neuropathies (EN) are characterized by spontaneous and/or paroxysmal pain felt in the cutaneous or deep distribution of an involved sensory or mixed nerve, or corresponding to the anatomical course of the nerve trunk or its branches [1]. Pain is spread into the distribution of other nerves for the same limb and even to that of corresponding nerves on the opposite side [2]. The pain is more severe on movement and at those points where nerves can become trapped passing through narrow fibro-osseous tunnels or around bony prominences. Clinically, these areas can be seen as trigger points or "tic douloureux". Spontaneous symptoms are described as unusual tactile and thermal feelings associated with numbness, tingling, pins and needles, burning, shooting, and electric shock-like sensations.

The paroxysmal pain caused by EN may be responsible for many so-called "breakthrough" pains encountered in patients with advanced cancer, and needing specific diagnosis and treatment. Neuropathies affecting only motor nerves may cause painful cramps which are often seen in motor neurone disease.

ENs are only rarely discussed in textbooks on cancer pain, perhaps because they are only occasionally caused by tumour growth directly. More often they result from loss of elasticity of the subcutaneous tissues, muscle weakness and increased mobility of the joints and bones and are due to the overuse of wasted muscles. This may happen when patients with advanced cancer decide to stay at home as long as possible and need to propel a wheelchair or walk on crutches. In general, because patients with cancer tend to live longer, they also tend to develop all kinds of pain related to debility, including pain due to EN. Nothing specific is known about the epidemiology of ENs, as this phenomenon is largely ignored in medical texts. Clinical descriptions of mononeuropathies have been known for many decades, but tend to be forgotten in academic teaching and may need to be rediscovered. One of the reasons for their being forgotten is the global trend to carry out fewer nerve blockades and to use more systemic analgesics.

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Table 1. Entrapment neuropathies encountered in patients with cancer

Entrapment neuropathy	Clinical picture	Place of entrapment	Treatment
Greater occipital nerve	One-sided or two-sided headaches	Between the suboccipital muscles (oblique, semispinalis and trapezius)	Injection first of local anaesthetic and later methylprednisolone steroids (40–80 mg)
Supra-scapular nerve	Pain on compression of the suprascapular area radiating to the tip of the shoulder, shoulder joint immobility, sometimes giving a picture of "frozen shoulder", atrophy of the supra- and infraspinatus muscles. May be caused by proximal muscle dystrophy due to dexamethazone	Suprascapular notch, sometimes the glenohumeral opening	Injection in the vicinity of the suprascapular notch with a mixture of bupivacaine and methylprednisolone 40–80 mg [14–17]. Gentle physiotherapy to mobilize the shoulder is usually indicated. Occupational therapy, adjustment of crutches, wheelchairs and special household equipment are necessary
Upper lateral cutaneous nerve of the upper arm (from axillary nerve)	This nerve can be compressed by the axillary nodes/tumours. When the axillary nerve is compressed, weakness of the deltoid and teres minor muscles may be apparent. These muscles may be atrophic. A small patch of hyperalgesia may be noticed on the lateral aspect of the skin covering the deltoid muscle	In the axilla	Continuous block has been tried [18]. Radiotherapy to the axillary nodes is indicated and usually effective
Intercostal nerves	Hyperalgesia in the whole dermatome suggests root compression due to vertebral metastases. Hyperalgesia in only part of the dermatome may suggest compression of the respective cutaneous branch by spasm of the paraspinal muscles (posterior cutaneous branch) or by nerve damage accompanying rib fracture	Either in the course of vertebral foramen or at the peripheral trajectory of the nerve	Radiotherapy to vertebral metastases. A 5% lidocaine patch for 12–16 hours per day applied directly to the area of hyperalgesia. Intercostal nerve blockade may be highly effective, especially when ultrasound is used [19–20]
Cutaneous ramus of the XII subcostal nerve	Pain on movement experienced in the lower part of the chest as well as in the lateral part of the thigh. In these areas there may be a stroke of hyperalgesia. Hyperalgesia may reach as low as the knee. This pain may be apparent when the patient is forced to lie on one side because of lung or liver pathology. Weight loss alone does not explain the mechanism of this EN. Frequently accompanied by iliohypogastric nerve EN (see below) [21, 22]	The nerve crosses the iliac crest some 8–10 cm posteriorly from the iliac spina. Hence the tender point there	Injection of bupivacaine and methylprednisolone to the tender point on the iliac crest will differentiate between higher (paraspinal?) or peripheral compression
Cutaneous ramus of the ilio-hypogastric nerve	A stroke of hyperalgesia below this point may be present. Hyperalgesia of the lateral part of the mons pubis suggests involvement of the whole iliohypogastric nerve [21, 22]	This nerve crosses the iliac crest some 8 cm posteriorly to the tender point of the cutaneous ramus of the XII subcostal nerve	Injection of bupivacaine and methylprednisolone may differentiate the site of compression (see text). The procedure may be difficult in some patients as they not infrequently accumulate quite a lot of fat in this area

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Table 1. Entrapment neuropathies encountered in patients with cancer — continuation

Entrapment neuropathy	Clinical picture	Place of entrapment	Treatment
Superior cluneal nerve	This compression can be due to long-lasting supinal positioning when the patient is confined to bed. However, this nerve can become trapped in the iliolumbar ligament. Hyperalgesia of the upper medial area of the buttock may be observed [23]		
Found 7–8 cm from the median line, at the level of the L5 processus spinosus	Injection of bupivacaine and methylprednisolone may be helpful. However, when the points are symmetrical on both sides, one should be careful as the pathology of the lumbar vertebrae may result in similar tender points. Relieving this pain may destabilize the spine and increase the risk of fracture		
Lateral cutaneous nerve of the thigh	Syndrome known as meralgia paraesthetica [24–26]. Pain, tingling or a burning sensation is observed in the lateral thigh. Hyperalgesia does not extend as far as the knee. May be the result of lying flat in bed. May be bilateral	The nerve is trapped under the inguinal ligament, usually 2–3 cm medially and below the iliac spina. A tender point is localized there	Injection of bupivacaine and methylprednisolone to the place of tenderness [27–29]. If bilateral, the clinician should also think of the more proximal entrapment in the spine. A 5% lidocaine patch applied to the area of hyperalgesia may be effective
Obturator nerve	The patient may complain of pain in a small patch at the medial part of the thigh. Hyperalgesia may also be found there. Weakness of the adductor muscles usually confirms the diagnosis [30]	A tender point is localized in the upper part of the obturator foramen, below and lateral from the mons pubis	Injection of bupivacaine and methylprednisolone to the tender point is usually helpful [31, 32]. Accuracy of this block can be increased by ultrasound. The mechanism for this entrapment in patients with cancer is uncertain, so paravertebral or pelvic nerve compression should be considered [33].
Painful sacrum	This happens in extremely cachexic patients lying in bed for days at a time. One or more sacral foramina may be extremely painful, suggesting entrapment of the cutaneous sacral nerves. Hyperalgesia in the sacral dermatomes may be present	One or more sacral foramina	Inject first bupivacaine and 20–30 minutes later methylprednisolone. The injection of both drugs together may be extremely painful because of the lack of space [34]

Neuropathic pain can be divided into two different categories. The first is nerve compression or nerve trunk pain [1]. This neurogenic pain has been attributed to increased activity in, as well as abnormal processing of non-nociceptive input from the nervi nervorum [3]. With time, there may be a progressive loss of small and myelinated nerve fibres [4]. It is unclear how important local inflammation is in this process. Nerves subjected to stress, either from toxicity or pressure, will respond with distal oedema [5–7]. Distal oedema may cause entrapment of the nerve in an anatomically narrow space. In this model the stressor may act proximally, but the pain will be experienced distally in a typical place. Another situation will occur when a nerve is compressed directly in the narrow space, for example by nerve traction. Here local inflammation may play an important role.

The other type of neuropathic pain is dysesthetic [1]. Here there is no inflammation in the damaged nerve, but it depends on the axonal damage, ectopic axonal sensitivity and central sensitization.

In the first type of neuropathic pain there will be skin hyperalgesia, while in the second hyperalgesia may be accompanied by allodynia. Relieving the pressure (decompression) on the nerve will result in recovery, while no recovery is expected in the case of dysesthetic pain. Again, long-standing pressure may evolve from reversible nerve trunk pain to irreversible dysesthetic pain. Both syndromes may show decreased sensitivity to opioids [8]. This limited sensitivity to opioids combined with a lack of specific treatment for EN frequently results in opioid intoxication.

ENs are different from frequent compression, usually by a tumour or its treatment, of the brachial or lumbar plexus [9]. In plexopathies, a number of nerves are involved, at the same time causing a complex but typical clinical picture. In these cases reduction of tumour volume by radio- or chemotherapy offers pain remission for some time. It is different, however, when symptoms develop a couple of months after radiotherapy and in the absence of tumour recurrence [9]. This pain may be classified as post-radiation damage to the nerves and treated like other neuropathic pain.

The symptoms of ENs depend of the kind of nerve impinged. Small, superficial, purely sensory nerves will present with burning pain in a typical area served by this nerve. Mixed nerves may give paresthesias and loss of muscle function, sometimes with long-lasting muscle atrophy. Suprascapular nerve entrapment may give atrophy of supra- and infraspinatus muscles without any pain.

ENs, providing they are recognized in time, are usually reversible. Patients with a better prognosis may undergo a neurosurgical decompression, while patients in poor general condition will need to rely on pharmacological treatment. The pain is only partially sensitive to opioids and higher doses of these drugs are usually needed, especially when NSAIDs are contraindicated. The injection of local anaesthetics and methylprednisolone is another option. It is thought that methylprednisolone acts not only as a local anti-inflammatory agent, but also acts by suppression of ectopic discharge [10].

Injection technique

The tender point should be localized by palpation. After disinfection, a 22-gauge 50 ml-long needle should be inserted carefully, searching for the bone. Once the bone is localized with the needle, the needle should be "walked" 1–2 mm at a time in order to find the nerve. This will be obvious when the patient winces. Do not attempt to inject drugs into the nerve. Retract the needle by 1–2 mm before injecting the drugs. Most of the injections can be carried out at the bedside. However, in some patients, ultrasound/radiological localization of the bone is necessary prior to injection [35, 36].

Decreasing the opioid dose

Some patients with EN are treated with high or very high doses of opioids for their pain. Not infrequently, symptoms of opioid-induced hyperalgesia are superimposed on the symptoms of EN. The rapid control of pain with an injection of local anaesthetics and methylprednisolone can result in increased toxicity of opioids. There is a need to decrease the opioid dose rapidly, preferably in a clinical environment. Decreasing the dose by 1/3 instantly and the slower decrease of the second 1/3 of the dose are usually seen as good practice. Too rapid a reduction in the dose may precipitate abstinence symptoms.

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