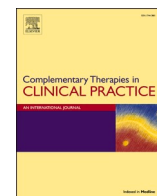


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A case report of immediate effects of acupuncture on neuropathic cancer breakthrough pain

Matthias Huemer^a, Daniela Jahn-Kuch^a, Guenter Hofmann^a, Martin Pichler^{b,*}

^a Department of Internal Medicine, Division of Oncology, Palliative Care Unit, Medical University of Graz, Graz, Austria

^b Department of Internal Medicine, Division of Oncology, Medical University of Graz, Graz, Austria

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ABSTRACT

Introduction: Acupuncture is a promising treatment for visceral cancer pain, but to date, evidence for immediate effects on neuropathic pain is limited.

Case presentation: This report presents a case of immediate pain relief by single-needle acupuncture on opioid-refractory neuropathic breakthrough pain in a 78-year-old female breast cancer patient with cervical bone metastases. Acupuncture was applied at a single point neuroanatomically correlating to the pain affected spinal segment.

Discussion: Immediately after acupuncture, the patient reported a complete pain relief lasting for one day. In the following days, neuropathic breakthrough pain was better manageable with reduced dosages of opioids. Acupuncture is possibly effective in providing immediate and safe pain relief in neuropathic cancer pain through neuromodulating effects on the spinal and central nervous level. Randomized controlled studies with individualized acupuncture point protocols are needed to establish efficacy and safety.

1. Introduction

Neuropathic pain is a common and debilitating symptom in cancer patients of various diseases or treatment-related side effects especially after platinum or taxane-containing regimen. The treatment of neuropathic pain is challenging and requires a multidimensional approach. Especially, motion-dependent shooting breakthrough pain in malignant myelopathies is hard to manage using conventional analgesics like opioids or anticonvulsants, leaving a large proportion of patients insufficiently symptom controlled [1].

Acupuncture can provide immediate and long-lasting pain relief in many pain syndromes, including visceral cancer pain, although the evidence of its effect on malignant neuropathic pain remains limited [2–4]. A characteristic of neuropathic pain in malignant myelopathies is the shooting breakthrough pain radiating along the segmental nerves into the periphery of the body. Hence, the area of pain directly corresponds with the affected spinal segment. The choice of effective acupuncture points should be based on neuroanatomical and segmental principles, as the acupuncture-induced change in pain threshold is mainly mediated by segmental inhibition [5,6]. This is further supported by preclinical studies investigating the biological mechanism of acupuncture analgesia

proposing different pain modulating neuronal systems on the spinal and central nervous level as a key mechanism of action [7,8]. Somatosensory pathways involved in the gate control theory and the descending pain suppression pathway mediate immediate analgesic effects if the stimulated acupuncture point and the region of pain share the same spinal segment [8]. Long-lasting analgesic effects, on the other hand, involve neuronal reorganization in the primary somatosensory cortex mediated by the stimulation of either local or distal points neuroanatomically corresponding with the affected area [7]. Therefore, the choice of effective acupuncture points strictly remains on neuroanatomical principles and exact identification of the pain-affected spinal segments in order to induce analgesia.

We found one recently published case report describing the use of acupuncture in bone metastasis-induced neuropathic pain, describing a gradual improvement of the quality of life and pain control over time but without immediate effect on breakthrough pain. However, the point protocol prescribed in this case was mainly based on the theory of traditional Chinese medicine and could not achieve a fast analgesia to bridge the gap of the delayed onset of conventional analgesics such as anticonvulsants [9]. Other clinical trials primarily investigate the effect of acupuncture on non-malignant neuropathic pain caused by peripheral

* Corresponding author. Department of Internal Medicine, Division of Oncology, Medical University of Graz, Auenbruggerplatz 15, 8036, Graz, Austria.
E-mail address: martin.pichler@medunigraz.at (M. Pichler).

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neuropathy [4]. This case report first describes the immediate pain relief in neuropathic cancer pain in a patient with malignant myelopathy after choosing an acupuncture point based on the underlying neuroanatomy resulting in an overall better pain management.

2. Case presentation

A 78-year-old female patient was admitted to our palliative care unit for pain management after an acute pain exacerbation on the left side of the neck and right flank. She had a history of breast cancer, multiple spinal bone metastases and was followed by our mobile palliative care team. The prescribed analgesics included hydromorphone 16 mg/d, duloxetine 60 mg/d with hydromorphone, metamizole, and paracetamol on demand. At admission, she described a deep dull visceral pain in the right flank and a sharp stabbing neuropathic pain on the left side of the neck radiating into the head and lower jaw. The cervical pain worsened with movement, especially of the head. A thorough examination revealed no other physical symptoms, neurological deficits, or meningeal signs. A CT scan of the cervical spine revealed multiple progressive bone metastases with fractures of the vertebrae C4 to TH1 compressing the spinal cord canal requiring a rigid cervical collar to prevent further fractures. Initial pain management included switching from oral opioids to continuous subcutaneous applied morphine (initial rate: 4 mg/h) together with parenteral applied metamizole 4 g/d, oral dexamethasone 8 mg/d, oral duloxetine 60 mg/d, and oral paracetamol 2 g/d. Following this, the patient reported adequate pain relief in the right flank. However, the neuropathic pain in the left neck persisted with shooting breakthrough pain and intermittently required additional boluses of morphine, especially during personal care and positioning, but without satisfying pain relief. Switching from duloxetine to gabapentin (initial dosage: 600 mg/d) resulted in a reduction of pain intensity and the required cumulative daily morphine dosage, but not the severity of breakthrough pain that additionally remained insensitive to morphine boluses. In addition, the intermittent neuropathic pain episodes caused sleep disturbances and increased depressive symptoms in the patient.

The first-line treatment of malignant spine fractures accompanied by acute neuropathic pain is radiotherapy of the affected site and analgesics, including opioids, glucocorticoids, antidepressants, and anticonvulsants [1]. In this case, radiotherapy of the affected vertebrae was impossible due to massive pain during positioning. Sedation or anaesthesia to manage this pain would put the patient at high risk of adverse events; hence, in consensus with the multidisciplinary team, the patient rejected radiotherapy. Instead, we aimed for conservative pharmaceutical treatment.

Gabapentin is effective in lowering the intensity of neuropathic pain and may lower the frequency of breakthrough pain [10]. However, it requires one to two weeks for the onset of its effect and a slow dose-titration to prevent central nervous adverse effects. Opioids are ineffective for acute breakthrough pain in neuropathies because of its acute and sudden onset [1]; additionally, a further increase of the rate in morphine bears the risk of overdosing in pain-free intervals. Although the patient's pain was moderately better than at the time of admission, she still experienced a high symptom burden, urging additional treatment modalities. Consequently, we offered her acupuncture as a complementary therapy to which she consented.

Based on the affected spinal segments C4 to TH1 causing our patient's pain, combined with the available knowledge on the biological mechanism and traditional Chinese aspects of acupuncture, an acupuncture-needling site was determined. Somatosensory nerve fibres from the spinal segments C5 to TH1 innervate all anatomical structures found in the area of the traditional acupuncture point "lung 8" that is located in the depression between the radial artery and the styloid process of the radial bone (lateral antebrachial cutaneous nerve: skin, C5-7; median nerve: superficial, intermediate and deep muscles of the distal forearm, C7-TH1). Our acupuncturist palpated a tender point

within this area and inserted a needle in a 45-degree angle to a depth of about 1 cm. The needle was then manually stimulated and adjusted in depth until a dull sensation was achieved corresponding to an activation of Aδ- and C-fibres, also known as "de qi" sensation [11], and left in place for 30 min.

Clinical nurses independently assessed pain intensity three times a day during routine symptom assessment throughout the hospital stay using the numerical rating scale (NRS, 0 = no pain, 10 = severest possible pain). Additionally, we used the cumulative morphine dosage documented in the medical record as a surrogate marker of pain.

3. Results

Immediately after achieving the de-qi sensation, the patient reported complete pain relief in the neck (Fig. 1). Furthermore, she did not report any breakthrough pain after the acupuncture until the next day. She could sleep uninterrupted during the daytime and only required one bolus of morphine at night before positioning for sleep. However, she experienced severe pain episodes during the following three days but reported an improved effect of morphine boluses. Within the following days, we could further reduce the required cumulative morphine dosage without an increase of pain severity and eventually achieved complete pain control when reaching the necessary gabapentin dosage of 1200 mg/d after one week of dose-titration. No adverse events were observed during or after acupuncture.

4. Discussion

This case report first describes an immediate pain relief of neuropathic cancer pain by single-needle acupuncture. Although the analgesic effect lasted only for one day, the patient reported a better effect of additional morphine boluses on the following days after acupuncture, improving the pain management in general. Therefore, no additional acupuncture was performed as the patient did not see any necessity for it. This result emphasizes the neuroanatomical approach in acupuncture point location and the proposed biologic mechanism of acupuncture itself. The better sensitivity to morphine may also be an effect of the increased gabapentin dose. However, complete pain control was first achieved on the day of acupuncture, supporting its analgesic effect. Given the ongoing research and integration in clinical practice, acupuncture may be a valuable and easy tool for improving the management of malignant neuropathic pain.

This clinical experience highlights the need for additional prospective controlled studies of acupuncture in neuropathic cancer pain. Consequently, a pragmatic trial design allowing individualized sham and verum acupuncture protocols based on neuroanatomical principles seems necessary to prevent bias in estimating the true effect size of acupuncture.

Declaration of conflicting interests

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Research ethics and patient consent

Written informed consent was obtained from the patient for using clinical data for research purposes and publication.

Author statement

M.H. was the acupuncturist and author on the case and conducted

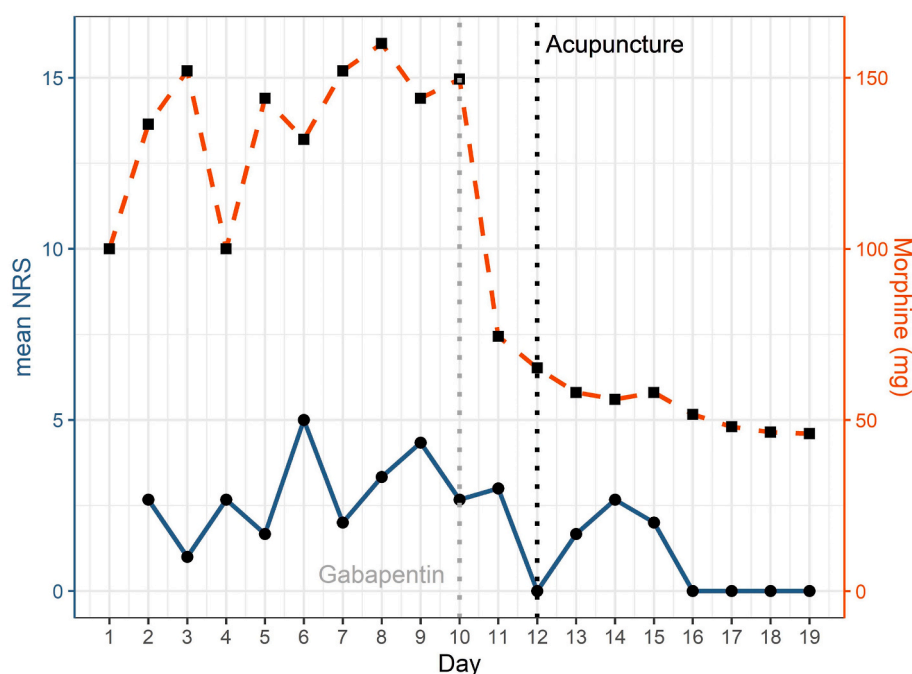


Fig. 1. Timeline of the mean daily pain intensity and cumulative daily morphine dosage. NRS = numerical rating scale, mg = milligram, continuous line = mean NRS, dashed line = cumulative daily morphine dosage, dotted vertical lines = timepoint of start of gabapentin and acupuncture.

the study. D.J.K. assisted in data collection and reviewing the manuscript. G.H. was the leading palliative care physician and supervised the manuscript writing. M.P. supervised the manuscript writing, reviewing, and submission process. All authors approved the final version of the manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ctcp.2022.101599>.

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