

CASE REPORT

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An unusual presentation of neuropathic pain following cervical spinal cord injury: a case report

Min Cheol Chang¹, Mathieu Boudier-Revéret^{2*} , Yoo Jin Choo¹ and Ming-Yen Hsiao³

Abstract

Background: We report a patient with unusual occipital neuropathic pain (at-level neuropathic pain) due to a small central cervical spinal cord injury (SCI).

Case presentation: A 50-year-old man presented with severe bilateral occipital pain after falling from a height of 2 m, 2 weeks ago. The degree of pain was evaluated to be 9 out of 10 using the numeric rating scale (NRS). The nature of the pain was tingling, burning, and piercing, and hyperalgesia was present over the bilateral posterior head regions. Greater occipital nerve block with bupivacaine and dexamethasone was not effective. On axial T2-cervical magnetic resonance imaging (MRI), a focal high signal change was observed in the central portion of the spinal cord at the C2 level. We deliberated that the patient's pain was due to the SCI observed on MRI, and after administration of oral medications, the NRS pain score reduced from 9 to 2.

Conclusions: Neuropathic pain caused by SCI varies according to the location and degree of injury of the pain-related neural tracts; therefore, clinicians should closely observe the pain patterns and findings on imaging in patients with SCI to determine the cause of pain accurately.

Keywords: Neuropathic pain, Spinal cord injury, Central cord syndrome, Occipital headache

Background

Neuropathic pain is a difficult complication of spinal cord injury (SCI) to manage as it can be severely debilitating and can result in inactivity and psychological problems, such as depression and anxiety [1]. It arises as a direct consequence of lesions in the somatosensory system, especially the lateral spinothalamic tracts [2].

Neuropathic pain is suspected when the nature of the pain is shooting, electric, burning, itching, pricking, tingling, or cold, and the location of the pain is in a region of sensory disturbance [3]. Neuropathic pain due to SCI can be divided into two main types, at-level and below-level neuropathic pain [4]. At-level neuropathic pain is pain that occurs in a segmental or dermatomal pattern within the dermatome at the level of neurological injury and three dermatomes below this level. Below-level

neuropathic pain refers to pain that presents diffusely caudal to the level of SCI, more than three dermatomes below the level of SCI.

In this study, we present a patient with unusual presentation of at-level neuropathic pain after SCI.

Case presentation

A 50-year-old-man visited the Department of Physical Medicine and Rehabilitation at a university hospital because of severe bilateral occipital pain after falling from a height of two meters, 2 weeks ago. The neck had flexed upon hitting the ground. His pain started immediately after the accident, and the numeric rating scale (NRS) score was 9 out of 10. The pain was tingling, burning, and piercing in nature with hyperalgesia over the bilateral posterior head regions. No sensory deficits were observed in the upper and lower limbs or trunk. Furthermore, there was no motor weakness. The deep tendon reflexes were normal in the upper and lower limbs. The patient's anal tone and perianal sensation were intact. Ultrasound-guided greater occipital nerve

* Correspondence: mathieu.boudier-reveret@umontreal.ca

²Department of Physical Medicine and Rehabilitation, Centre hospitalier de l'Université de Montréal, 3840, Saint-Urbain St., Montreal, QC H2W 1T8, Canada

Full list of author information is available at the end of the article



block with 1.5 mL of 0.5% bupivacaine and 4 mg of dexamethasone was performed, and no short- or long-term effects were not found. On axial T2-cervical magnetic resonance imaging (MRI) (1.5 T, Magnetom Vision, Siemens, Erlangen, Germany; reconstruction matrix = 216×152 , field of view = $140 \times 140 \text{ mm}^2$, echo time = 100 ms, repetition time = 3739 ms) performed 2 weeks post-injury, a focal high signal change was observed in the central portion of the spinal cord at the C2 level, with no bone fracture (Fig. 1). Also, mild central canal stenosis was presented at the C4–5 and C5–6 levels. The SCI manifested on cervical MRI seemed to have resulted in the patient's pain. After administration of oral medications, including 150 mg of pregabalin twice daily, 75 mg/625 mg of tramadol/acetaminophen twice daily, and 10 mg of buprenorphine (skin patch) once weekly, the patient's pain became bearable (NRS score: 2).

Discussion and conclusions

The neurons of the lateral spinothalamic tract originate in the spinal dorsal root ganglia and enter the spinal cord via the posterior horn. Subsequently, they decussate across the anterior white commissure and ascend in the lateral spinothalamic tract on the contralateral side [5]. Damage of this neural tract from SCI can result in neuropathic pain at or below the level of the injury. In our patient, neuropathic pain following SCI occurred in the bilateral occipital regions, which corresponds to the C2 dermatome [6]. The neuropathic pain seemed to

have resulted from the injury of the central portion of the spinal cord at the C2–3 level. Due to the lesion, only the bilateral lateral spinothalamic tracts receiving pain signals from the C2 dermatome were damaged in the decussation portion, without involving the lateral spinal neural tracts, such as the lateral spinothalamic tract leading to the brain after the decussation (containing afferent fibres below the lesion) and the corticospinal tract (Fig. 1). Consequently, following SCI from the fall, neuropathic pain at the level of the injury, which was at the C2 dermatome, developed in our patient, with no significant motor deficits. The condition of our patient corresponds to central cord syndrome. Usually in patients with central cord syndrome, motor weakness is manifested below the level of injury with sensory deficits. Because upper extremity motor fibres are located more centrally than lower extremity motor fibres, motor function of upper extremities is typically more severely impaired than lower extremities [7]. However, when the lesion size is small as in our patient, only bilateral pain and loss of tactile sensation at the affected level can be manifested without motor deficits.

Here, we reported a case of unusual occipital neuropathic pain due to a small central cervical SCI. As SCI can cause neuropathic pain in various aspects, depending on the location and degree of the injury of the pain-related neural tracts, clinicians should closely observe the pain patterns and findings on imaging in patients with SCI to determine the cause of pain accurately.

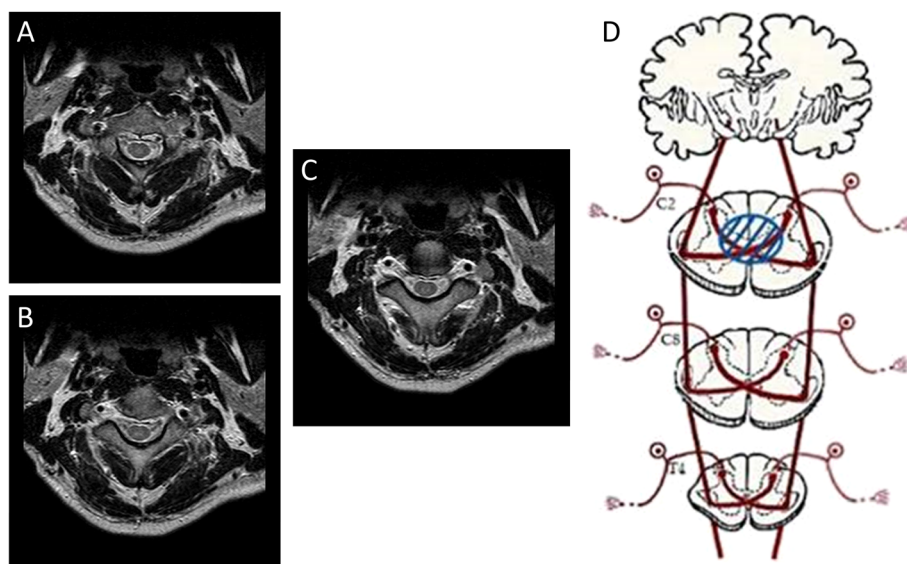


Fig. 1 a, b, c Three sequential cranial to caudal axial T2-weighted cervical spine magnetic resonance images at the C2–3 disc-level reveal focal high signal intensity in the central portion of the spinal cord. d A schematic diagram of the lateral spinothalamic tracts and injured area in the cervical spinal cord. The area within the blue circle indicates the injured region

Abbreviations

MRI: Magnetic resonance imaging; NRS: Numeric rating scale; SCI: Spinal cord injury

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Disclosure

The authors have no conflicts of interest related to this work. No funding was received. The authors obtained written consent from the patient.

Authors' contributions

MCC conceived the study and carried out the clinical research. MBR, MYH, YJC and MCC participated in the design of the manuscript. YJC conceived figure 1. All authors participated in the revision of the manuscript and figure. The authors read and approved the final manuscript.

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Availability of data and materials

Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

Ethics approval and consent to participate

The study was approved by the local Institutional Review Board of Yeungnam university hospital (number: 2019–12-054).

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor of this journal. The authors adhered to the CARE guidelines.

Competing interests

The authors declare that they have no competing interests.

Author details

¹Department of Physical Medicine and Rehabilitation, College of Medicine, Yeungnam University, Namku, Taegu, Republic of Korea. ²Department of Physical Medicine and Rehabilitation, Centre hospitalier de l'Université de Montréal, 3840, Saint-Urbain St., Montreal, QC H2W 1T8, Canada. ³Department of Physical Medicine and Rehabilitation, National Taiwan University Hospital, College of Medicine, National Taiwan University, Taipei, Taiwan.

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