CASE REPORT

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Cervical epidural hematoma: a case series highlighting uncommon causes



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Abstract

Background Cervical epidural hematoma (CEH) is a rare but potentially devastating condition, characterized by the accumulation of blood within the epidural space of the cervical spine, leading to spinal cord compression (Perron AD, Huff JS. Spinal cord disorders. In: Marx JA, et al. editors. Rosen's emergency medicine: concepts and clinical practice. 8th ed. Philadelphia: Saunders; 2013. pp. 1419–27.); (Raasck K, Habis AA, Aoude A, Simoes L, Barros F, Reindl R. Spontaneous spinal epidural hematoma management: a case series and literature review. Spinal Cord Ser Cases. 2017;3:16043. https://doi.org/10.1038/scsandc.2016.43.); (Ryo Yamamoto M, Ito H, Shimuzu K, Wakabayashi H, Oyama. Two cases of cervical epidural hematoma presenting with left-sided hemiplegia and requiring surgical drainage. Cureus. 2022;14(4):e23915. https://doi.org/10.7759/cureus.23915.). While trauma and iatrogenic causes are well-documented, cases attributed to neck strain and acupuncture are uncommon. (Raasck K, Habis AA, Aoude A, Simoes L, Barros F, Reindl R. Spontaneous spinal epidural hematoma management: a case series and literature review. Spinal Cord Ser Cases. 2017;3:16043. https://doi.org/10.1038/scsandc.2016.43.); (Shiraishi S, Goto I, Kuroiwa Y, Nishio S, Kinoshita K. Spinal cord injury as a complication of an acupuncture. Neurology. 1979;29(8):1188–90. https://doi.org/10.1212/wnl.29.8.1188.) Here, we present two cases of CEH secondary to these unusual aetiologies. Both cases highlight the importance of considering uncommon causes of CEH to ensure early recognition and prompt treatment.

Case presentations Case 1 is an 81-year-old lady who presented with left hemiparesis and paraesthesia following a fall with neck strain. Magnetic resonance imaging (MRI) of cervical spine revealed left C3-C7 epidural haematoma with severe cord compression. In Case 2, a 35-year-old gentleman experienced sudden onset numbness and weakness in all limbs just 10 minutes after receiving acupuncture. MRI showed an epidural hematoma at the C2-C4 levels. Both patients underwent immediate surgical decompression and had significant recovery.

Conclusion Although CEH is a rare occurrence, it can potentially be a neurosurgical emergency. Physicians must remain cognizant of the diverse aetiologies associated with CEH and the necessity for early recognition and immediate treatment.

Keywords Spinal epidural hematoma, Neck strain, Acupuncture, Hemiparalysis, Decompression

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Introduction

Cervical epidural hematoma (CEH) is a rare yet potentially devastating condition that results in spinal cord compression. Trauma and surgical interventions are recognized as common causes of epidural hematoma, spontaneous occurrences may also occur, especially in patients with coagulopathy or those undergoing anticoagulation therapy. In this report, we present two cases of CEH secondary to unusual aetiologies, emphasizing the critical importance of early recognition and prompt management.

Case presentations

Case 1

An 81-year-old lady, background history of hypertension and hyperlipidaemia, presented to the emergency department (ED) with sudden onset neck pain and left upper and lower limb weakness after straining her neck in a fall. She experienced dizziness upon getting up from bed, lost her balance and fell down. She broke the fall with her right hand and strained her neck. There was no reported direct trauma to neck or head injury. She complained of severe neck pain accompanied by left sided weakness and numbness right after.

On examination, she exhibited left sided hemiplegia with a muscle power rating of 1/5 on Medical Research Council (MRC) scale for the left C5-T1 myotomes and 2/5 for the L2-S1 myotomes. Sensation was globally



Fig. 1 CT scan, axial view. Left C2 epidural hyperdensity

reduced across all dermatomes on the left side, the power and sensation on the right side remained intact. Cranial nerve examinations were normal and distal pulses were present. Tenderness was noted on examination of the cervical and upper thoracic spines, with no evidence of step deformity. Digital rectal examination revealed reduced anal tone.

She was referred to orthopaedic spine team in view of concern of spinal cord injury. The orthopaedic spine team reviewed her case and suggested referring her to neurology team for a possible stroke. A computed tomography (CT) scan of the brain was performed and showed no acute infarct or haemorrhage. CT of cervical spine reported cervical spondylosis and left-sided epidural hyperdensity in the spinal canal from the C2-C6 levels, raising suspicion of an epidural haematoma [Figs. 1 and 2]. No cervical spine fractures were detected.

A magnetic resonance imaging (MRI) of the cervical spine was then performed to evaluate the extent of cord compression. It revealed a left posterior epidural hyper-acute hematoma from the C3 to C7 levels, causing severe compression of the cord [Figs. 3 and 4]. Emergency decompressive C3-6 left hemilaminectomy and ipsilateral instrumentation were performed 18 hours from the time of injury (13 hours from the time of presentation to the ED) after discussion with her family. Intraoperative findings confirmed a left cervical epidural hematoma extending from C2 to C6, along with tortuous epidural vessels in the left epidural space. There was no dura tear or cerebrospinal fluid leak.

Following the operation, she was transferred to the high dependency unit and then to the general ward on the second day post-operation. Her condition improved, with sensation returning to normal and power in both her left upper and lower limbs improving to 4/5. She was subsequently transferred to a community hospital for rehabilitation on day 8 post-operation.

Case 2

A 35-year-old gentleman, with no significant past medical history, presented to the emergency department with sudden onset of numbness and weakness of all 4 limbs. He was working in the Informative Technology industry and had sought acupuncture treatment for neck stiffness that he had been experiencing. He was lying prone when the acupuncture needles were inserted paravertebrally into the neck and shoulders. Weakness and numbness developed 10 minutes after the needles were introduced, with the left side being more affected more than the right. There were no falls or head injury, headache or loss of consciousness.

On examination, his vital signs were normal. There was left hemiplegia with a power of 0/5 on the MRC scale for muscle power. Power was 4/5 on the right C5-T1 and



Fig. 2 CT scan, axial view. Left C3 epidural hyperdensity



Fig. 3 MRI, T2, axial view. Left C3 epidural haematoma with severe cord compression



Fig. 4 MRI, T2, sagittal view. C2-C7 left epidural haematoma, maximal thickness 0.8 cm at C3 $\,$

L2-S1 myotomes. Sensation was globally reduced across all dermatomes on the left, with a sensory level at C5-C6. The sensation on the right was otherwise intact. Cranial nerve examination were normal and distal pulses were present. On digital rectal examination, his anal tone was lax.

Orthopaedic consult was sought and an urgent MRI of the cervical spine performed showed an epidural haematoma from C2-C4 level with acute to subacute compression of the adjacent cord [Figs. 5 and 6]. There was no sign of respiratory distress or neurogenic shock clinically. He underwent C3-C4 laminectomy and evacuation of epidural haematoma emergently. Intra-operatively, tortuous epidural vessel was noted with the epidural haematoma extending from C2 caudal aspect to C4.

He was transferred to the general ward and thereafter to a community hospital to undergo rehabilitation. He was eventually discharged from inpatient rehabilitation two weeks after his initial presentation to the emergency department. On discharge, he had regained full power on his right side with a MRC power of 5/5. There was also significant improvement the power on his left upper and lower limbs from 0/5 to 4/5 over C5-T1 and L2-S1 myotomes.

Discussion

Spinal epidural haematomas (SEH) occurs when blood accumulates between the vertebrae and dura of the spinal cord. It is a rare condition with an incidence of approximately 1 in 1,000,000 people annually [1]. The pathophysiology involves rupture of the epidural venous



Fig. 5 MRI, T2, axial view. C3 epidural haematoma



Fig. 6 MRI, T2, sagittal view. C2-C4 epidural haematoma with cord compression

plexus, leading to hematoma formation and subsequent spinal cord compression [2]. Compared to the lumbar and cauda equina region, haematomas in the cervical and thoracic region are more likely to cause symptoms due to the smaller size of the epidural space, resulting in less space available for volume compensation [3].

Trauma and iatrogenic causes are well-documented [1, 2, 4], it may also occur spontaneously particularly for patients with coagulopathy or are on anticoagulation [2, 5], both cases above highlight the potential for CEH to occur following seemingly innocuous activities such as neck strain and acupuncture. The intraoperative findings for our patients revealed the presence of tortuous epidural vessels, suggesting a possible association of tortuosity and risk of spinal epidural haematoma. Shanthanna and Park [4] reported a case of T10-12 spinal epidural haematoma following epidural steroid injection. The authors proposed that tortuous and weakened blood vessels might be ruptured upon injection, leading to haematoma. Few papers also reported tortuous epidural veins could cause radiculopathy or myelopathy [6, 7]. Nonetheless, more studies are required to explore this relationship and to gain a more comprehensive understanding of the role of tortuous vessels in spinal epidural haematoma.

CEH typically presents with sudden onset severe neck pain, often followed by neurological deficits such as weakness, sensory abnormalities, and sometimes bowel or bladder dysfunction [2]. Although rare, CEH may present with associated syndromes such as Horner syndrome [8] due to sympathetic chain involvement or other cranial nerve deficits depending on the location and extent of spinal cord compression. The clinical presentation mimics stroke [5, 8], making diagnosis challenging. Distinguishing between the two conditions is crucial as their management strategies differ significantly. Stroke necessitates evaluation for thrombolytic therapy or mechanical thrombectomy, CEH requires surgical intervention to alleviate spinal cord compression. Horner's syndrome and the absence of cranial nerve palsies in acute hemiparalysis are indicative of spinal epidural haematoma rather than stroke [8]. Imaging modalities, particularly MRI, also play a crucial role in confirming the diagnosis and assessing the extent of spinal cord compression [9].

Despite its rarity, it is regarded as a neurosurgical emergency that requires early immediate treatment to prevent irreversible neurological deficits [1]. Early recognition and surgical decompression have been shown to result in significant recovery of neurological deficits in CEH cases reported in the literature [5, 10], including our own cases. In a case series of 15 patients who developed SEH after cervical spine surgery, there were proportionately more patients with residual neurological deficits when there was a delay in the diagnosis of SEH (66% vs. 33%) [10].

Discussion on acupuncture-related CEH

The case of CEH following acupuncture highlights the potential risks associated with alternative medical therapies [11]. Acupuncture is a popular alternative medical treatment in Asia, involving the insertion of thin needles into specific points on the body to relieve pain [12]. This treatment, however, is not without risk. SEH that developed after acupuncture to the neck have been reported in literature [13]. However these symptoms had developed between 1 and 6 hours after acupuncture. This is in contrast to our patient, who developed the symptoms during the procedure.

Other than SEH, other complications that have been reported in literature after acupuncture to the neck and back include infections such as epidural abscess, transverse myelitis, spondylodiscitis, or direct spinal cord injury [11]. With the growing popularity of alternative medicine, this case serves as a reminder for healthcare providers to be cautious and knowledgeable about the potential risks involved, particularly in more invasive therapies like acupuncture.

Conclusion

These cases highlight the importance of considering uncommon causes of CEH in patients presenting with acute neck pain and neurological deficits. Early recognition and intervention are paramount to optimizing outcomes in this rare but potentially devastating condition. Healthcare providers should maintain vigilance and awareness of the diverse aetiologies and management strategies associated with CEH to ensure optimal patient care.

Abbreviations

- CEH Cervical epidural haematoma
- CT Computed tomography
- ED Emergency department
- MRC Medical Research Council
- MRI Magnetic resonance imaging
- SEH Spinal epidural haematoma

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Author contributions

Wey Ting Lee and Joan Fun took the lead in writing the manuscript in consultation with Yi Wen Mathew Yeo. Wey Ting Lee prepared the figures. All authors reviewed the manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate Not applicable.

Consent for publication

Consent was obtained from the patients for publication of this case report and accompanying images.

Competing interests

The authors declare no competing interests.

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