



Thoracic epidural haematoma after spinal manipulation treatment

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Dear Editor:

Spinal epidural haematoma (SEH) is an infrequent clinical diagnosis. In the setting of no known coagulopathy, mitotic or vascular lesion, the most common cause is that of significant trauma. In present times, the use of spine manipulation treatment (SMT) by complementary medicine health care professionals such as chiropractors is reputed to be effective for various spine-related complaints. Complications of SMT are reputed to be rare. We report the case of a paediatric patient who presented to us with spinal cord compression secondary to an acute thoracic SEH after undergoing SMT at a chiropractor. This case is discussed in corroboration with existing literature.

An 11-year-old male with no significant past medical history presented to the Emergency Department of another hospital complaining of lower back pain after a fall during a basketball game at school. According to documentation, there was some tenderness over the lumbar para-spinal region, but the patient demonstrated normal motor power and sensation in both legs. X-rays of his lumbar spine did not report any vertebral fracture or dislocation. He was diagnosed with lumbar muscle spasm and given a trial of analgesia. He was discharged as his back pain improved. Following that, the patient consulted a chiropractor who performed SMT on him. However, during the night, he developed worsening lower back pain associated with limb weakness. He was brought to our Children's Emergency Department. On examination, there was lower

back pain and flaccid paralysis of bilateral lower limbs. Concurrently, there was completely absent power, sensation and reflexes in both lower limbs as well. A sensory level up to T11 was noted. Anal tone was lax and there was saddle anaesthesia. Both upper limbs were neurologically intact. The remaining systems review were normal.

Urgent magnetic resonance imaging (MRI) of the patient's spine reported a heterogeneous T1-weighted hypointense and T2-weighted hyperintense extradural lesions at T10 to T11 levels causing acute cord compression. Presence of hemosiderin with minimal enhancement within the $3.5 \times 1.3 \times 2.0$ cm lesion was consistent with that of an epidural haematoma (Fig. 1). The patient underwent emergency laminectomy and evacuation of epidural lesion. Intraoperatively, a clotted epidural haematoma at T10 to T11 levels causing severe mass effect on the underlying spinal cord was seen. A small, bleeding epidural vein on the left side of T11 in the epicentre of the haematoma was visualised. No other suspicious lesions were noted. Histology of the excised SEH demonstrated blood clots with some admixed adipose tissue. No malignancy was found. Extensive haematological profiling did not report any coagulopathy. A postoperative MRI scan with contrast showed there was interval decompression of the thoracic cord with resolution of the acute cord compression at T10 to T11. No abnormal cord enhancement was detected (Fig. 2). After surgery, the patient had improvement of his sensory level up to L1. However, there was no other improvement in the remainder of his neurological deficit. At the time of this writing, he was undergoing intensive neuro-rehabilitation to optimise his recovery.

Spinal epidural haematoma in the paediatric population is extremely rare, and only a small subset of them are traumatic in nature [1]. In addition, the incidence of SEH as a consequence of SMT is also very uncommon, the majority of such cases reported in the adult population [2]. At present, the exact incidence of life-threatening complications resulting from SMT is still unknown, and previous estimates have all been based on assumptions which may or may not be true [3].

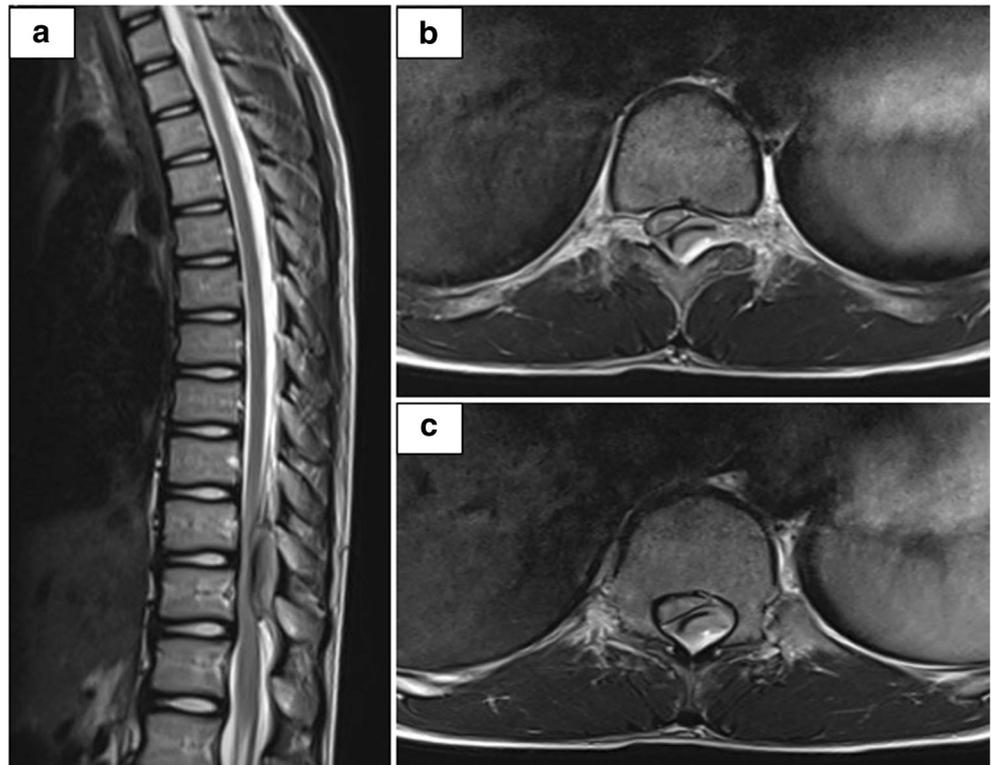
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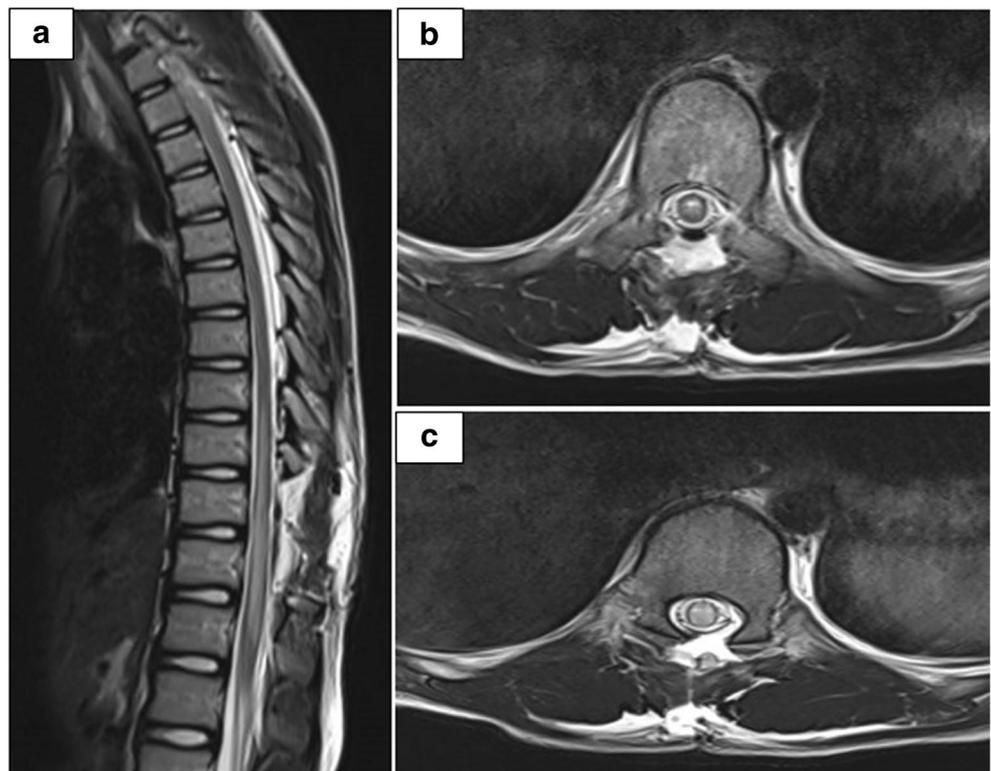
Fig. 1 Representative preoperative T2-weighted MRI images of the patient's cervicothoracic spine in sagittal (**1A**) and axial (**1B** and **1C**) views. **1A** shows a heterogeneously hyperintense extradural lesion extending from T10 to T11 levels. **1B** and **1C** depicts axial view at the levels of T10 and T11, respectively. There is an extradural lesion at the left posterolateral aspect of the spinal canal, extending into the left lateral recesses. The thecal sac is displaced anterolaterally with resultant cord compression



Typically, SMT by chiropractors involves high-velocity, low-amplitude manual thrusts to spinal joints that may extend beyond their physiological range of motion

[3]. It has been postulated that such excessive movement of the spine injures the epidural veins, either directly or via a sudden increase in venous pressure,

Fig. 2 Representative postoperative T2-weighted MRI images of the patient's cervicothoracic spine in sagittal (**2A**) and axial (**2B** and **2C**) views. These images correspond directly to all the images in Fig. 1. Here, the SEH has been evacuated, and its mass effect is resolved. Interval decompression of the thoracic cord with resolution of the previous cord compression. The thoracic cord is of normal configuration. Interestingly, there is increased hyperintensity noted from T8 to T12 levels. Presumably, these are related to postsurgical changes



resulting in a SEH [4]. If such injuries do occur, they tend to occur in the cervical or lumbar region. In the older population, SMT may exacerbate existing degenerative changes such as disc herniations, or cause dissection of the vertebral or internal carotid artery. In the context of paediatric patients, one must be aware of the discrepancies in the biomechanics between the adult and paediatric spine. In the latter, there is increased flexibility, relative muscle weakness and incomplete ossification of the osseous components of the spinal column [5]. Hence, owing to the immaturity of the paediatric spine, the strength of mechanical forces applied by standard SMT techniques may not be suitable in this group of patients.

In summary, this is a case of a healthy 11-year-old male who presented to us with a devastating spinal cord injury after SMT by a chiropractor. It is of course, difficult to determine if the epidural haematoma was truly a consequence of SMT or secondary to a lesion already present prior to SMT. This report aims to highlight the red flags of back pain in the paediatric population and the possible risks of SMT in this group of patients. Given the common use of SMT for various spine-related pathologies, we advocate the urgent need for prospective studies to generate reliable complication numbers in the best interests of affected patients.

Compliance with ethical standards

Conflict of interest declaration We, the authors of this manuscript, report no funding, financial support or industrial affiliations received for the writing of this article. In addition, we report no conflict of interest concerning the material or methods used in this paper. This manuscript has not been published and is not being considered for publication elsewhere.

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