

Disseminated leptomeningeal tumour mimicking a subarachnoid haemorrhage

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Abstract

This article describes an unusual presentation of disseminated oligodendroglial-like leptomeningeal tumour. A previously healthy 23-year-old Caucasian woman presented with headache, photophobia and recurrent seizures. Initial investigations were suggestive of subarachnoid haemorrhage. Her symptoms deteriorated rapidly and within weeks she developed complete blindness and diffuse sensory ataxia. The aim of this article is to increase awareness of this rare disease, especially in patients who present with acute, rapidly progressive neurological symptoms with signs of acute or chronic central nervous system bleeding.

Keywords

Diffuse leptomeningeal glioneuronal tumour, disseminated oligodendroglial-like leptomeningeal tumour, oligodendrogliomatosis, subarachnoid haemorrhage

Introduction

Disseminated oligodendroglial-like leptomeningeal is a rare tumour that is not recognized in the WHO 2007 classification system of central nervous system (CNS) tumours. The pathogenesis and clinical course of disease is unclear. We describe an unusual presentation of the case in a previously healthy 23-year-old woman. Her initial presentation mimicked subarachnoid haemorrhage. Despite a rapid deterioration of symptoms leading to complete blindness, 4 years following radiotherapy to the cranio-spinal axis, she remains in complete radiological response with stable symptoms.

Case report

A previously healthy 23-year-old Caucasian woman presented to the emergency department with a 2-day history of headache and photophobia commencing the day after a party where she had taken MDMA (3,4-methylenedioxy-methamphetamine) and ketamine. She reported that a few weeks earlier she had also had nausea and headache following a party at which she had taken similar drugs, including cocaine.

Neurological examination was normal and computed tomography (CT) of the brain unremarkable. In hospital, she developed a tonic-clonic seizure. Cerebrospinal fluid (CSF) analysis showed $29,120 \times 10^6$ red blood cells (RBCs)/L, protein 858 mg/L, 24×10^6 white blood cells (WBCs)/L and normal glucose at 5.1 mmol/L. The RBCs in the CSF were thought to be

secondary to a traumatic tap as no xanthochromia was found. Her symptoms were attributed to drug abuse and she was sent home with oral analgesia.

Over the following days she did not take any recreational drugs but nevertheless experienced severe headaches and vomiting. Eleven days after the first presentation she was re-admitted to hospital with recurrent seizures, which were treated with intravenous phenytoin and diazepam. Examination revealed a disconjugate gaze, left VII lower motor neuron cranial nerve palsy and up-going plantar reflexes. CT and CT venography were normal. On repeat lumbar puncture, the opening pressure was 24 cm of water, the RBC count $13,100 \times 10^6$ /L and protein level 1085 mg/L. Viral, bacterial and autoimmune screens were negative. On brain magnetic resonance imaging (MRI) susceptibility-weighted sequences showed superficial haemosiderin staining along the cerebellum, sylvian fissures and left parietal and frontal convexities consistent with a previous subarachnoid haemorrhage (Figure 1(a), arrowed)

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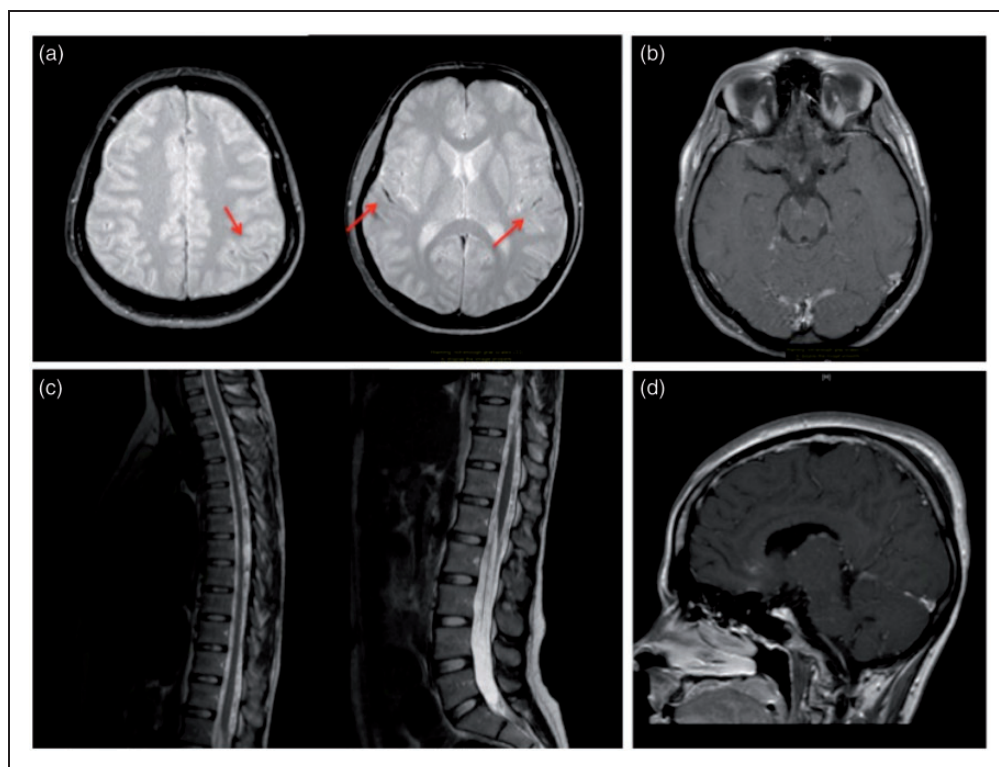


Figure 1. Axial and sagittal magnetic resonance imaging (MRI) images of the brain and spine. (a) T2 susceptibility weighted sequence brain MRI image- red arrows shows superficial haemosiderin staining along the cerebellum sylvian fissures and left parietal and frontal convexities; (b) T2 FLAIR sequence brain MRI image showing increased signal in the occipital and temporal subarachnoid spaces suggestive of acute haemorrhage; (c) T2 sagittal spine MRI image demonstrating extensive nodular leptomeningeal enhancement; and (d) T1 sagittal brain MRI image showing nodular pial enhancement over the pituitary stalk, hypothalamus and on the anterior aspect of the medulla extending down to the cervical canal.

and FLAIR sequences showed increased signal in the occipital and temporal subarachnoid spaces possibly representing more acute haemorrhage (Figure 1(b)). Catheter angiography was normal and did not show any aneurysm or intracranial source of bleeding.

Four days after admission she complained of severe headache and blurred vision. Ophthalmological examination revealed bilateral papilloedema and peripheral retinal haemorrhages. A repeat CT brain was normal and did not show hydrocephalus. On repeat therapeutic lumbar punctures opening pressures were consistently above 40 cm H₂O, with high RBC count ($>2000 \times 10^6/L$) and increasing protein ($>900 \text{ mg/L}$). An external ventricular drain (EVD) was therefore inserted. However, she deteriorated rapidly, developing complete blindness, flaccid tetraplegia and diffuse sensory ataxia.

On review of the brain imaging, the large amount of haemosiderin demonstrable by MRI and the absence of acute blood on CT raised the possibility of bleeding from the spinal cord. Spinal MRI demonstrated extensive nodular leptomeningeal enhancement over the entire surface of the cord, particularly prominent around the conus and cauda equina (Figure 1(c)). Repeat MRI of the head with pituitary views showed similar pathological nodular pial enhancement over the pituitary stalk, hypothalamus and on the anterior

aspect of the medulla extending to the cervical canal (Figure 1(d)). A meningeal biopsy was therefore performed at lumbar level.

Microscopy showed a myxoid tumour composed of cells with small round nuclei, dense chromatin and only a small amount of weakly eosinophilic cytoplasm. Figure 2 shows representative high-power images. The morphology is best appreciated in Figure 2(a) (intraoperative smear, haematoxylin and eosin) and Figure 2(b) (haematoxylin and eosin). Figure 2(c) (Alcian blue/PAS) highlights the blue myxoid matrix. The sections did not include mitotic figures, microvascular proliferation or necrosis. The tumour was not immunopositive for GFAP, S100 or synaptophysin. There was weak nuclear and cytoplasmic immunopositivity for Olig2. SMARCB1 labelling was difficult to interpret but the fluorescence *in situ* hybridization (FISH) did not indicate deletion of the HIRA region of chromosome 22q11 or loss of chromosome 22.1 p/19q co-deletion was absent. This confirmed diagnosis of disseminated oligodendroglial-like leptomeningeal tumour.

Three weeks into her admission, the patient had completely lost her vision bilaterally. However, the weakness progressively resolved, and the sensory ataxia improved. She commenced craniospinal radiotherapy (45.09 Gy in 27 fractions) and tolerated this well. She continued on steroids and had regular

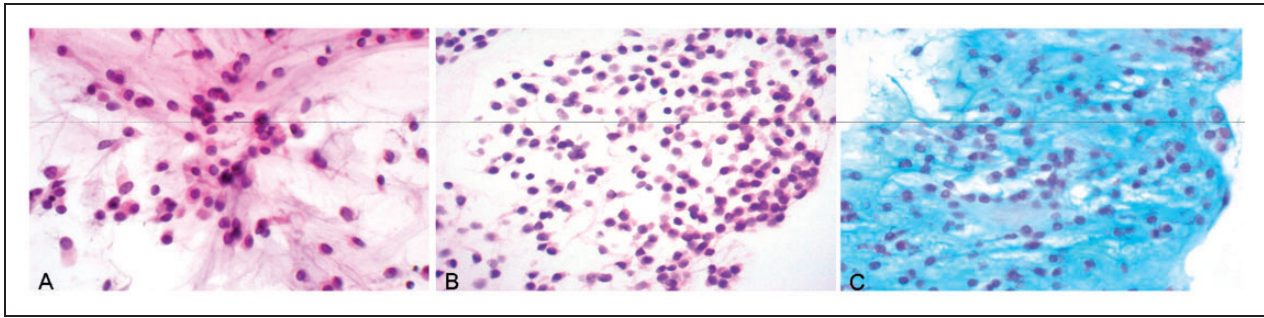


Figure 2. Representative high-power images of myxoid tumour which composed of cells with small round nuclei, dense chromatin and a small amount of weakly eosinophilic cytoplasm. (a) and (b) haematoxylin and eosin stain; and (c) Alcian blue stain.

therapeutic lumbar punctures, which were eventually reduced in frequency and then stopped. Two months after completion of radiotherapy, MRI of the brain and spine showed complete regression of the leptomeningeal nodular enhancement. Subsequent 6-monthly MRIs have not shown any recurrent disease, now more than 4.5 years following the acute clinical presentation. Clinically, the patient remains blind with decreased proprioception in both hands.

Discussion

Disseminated oligodendroglial-like leptomeningeal tumour is rare and not recognized in the World Health Organization (WHO) 2007 classification system of CNS tumours. It was characterized as a distinct entity in 2012 by Rodriguez FJ et al.¹ Although the authors described it as a tumour of childhood, the series included adult patients aged 25, 26 and 46 years. Survival ranged from 3 months to 21 years after diagnosis. The clinical and pathological descriptions were similar in older, single case reports^{2–4} dating back as far as the 1940s: Beck and Russell reported on four patients who presented with seizures and headache, and developed visual loss and loss of power in the limbs,² microscopy revealed diffuse infiltration of the cerebral and spinal meninges by tumour and, in three of three cases, optic nerve infiltration was seen at autopsy. More recently, Perilongo et al.³ described discrete spinal lesions, extensive leptomeningeal disease and low-grade glial tumour with histological features not typical of a specific category within the current WHO classification, in three children.

Our patient's clinical presentation was unusual in that it was so acute, mimicking subarachnoid haemorrhage, and the deterioration so rapid, leading to a catastrophic loss of vision. The loss of vision despite EVD insertion and repeated therapeutic lumbar punctures suggests that the cause was infiltration of the optic nerve, as in few previously reported cases,⁵ rather than raised intracranial pressure. The absence of leptomeningeal enhancement on brain MRI, in which only hemosiderin deposit could be clearly appreciated, and the history of drug abuse added to the challenge of reaching a diagnosis. The case

was referred for second opinion to a colleague (SL, see Acknowledgements) and a consensus diagnosis of disseminated oligodendroglial-like leptomeningeal tumour was reached.

The optimum management of this disease is not known. Radiotherapy has been utilized mainly in adults or older children, with varied responses.^{6–9} Our patient received craniospinal axis irradiation and improved clinically and functionally. Although she remains blind with distal sensory impairment, there has been no recurrence of headache or development of any new neurological symptom. Furthermore, there has been complete radiological response for more than 4 years following treatment. In younger children, treatment has mainly involved chemotherapy with carboplatin/vincristine or temozolomide, and responses have varied.^{5–8} Chemotherapy will be an option to consider in our patient in case of clinical or radiological recurrence.

Conclusion

Despite its rarity, disseminated oligodendroglial-like leptomeningeal tumour is increasingly recognized. It should also be considered in patients that present with acute, rapidly progressive neurological symptoms (including unexplained blindness) and signs of acute or chronic CNS bleeding. Diagnosis will usually depend on leptomeningeal biopsy. Radiotherapy in this specific case showed complete response for more than 4 years following treatment.

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Conflict of interest

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

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