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Case Report

A case of spinal cord intramedullary cavernoma☆

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ABSTRACT

Rare vascular abnormalities of the central nervous system, spinal intramedullary cavernomas make up fewer than 5% of all spinal cord lesions. Symptoms are vague, making diagnosis difficult. A fast and precise diagnosis is made possible by the early detection and characterization of these lesions, which is made possible by radiological imaging, especially MRI with contrast. A 45-year-old man who had intermittent neck discomfort and developed upper limb weakness also had motor and sensory difficulty. Diagnosis of a spinal canal intramedullary cavernoma was confirmed by an magnetic resonance imaging (MRI) showing a distinct intramedullary lesion. This case report focuses on managerial factors and diagnostic problems.

Introduction

The rare spinal cord lesion known as spinal cord cavernous malformation (SCCM) accounts for around 1% of intramedullary lesions in children and 5% of intramedullary lesions in adults. The appearance of larger channels free of glial or neuronal tissue is a characteristic of these vascular abnormalities. The symptoms of SCCM can range from asymptomatic to progressive myelopathy, and magnetic resonance imaging (MRI) is the most effective diagnostic technique [1].

Clusters of dilated capillaries with thin walls that are prone to recurrent microhaemorrhages are called cavernomas, or cavernous malformations [2]. Due to their rarity and nonspecific symptoms, spinal intramedullary cavernomas often go undiagnosed until patients present with significant neurological deficits. Their unpredictable clinical course and potential for causing substantial morbidity highlight the need for timely diagnosis and management.

Among the many clinical features that spinal cavernomas can produce are progressing myelopathy and incidental observations. Mass effects, recurring microhaemorrhages, or spinal

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cord edema are frequently the cause of these symptoms, which might result in neurological decline, sensory abnormalities, or motor impairments. These symptoms are more likely to occur in the cervical area.

Case presentation

A 45-year-old male residing in South East Asia presented to our outpatient department with complaints of progressive weakness in his upper limbs and intermittent neck pain over 6 months. Initial assessment in the orthopedics outpatient department focused on musculoskeletal causes, given the nature of his complaints. On further physical examination, the patient exhibited normal cranial nerve function, no signs of cerebellar dysfunction and intact lower limb coordination. However, persistent neurological symptoms prompted a referral to neurology.

Neurological examination revealed: Weakness (4/5) in bilateral upper limb muscles. Decreased pinprick and temperature sensation in a cape-like distribution over the shoulders and exaggerated deep tendon reflexes in the upper limbs. Following the physical examination, laboratory investigations, including complete blood count, metabolic panel and inflammatory markers were requested, all of which were within normal limits. Given the clinical presentation, magnetic resonance imaging (MRI) of the cervical spine was performed for further evaluation.

Non contrast MRI cervical spine findings: Focal T1/T2/T2FSWI hypointense popcorn-like rim lesion in the intramedullary region of the cervical cord at the level of the C2 vertebra, measuring approximately 5 × 6 × 7 mm (anteroposterior X transverse X craniocaudal) with surrounding mild edema (Figs. 1A and B). It shows blooming on GRE (Figs. 1F). There is e/o intramedullary peripheral ring hypointensity on T1/T2WI with peripheral blooming on GRE s/o peripheral chronic haemorrhage with T1 hyperintensity, T2 hypointensity and peripheral blooming on GRE in centre s/o acute haemorrhage it is extending from C1 to C4 vertebrae level s/o hematomyelia (Figs. 1G-I).

Post contrast MRI cervical spine findings: No significant enhancement on postcontrast study (Fig. 2). Magnetic resonance spectroscopy (MRS) did not show any significant metabolic peak, making malignancy unlikely (Fig. 3). These imaging features were highly suggestive of a spinal cord cavernoma with associated hematomyelia.

Given the symptomatic nature of lesion, the patient was advised for surgical resection. However, the patient opted for conservative management, which included regular follow-up, physiotherapy, and symptomatic treatment. The primary focus remained on pain control, physical therapy, and monitoring for any progression of neurological symptoms.

Discussion

Spinal intramedullary cavernomas, though rare, can cause significant morbidity. The lesion's propensity for recurrent bleeding leads to progressive neurological decline. Clinical symptoms often depend on the lesion's size and location, with cervical lesions more likely to present earlier due to the dense neural structures.

Sequences further accentuate blooming artifacts due to blood products, aiding in confirmation. Since magnetic resonance imaging (MRI) allows for a comprehensive image of the characteristic characteristics of spinal cavernomas, it is essential for diagnosis. Different blood degradation products give these vascular malformations their "popcorn-like" or "mulberry-like" look, and their signal core is mixed. Regions of hyperintensity and hypointensity on T1- and T2-weighted sequences best illustrate this variability, which corresponds to distinct bleeding phases [2]. GRE sequences further accentuate blooming artifacts due to blood products, aiding in confirmation. The hypointense hemosiderin rim on T2-weighted sequences that is characteristic of spinal cavernomas is caused by blood breakdown products and persistent microhemorrhages. Cavernomas can be distinguished from other intramedullary spinal lesions using this "black rim" characteristic. Because gradient recalled echo and susceptibility-weighted imaging sequences are sensitive to magnetic susceptibility artifacts, they highlight this rim, hence the "blooming artifact" is an important confirming result.

Important MRI findings help distinguish between intramural spinal cancers such as ependymomas, astrocytomas, and hemangioblastomas, even if their imaging features may overlap. In the spinal cord, ependymomas are located in the center and frequently exhibit bleeding or cyst development. Astrocytomas exhibit variable contrast enhancement and widespread cord extension, and they are more infiltrative. Vascular syrinx or flow voids and strong postcontrast enhancement are common features of hemangioblastomas, which are occasionally linked to bleeding.

MRI features and clinical correlate supported the diagnosis of a spinal cavernoma. Additional evidence for the diagnosis came from the lack of postcontrast enhancement, which is a sign of neoplastic lesions, as well as the absence of high choline levels and lactate peaks, which are linked to aggressive tumors. The spinal cavernoma can be distinguished from other spinal cord disorders thanks to these features and clinical association.

In all patient groups, with the exception of intracerebral cavernomas, surgery is the main treatment regimen for cavernomas. Surgery is also necessary for elderly people who are usually treated for ailments including listhesis, disc herniation, and lumber stenosis. Gross resection procedures with acceptable morbidity and no recorded death have been made possible using microsurgery methods. Patients with significant comorbidities and a Karnofsky score of less than 60 should get conservative treatment. However, there is no convincing reason why the remaining patients should forego or delay surgery [3].

Ischemic injury from prolonged traction, manipulation, rotation, and warming of the spinal cord during bipolar coagulation is the main cause of surgery-related problems and morbidity. To determine how much surgical manipulation the spinal cord can withstand, intraoperative monitoring is essential. Electrophysiological motorization is a crucial technique for preventing impairments brought on by surgery. Reducing

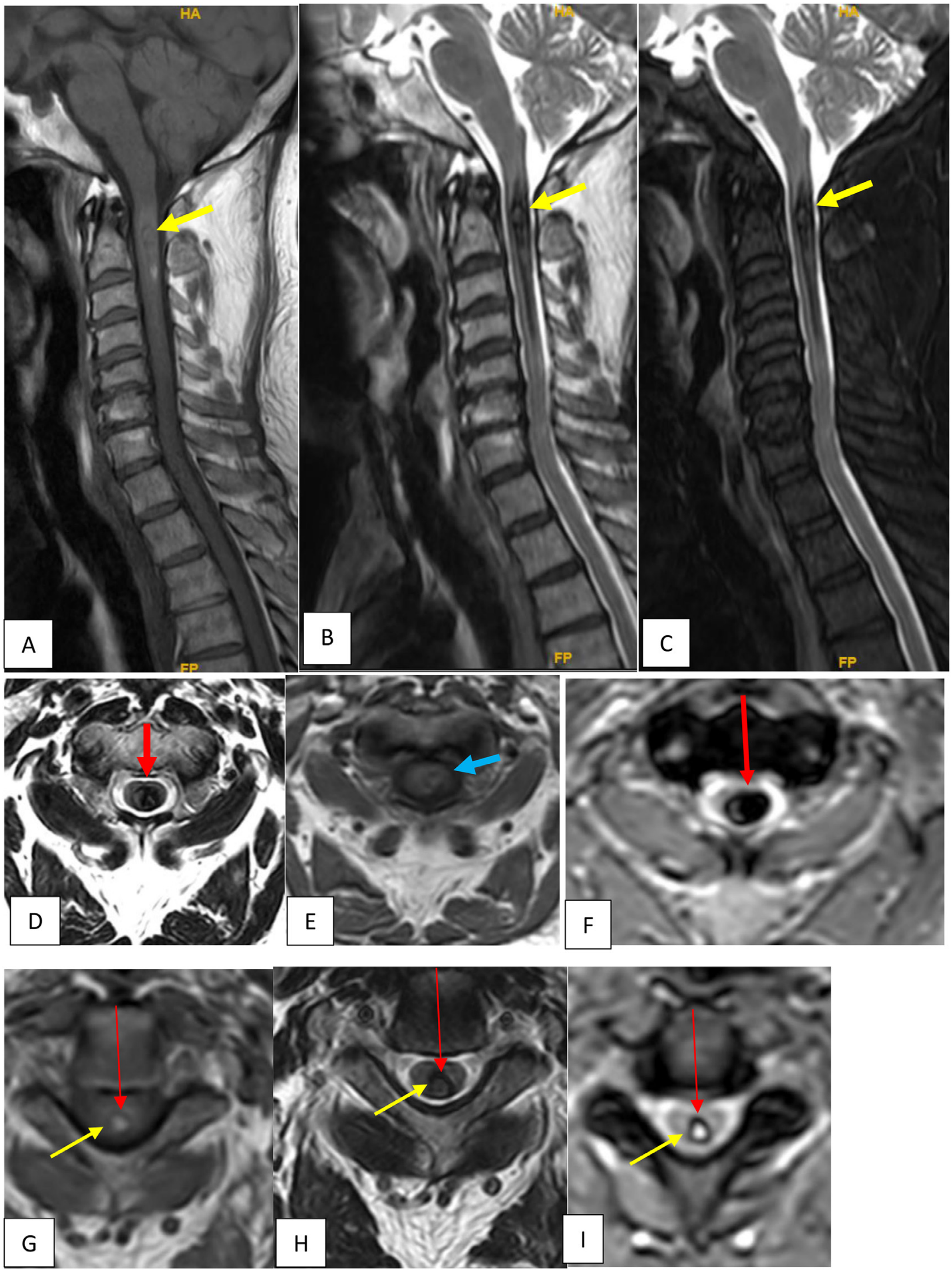

Fig. 1 – (A) SAGGITAL T1WI, (B) SAGGITAL T2WI, (C) SAGGITAL T2FSWI, (D) AXIAL T2WI, (E) AXIAL T1WI, (F) AXIAL GREWI, (G) AXIAL T1WI, (H) AXIAL T2WI and (I) AXIAL GRE. (A-C) shows focal Tl/ T2/T2FSWl hypo intense popcorn like rim lesion (yellow arrow) noted in the intramedullary region in the cervical cord at the level of C2 vertebra with surrounding mild edema. (D and E) shows- focal Tl/T2Wl hypo intense popcorn like rim lesion noted in the intramedullary region in the cervical cord at the level Of C2 vertebra with surrounding mild edema. (F) shows intramedullary blooming (red arrow) on GRE at C2 vertebrae level in spinal cord. (G, H and I) shows e/o intramedullary peripheral ring hypointensity on T1/T2WI (red arrow) with peripheral blooming on GRE (red arrow) s/o peripheral chronic hemorrhage with T1 hyperintensity (yellow arrow), T2 hypointensity (yellow arrow) and peripheral blooming on GRE (yellow arrow) in center s/o acute haemorrhage it is extending from C1 to C4 vertebrae level s/o hematomyelia.

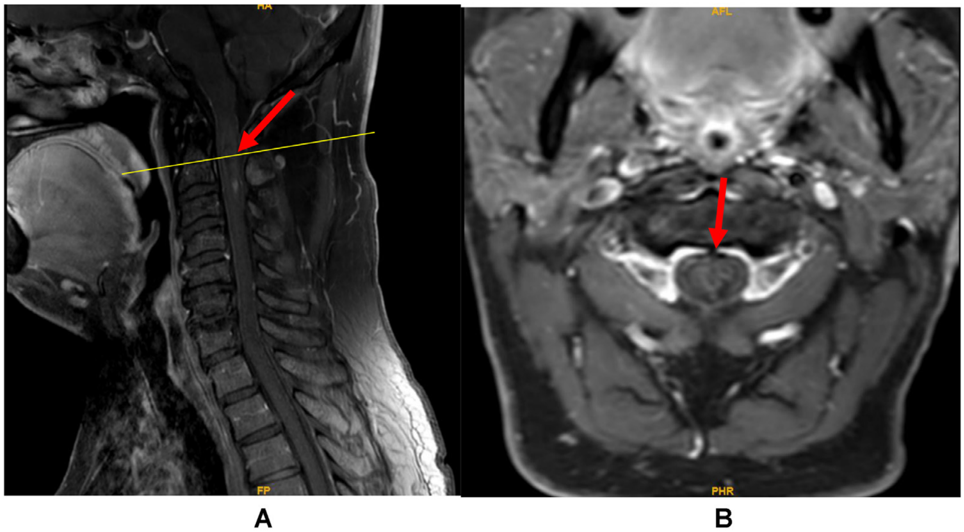

Fig. 2 – (A) SAGGITAL T1CONTRAST WI (B) AXIAL T1 CONTRAST WI AT C2 LEVEL. It shows no significant enhancement (red arrow) on postcontrast study.

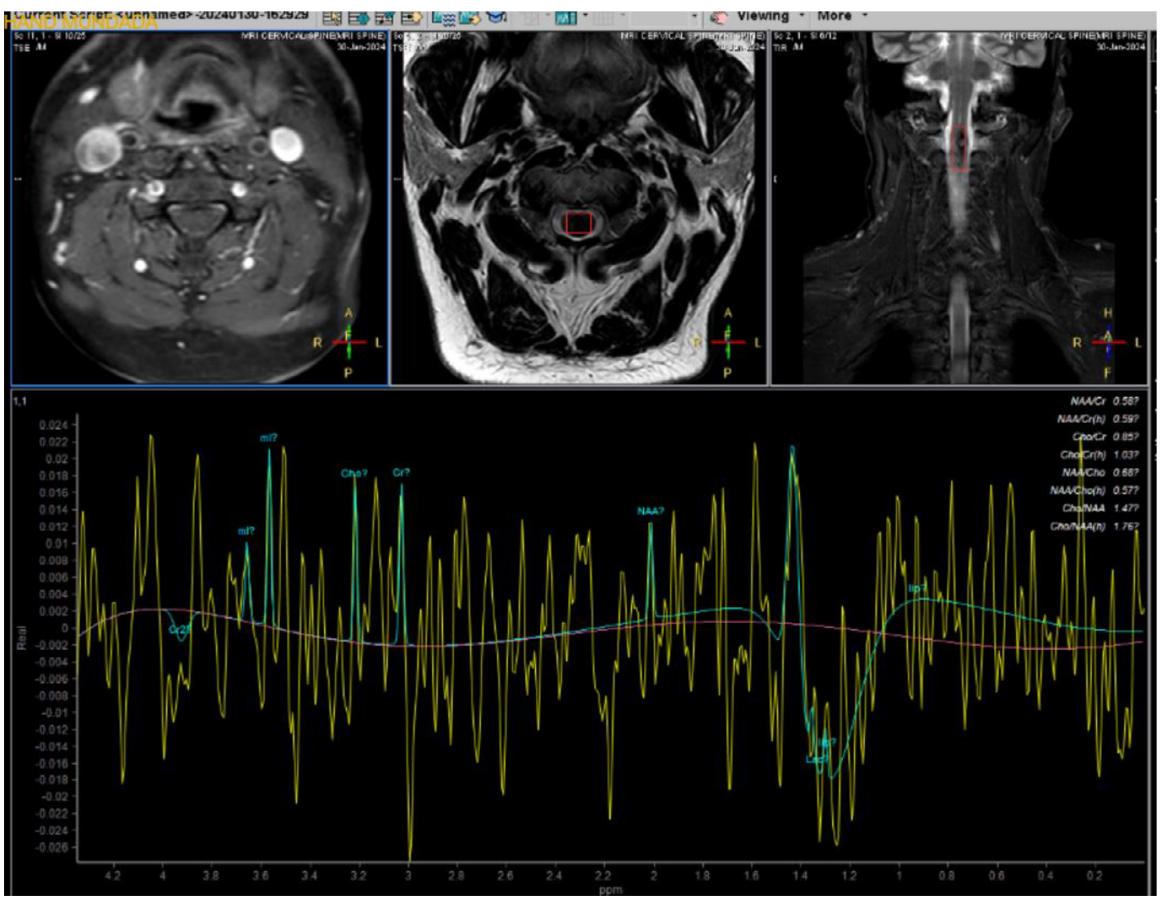

Fig. 3 – MR SPECTROSCOPY- shows no significant peak- other tumors can be ruled out.

morbidity requires precise preoperative lesion location. However, preoperative imaging may not be reliable since anatomy changes throughout the surgical procedure. One trustworthy technique for accurate localization is intraoperative ultrasound imaging [4].

In order to monitor lesion stability and identify any hemorrhages, conservative treatment of spinal cavernomas entails routine clinical assessments and MRI surveillance. Patients who have lesions in high-risk locations, stable symptoms, and little history of bleeding are advised to use this strategy.

Conservatively treated patients have a low annual risk of bleeding and maintain neurological stability over time, according to research. This method lowers the danger of surgery while preserving quality of life, making it a suitable option for certain people [5].

With follow-up intervals of 6-12 months following diagnosis, MRI is essential for conservative therapy of spinal cavernomas. If lesion progression or bleeding is indicated by new or worsening neurological symptoms, an urgent MRI is required. Crucial sequences such as T1, T2-weighted, GRE, and SWI aid in the detection of microhemorrhages, spinal cord edema, and hemorrhagic episodes, hence directing clinical judgments. The literature on cerebral cavernomas supports these guidelines, which call for routine MRI scans to check for any changes [6].

Since the appropriate time for intervention is yet unknown, medical treatment for asymptomatic individuals and clinical and radiological surveillance are required. The best time for action is typically postponed to prevent spinal cord aggression in instances of abrupt paraplegia therapy, which is largely surgical.

The decision to pursue conservative management requires careful consideration of the risks and other benefits [7]. While surgery offers definitive treatment, it is not without potential complications, including worsening neurological deficits [8]. Conservative treatment for those with mild to severe symptoms includes close observation and surgery. By doing this, the danger of bleeding is reduced and neurological stability is preserved. It ensures low surgical risk and preserves quality of life in people that are asymptomatic or mildly symptomatic [9]. Advances in microsurgical techniques and perioperative care have improved outcomes for patients undergoing surgery, but the individualized approach remains key to optimal care.

Conclusion

The case highlights how crucial a comprehensive approach is to the diagnosis and treatment of spinal intramedullary cavernomas. MRI is essential for early detection, distinction, and tracking the development of lesions. Sophisticated imaging techniques including as T1-, T2-weighted, GRE, and SWI sequences are necessary for precise follow-up and characterization. Although the best course of action for symptomatic instances is surgical excision, people without progressing symptoms might still benefit from conservative therapy. Timely intervention depends on routine MRI observation. Clinicians should maintain a high index of suspicion for spinal cavernomas in patients presenting with progressive neurological deficits and characteristic imaging findings.

Patient consent

We confirm that the patient's informed consent has been acquired in a language comprehensible to them and in their own words for the study titled, A Case of Spinal cord Intramedullary cavernoma.

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