Spinal arteriovenous malformation with a calcified nodule: illustrative case

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BACKGROUND This article describes a rare case of cervical spinal arteriovenous malformation (AVM) mimicking a neurogenic spinal tumor.

OBSERVATIONS A 22-year-old female presenting with a C6–7 AVM with a calcified nodule experienced new-onset acute right upper radiculopathy associated with extradural compression of the spinal cord. Note that spinal AVMs with a calcified nodule are rare. Endovascular embolization is generally used to relieve the symptoms of AVM; however, this procedure cannot relieve cord compression, particularly in cases complicated by calcified nodules. This article discusses treatment options.

LESSONS Decompression surgery is preferable to endovascular embolization because it alleviates symptoms while preventing cord compression and minimizing the risk of recurrence.

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KEYWORDS spinal arteriovenous malformation; spinal calcified nodule; spinal neurogenic tumor

Spinal arteriovenous malformations (AVMs) are uncommon, and their pathogenesis is largely unknown. When the condition is left untreated, the prognosis for patients with associated neurological symptoms is poor. Calcified nodules in spinal lesions (e.g., meningioma and AVMs) are particularly rare. This article presents the case of a cervical spinal AVM with a calcified nodule in accordance with Consensus Surgical Case Report (SCARE) guidelines.1 This article also includes a brief review of the relevant literature and a discussion of treatment options.

Illustrative Case

A 22-year-old female presenting with progressive right shoulder pain for 2 days was admitted to the emergency department of our hospital for an examination. The patient reported radiating pain in the right arm and numbness over the sensory dermatome of C5–7. Her symptoms progressively deteriorated as numbness spread to the left forearm and left lower leg. A neurological examination revealed grade 4 muscle power in the right upper limb. The patient also reported abnormal touch-vibration and pain-temperature sensations in the same area. A cervical spine lesion was suspected; however, radiographs revealed good alignment without instability (Fig. 1). Computed tomography (CT) scans revealed a calcified nodule measuring 0.47 × 0.51 × 0.58 cm over the right C6 vertebrae (Fig. 2). Magnetic resonance imaging (MRI) revealed an epidural lesion over the C5 to C6–7 right-posterior epidural space causing cord compression and C6–7 neural foramen encroachment. An epidural hematoma and a neurogenic tumor could not be ruled out (Fig. 3). Note that nerve conduction velocity and electromyography results were typical for an individual of her age.

Under the assumption that this was a neurogenic tumor, we adopted a posterior approach to a C5 to C6–7 laminectomy and tumor excision. An initial examination of the epidural space revealed a bundle of abnormal vessels (Fig. 4). The bleeding tendency of the lesion was high, and a whitish round tumor was observed adjacent to the blood vessels. A histological examination revealed a number of dilated arterial and venous vessels, indicating an AVM and a calcified nodule in the dermis. After the operation, the clinical symptoms completely subsided.

ABBREVIATIONS AVF = arteriovenous fistula; AVM = arteriovenous malformation; CT = computed tomography; MRI = magnetic resonance imaging.

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Patient Informed Consent

The necessary patient informed consent was obtained in this study.

Discussion

Observations

Spinal lesions can be classified according to their location as extradural, intradural extramedullary, and intramedullary. The spinal lesion examined in this study was located in the extradural region. In the neuroradiological differential diagnosis of epidural lesions, it is important for clinicians to consider metastasis, bone tumors, nerve sheath tumors, and vascular lesions. Calciﬁcation is common in intracranial meningioma; however, it is rarely encountered in extradural tumors along the spinal cord.

Spinal AVMs represent only 3% to 4% of all space-occupying lesions affecting the spinal cord, and most of these appear in the third or fourth decade of life. No predominant sex has been noted in adult populations. Multiple systems have been established for the classiﬁcation of spinal AVMs. The most widely used system is based on the appearance of fistulas on radiographic images. Extralateral arteriovenous fistulas (AVFs) do not fall within this classiﬁcation; therefore, they were added as a new type, resulting in a classiﬁcation system involving ﬁve types. The patient in the current study presented with a type Vb AVF lesion.

The clinical manifestations of spinal AVMs include hypoesthesia (sudden or gradual) as well as paresthesia, progressive paraparesis, back pain, and sphincter disturbances. Similarities between spinal AVMs and spinal tumors in terms of clinical manifestation make it difﬁcult to differentiate between the two based solely on clinical symptoms.

The appearance of calciﬁed nodules in spinal AVMs is unexpected, and even in spinal menigioma, this manifestation is rare (1%–5%). Radiological features of spinal menigioma on CT and MRI are often broad-based dural attachments located posterolaterally. In the current case, the calciﬁed lesion was round and well differentiated, without dural attachment. Calciﬁed nodules are considered benign, and the pathology is unknown. Bertoni posited that they are caused by inﬂammatory reactions, whereas Liccardo et al. and Song et al. described them as spinal epidural calciﬁed pseudoneoplasms.

The treatment options for spinal AVM include surgery and endovascular intervention, and selecting between the two relies on suitable medical imaging. Endovascular treatment is the preferred course when the vessels feeding the AVM can be obliterated and/or the risk of surgery is signiﬁcant. Surgical interventions are indicated when the lesion is resectable. In the current study, surgery was considered the most effective approach to preventing the growth of the calciﬁed lesion and corresponding spinal cord compression.

Lessons

AVMs can generally be treated via endovascular embolization as long as the feeding artery can be identiﬁed. The rare appearance of calciﬁed nodules within a malformation should be considered a slow-growing spinal calciﬁed extradural lesion, appearing as a well-deﬁned, hyperdense lesion on CT scans. Nonetheless, identifying
epidural lesions can be challenging, and it may be necessary to arrange for an angiogram if slow flow is suspected after MRI. If left untreated, these lesions can cause epidural compression-induced myelopathy or radiculopathy. Surgical interventions aimed at lesion removal generally provide favorable outcomes in terms of symptom regression and cord compression, and the incidence of recurrence is low.

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References


**Disclosures**

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

**Author Contributions**

Conception and design: Chen, Liu. Acquisition of data: Chen, Liu. Analysis and interpretation of data: all authors. Drafting the article: all authors. Critically revising the article: Chen. Reviewed submitted version of manuscript: Chen, Liu. Approved the final version of the manuscript on behalf of all authors: Chen. Administrative/technical/material support: Chen. Study supervision: Chen.

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