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CASE REPORT

Ruptured Cervical Radiculomedullary Artery Mycotic Aneurysm Presenting with Intracranial and Spinal Subarachnoid Haemorrhage: A Case Report

SH Liu[1], NL Chan[2], NR Mahboobani[1], TL Poon[2], WL Poon[1]

[1]Department of Radiology and Imaging, Queen Elizabeth Hospital, Hong Kong SAR, China
[2]Department of Neurosurgery, Queen Elizabeth Hospital, Hong Kong SAR, China

CASE PRESENTATION

A 64-year-old Chinese man with no significant past medical history presented to the Accident and Emergency Department of our institution in December 2021 with a 1-day history of headache and vomiting. He reported no head injury, seizure or loss of consciousness. Physical examination revealed no focal neurological deficit. Non-contrast computed tomography (CT) of the brain showed subarachnoid haemorrhage predominantly in the posterior cranial fossa, extending to the spinal canal at the C3 vertebral level, and to a lesser extent in the basal cisterns and at the inferior frontal regions (Figure 1). CT angiogram of the head and neck arteries revealed a 2-mm arterial-enhancing lesion in the cervical spine canal at the C2/3 vertebral level (Figure 2). It appeared to arise from a branch of the right vertebral artery and was connected to a prominent midline vasculature along the anterior surface of the spinal cord. No intracranial vascular lesion was identified.

Diagnostic cerebral and cervical spine catheter angiography was performed 3 days after admission. On right vertebral artery angiogram, there was a lobulated fusiform aneurysm at the right C4 radiculomedullary artery measuring 7.2 mm in length and 2.5 mm in diameter (Figure 3). This radiculomedullary artery is the dominant supply to the anterior spinal artery in the cervical region and corresponds to the findings on CT angiogram. There was no evidence of arteriovenous shunting. Subsequent magnetic resonance imaging of the spine revealed a contrast-enhancing lesion within the cervical spine canal (Figure 4), corresponding to the CT- and angiography-detected aneurysm. There was no evidence of spinal arteriovenous shunting, vascular malformation or tumours.

The patient developed fever after admission. Initial blood tests showed normal white blood cell count but neutrophilia. Repeated blood tests revealed leucopenia with persistent neutrophilia, thrombocytopenia and elevated C-reactive protein level. Blood culture yielded *Klebsiella pneumoniae* species. The patient was prescribed antibiotics. Echocardiogram showed no evidence of myocardial infarction, endocarditis

Correspondence: *Dr SH Liu, Department of Radiology and Imaging, Queen Elizabeth Hospital, Hong Kong SAR, China*
Email: lsh264@ha.org.hk

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Ethics Approval: The patient was treated in accordance with the Declaration of Helsinki and provided verbal consent for publication.

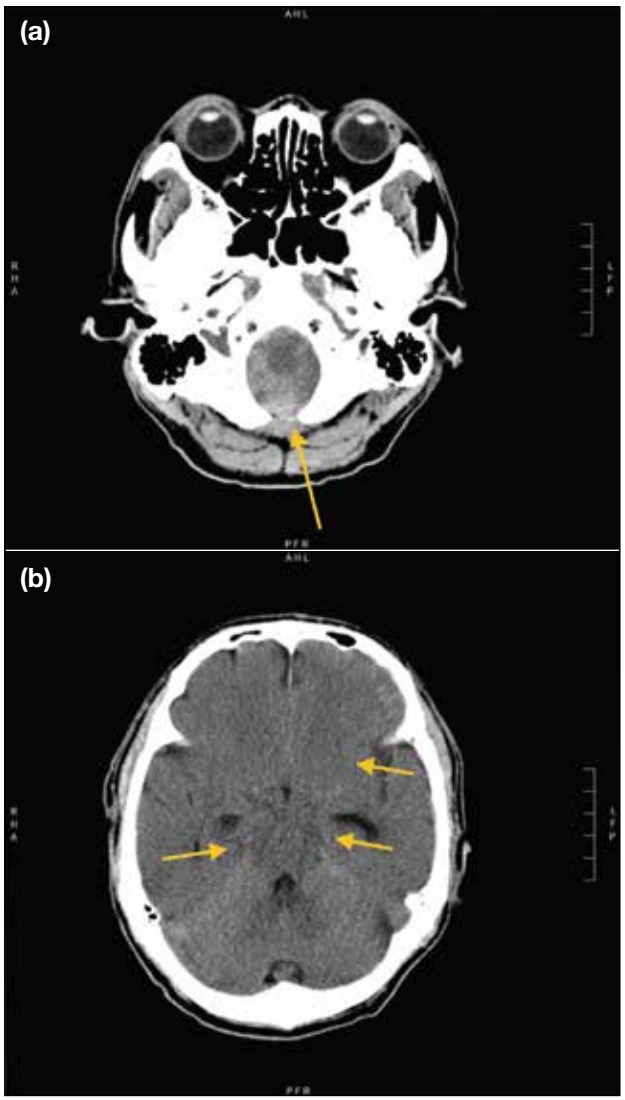

Figure 1. Non-contrast computed tomography of the brain at the level of foramen magnum (a) and basal cisterns (b). Subarachnoid haemorrhage is shown (arrows), predominantly in the posterior cranial fossa, especially at the foramen magnum.

or valvular vegetation. He remained stable with no new neurological signs or symptoms. Laboratory tests showed subsequent normalisation of white blood cell counts, platelet count and C-reactive protein level. Follow-up diagnostic catheter angiography of the right vertebral artery was performed 3 weeks after the first catheter angiography. There was no opacification of the aneurysm, suggesting that it is healed. The right C4 radiculomedullary artery remained patent, with supply to the anterior spinal artery visualised (Figure 5).

With the available clinical history, laboratory test results, and spontaneous occlusion of the aneurysm during antibiotic therapy, the most likely diagnosis for this patient was ruptured mycotic aneurysm at the right C4 radiculomedullary artery. The patient remained stable with neither altered consciousness nor focal neurological deficit. He completed a 6-week course of antibiotics as per the microbiologist's recommendation and was discharged uneventfully.

DISCUSSION

Spinal artery aneurysm is a rare cause of spinal or intracranial subarachnoid haemorrhage. Diagnosis of spinal artery aneurysms can be challenging and is sometimes delayed due to the rarity of the condition. These aneurysms have different morphological features to those of intracranial origin. They are usually fusiform, without a defined neck, and often not related to arterial branching sites.[1] In addition, they are usually associated with underlying vascular lesions such as arteriovenous malformation[2] or fistula.[3] There are also reported cases of association with tumours (e.g., haemangioblastoma),[4] aortic coarctation[2] and Moyamoya disease.[5] Other causes include underlying vasculopathy such as Behçet's disease,[6] Sjögren's syndrome,[7] systemic lupus erythematosus,[8] and pseudoxanthoma elasticum.[9] Mycotic aneurysms, as an alternative consideration, are rarely reported.[1,10]

There is no standardised treatment for ruptured radiculomedullary artery aneurysm due to its rare occurrence and varying aetiology.[11,12] Management should be tailored to each patient and take account of the size of haematoma, size of aneurysm, neurological symptoms, and feasibility and risk of intervention.

Vascular anatomy should be thoroughly evaluated prior to endovascular intervention or surgery. Cross-sectional imaging such as computed tomography or magnetic resonance angiography and catheter angiography can be adopted to delineate the morphology and size of the aneurysm, size of the relevant arteries, and pattern of vascular supply to the relevant segment of the spinal cord.

Dabus et al[13] reported a case of spontaneous thrombosis of a posterior radiculomedullary artery dissecting aneurysm with its parent artery in their case series, of which the patient showed no neurological deterioration on follow-up. This may have been due to the presence of good anastomoses of the radiculopial and radiculomedullary arteries. This emphasises the importance of angiographic evaluation of the arterial supply to the spinal cord. If the

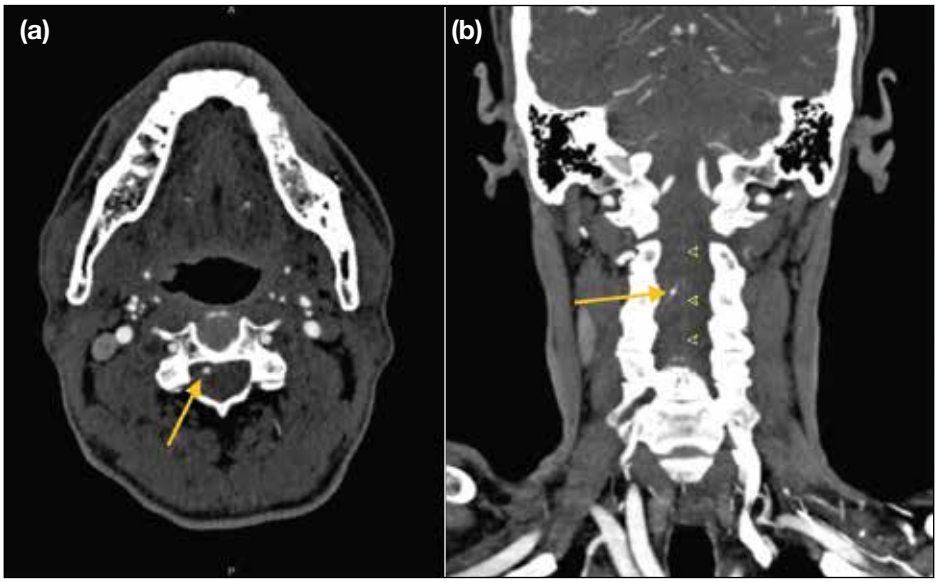

Figure 2. Computed tomography angiogram of the head and neck in axial plane (a) and coronal plane (b) showing tiny arterially enhancing lesion (arrows) in the cervical spinal canal at the C2/3 vertebral level arising from a branch of the right vertebral artery and connecting to the later catheter angiography–confirmed anterior spinal artery (arrowheads in [b]).

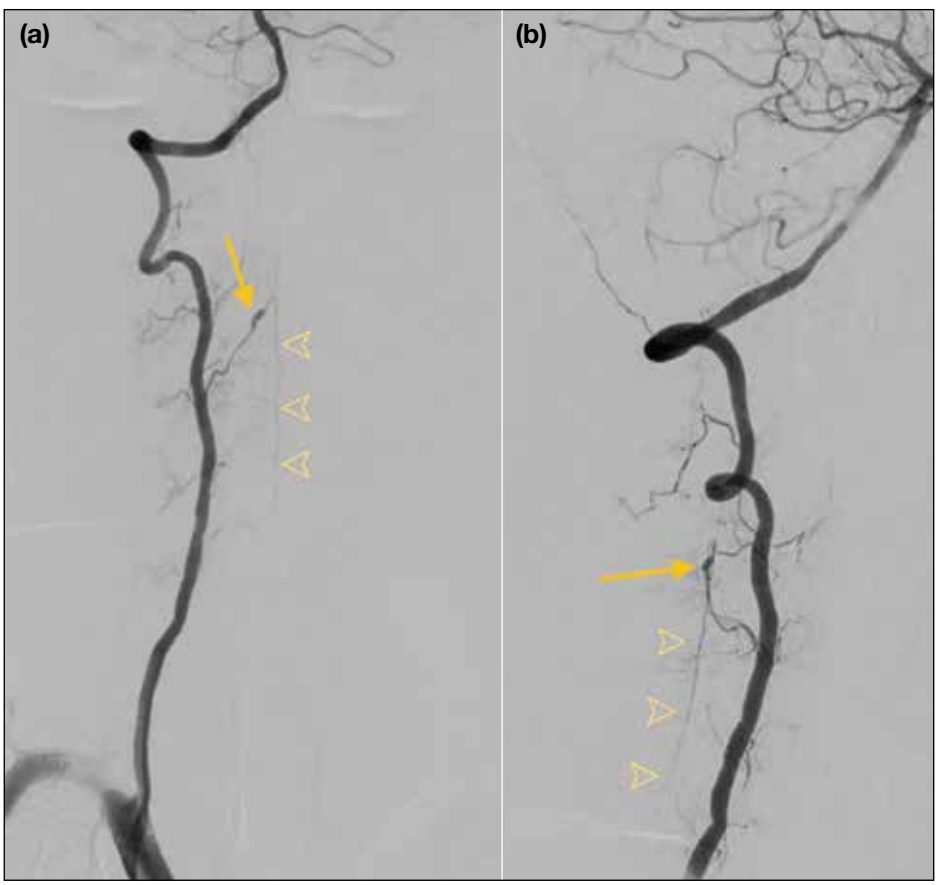

Figure 3. Digital subtraction catheter angiography of the right vertebral artery in anteroposterior projection (a) and lateral projection (b). A lobulated fusiform aneurysm (arrows) is seen at the right C4 radiculomedullary artery, which showed supply to the anterior spinal artery (arrowheads).

culprit artery shows a dominant supply to the relevant segment of cord, thrombosis or inadvertent injury during intervention may jeopardise the spinal cord blood supply. This has to be taken into account when deciding the suitable treatment strategy for each patient.

Endovascular intervention for small fusiform aneurysm without surgical neck at a very small size vessel can be

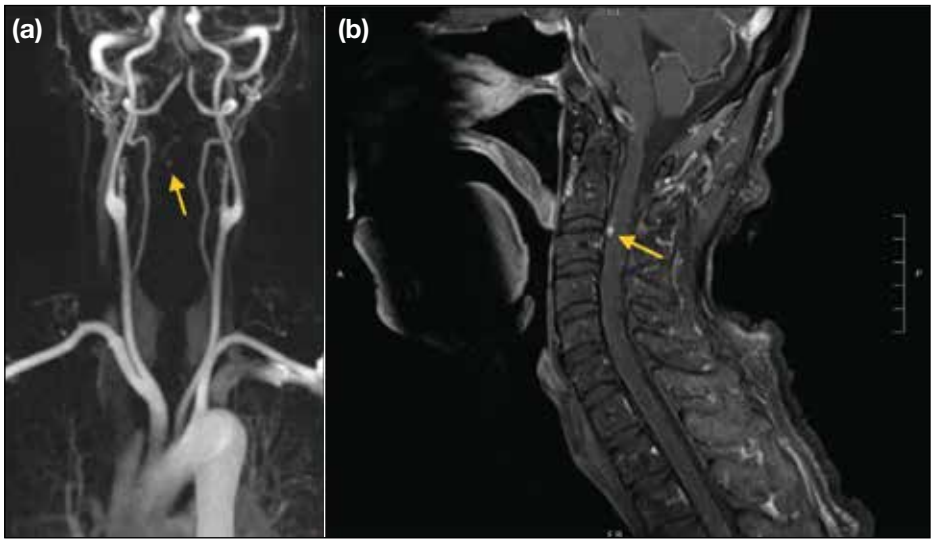

Figure 4. (a) Time-resolved magnetic resonance imaging angiography and (b) post-gadolinium T1-weighted magnetic resonance imaging with fat saturation of the cervical spine. The radiculomedullary aneurysm (arrows) is demonstrated as an enhancing lesion in the spinal canal.

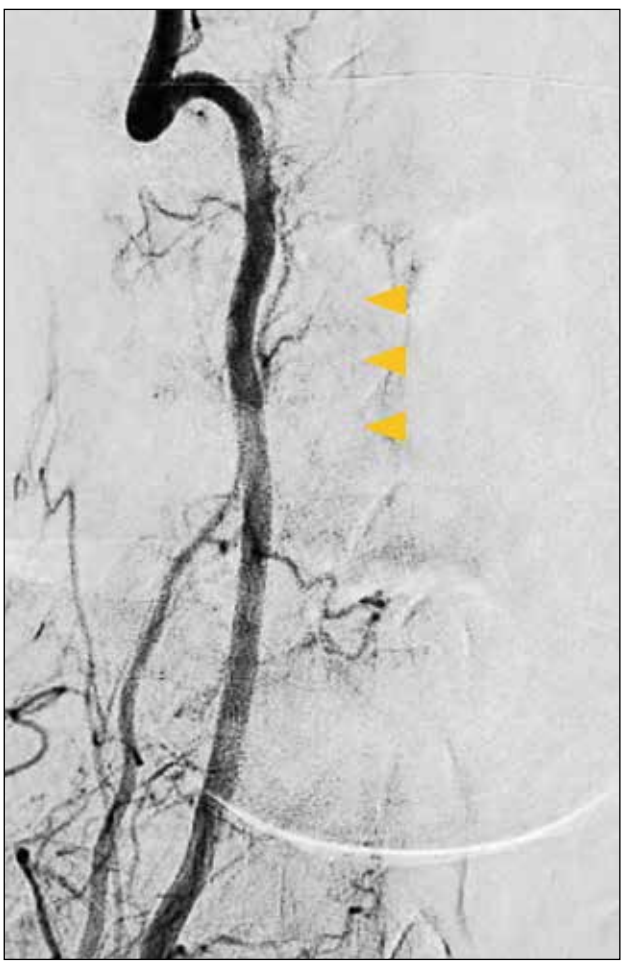

Figure 5. Digital subtraction catheter angiography of the right subclavian artery in anteroposterior projection. Previously noted right C4 radiculomedullary artery aneurysm has healed. Anterior spinal artery is visualised (arrowheads).

technically challenging and carries the potential risk of arterial thrombosis causing spinal ischaemia. In the case of large aneurysm or large haematoma with considerable mass effect, surgery such as clipping or resection may be a better option to reduce compression on the adjacent spinal cord and/or nerve roots.

Cases of resolution or thrombosis of spinal artery aneurysms have been reported,[1,6,7,13-15] either with a conservative approach or with medical treatment when an underlying cause is determined. In cases with small haematoma, minimal or mild neurological symptoms, and technically challenging and high-risk intervention, a conservative approach or medical treatment to target the underlying cause are reasonable options.

In our patient, apart from headache and vomiting, there was no focal neurological deficit. Aetiology was presumed to be a mycotic aneurysm. There was potentially high surgical risk including postoperative neurological deterioration. Medical treatment with antibiotic therapy was adopted.

CONCLUSION

Radiologists should remain alert for spinal artery mycotic aneurysm as a rare cause of subarachnoid haemorrhage. Treatment varies with the size, location and morphology of the aneurysm, vascular anatomy of the spinal arteries, presenting symptoms, and risk of intervention including potential neurological deterioration. Decision for intervention should be based on the balance of

risks and benefits. In patients with mild symptoms and high surgical risk, medical treatment with antibiotics is a reasonable treatment choice. Follow-up imaging including catheter angiography should be considered to monitor progress and guide further management.

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