An Unusual Posttraumatic Pseudoaneurysm of Intracranial Segment (V4) of the Vertebral Artery

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Abstract

Traumatic pseudoaneurysm of the vertebral artery is an uncommon and one of the most difficult lesions to treat. Posttraumatic vertebral artery pseudoaneurysm is located mostly extracranially, and its intracranial occurrence is exceedingly rare. We report a case of an 18-year-old man who underwent successful treatment of posttraumatic intracranial pseudoaneurysm of V4 segment of the vertebral artery by endovascular embolization. The patient who sustained trauma in a road accident presented with the complaints of headache, giddiness, and vomiting for the last 13 days. On admission, he was conscious but drowsy with no focal neurologic deficit. CT scan of the brain was suggestive of no significant intracranial abnormality. As the patient had headache, vomiting, and drowsiness, the CT was unable to explain his clinical picture, so CT angiography was performed to exclude vascular abnormality. CT angiography of the brain was suggestive of left vertebral artery aneurysm arising from V4 segment of the left vertebral artery. DSA showed a large pseudoaneurysm arising from left V4 segment of the vertebral artery near origin of PICA. Because of its difficult location, surgical treatment is less preferable as compared with endovascular treatment. The patient underwent endovascular coiling of pseudoaneurysm. Postcoiling DSA showed complete occlusion of pseudoaneurysm. The patient had uneventful postoperative period and showed good recovery.

Keywords
- pseudoaneurysms
- vertebral artery
- intracranial
- extracranial
- endovascular

Introduction

Pseudoaneurysm, which is also known as *false aneurysm*, is a hematoma that forms as a result of leaking hole in an artery contained by the surrounding tissue. Traumatic pseudoaneurysms of the vertebral artery are rare lesions as this artery is anatomically protected. The initial description was made by Matas in 1893.[1] The most common site of the posttraumatic pseudoaneurysm is the third part of the vertebral artery out of the four anatomical segments of vertebral artery. To the best of our knowledge, there are only two cases of posttraumatic V4 segment vertebral artery pseudoaneurysm reported in V4 segment.[2] The case described here is of an 18-year-old man who presented with left vertebral artery pseudoaneurysm due to road side accident 15 days back.

Case Report

An 18-year-old male patient, who sustained trauma in a road accident presented with headache, giddiness, and vomiting for the past 13 days. On clinical examination, the patient was conscious but drowsy, opening eye to pain, telling name on repeated asking, obeying command on repeated asking,

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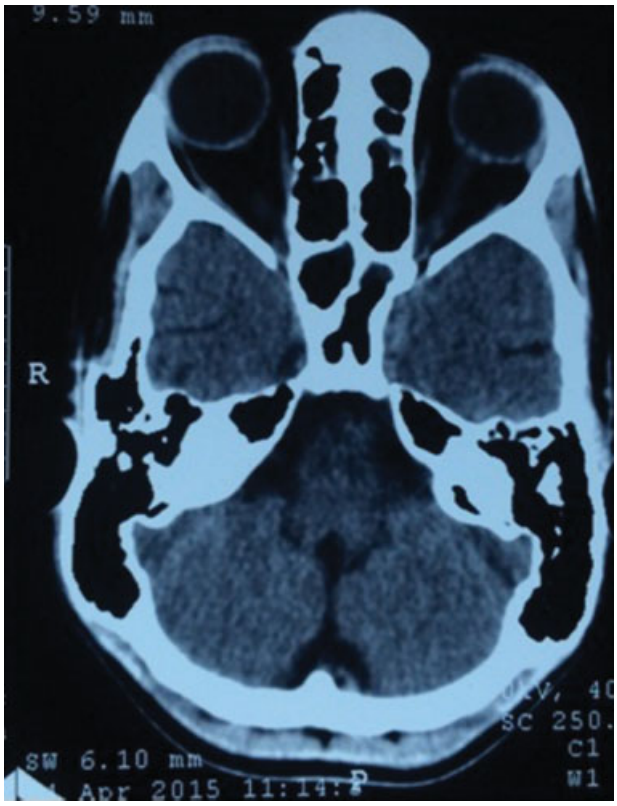

Fig. 1 CT of the brain shows normal study.

moving all four limbs spontaneously, having the Glasgow Coma Scale (GCS) 13/15. There was no focal neurological deficit. Blood pressure (BP) was 130/86 mm Hg, and pulse rate 88 beats/min. Computed tomographic (CT) scan of the brain showed no significant intracranial abnormality (►**Fig. 1**). As the patient had headache, vomiting, and was drowsy, CT of the brain was unable to explain his clinical picture, so CT angiography was performed to exclude vascular pathology. CT angiography was suggestive of left vertebral artery aneurysm arising from V4 segment of the left vertebral artery, projecting superiorly and narrowing of distal vertebral artery (►**Fig. 2**). Digital subtraction angiography (DSA) was planned for delineating the exact morphology of pseudoaneurysm and assessing the distal flow in the vertebral artery. DSA showed a large pseudoaneurysm arising from left V4 segment of the vertebral artery near origin of the posterior inferior cerebellar artery (PICA) (►**Fig. 3A, B**). Endovascular treatment was planned. Coiling of pseudoaneurysm was done and postcoiling DSA showed complete occlusion of aneurysm with patent flow in the left PICA (►**Fig. 4A, B**).

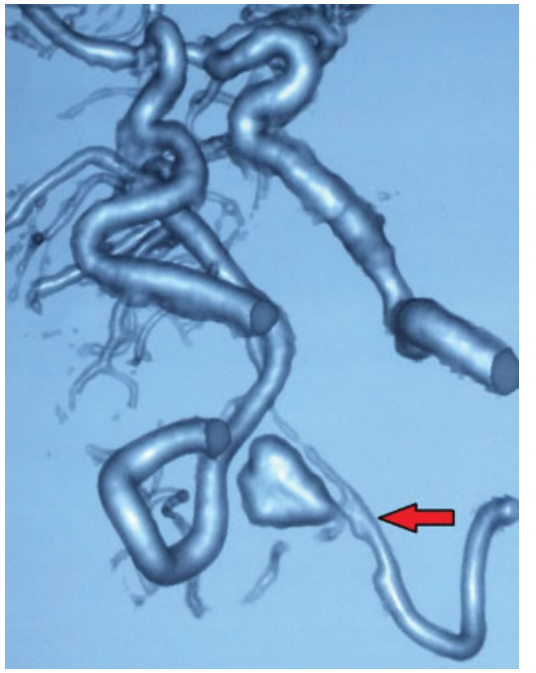

Fig. 2 CT angiography shows left vertebral artery aneurysm that is arising from V4 segment of the left vertebral artery, projecting superiorly and narrowing of distal vertebral artery.

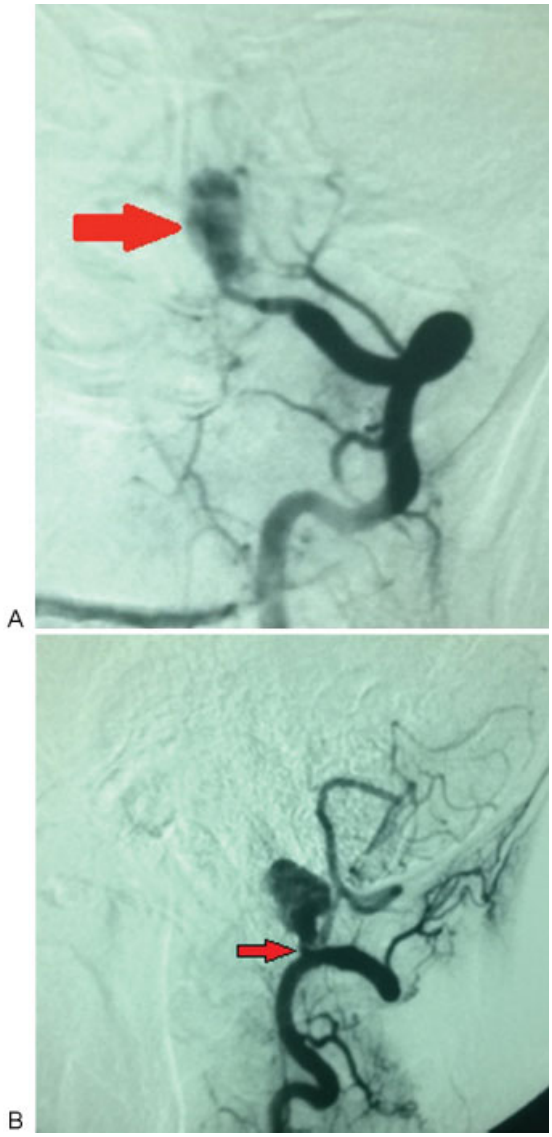

Fig. 3 Preoperative DSA images of pseudoaneurysm of the V4 segment of the left vertebral artery show a large pseudoaneurysm arising from left V4 segment of vertebral artery near origin of PICA (A) AP view and (B) lateral view.

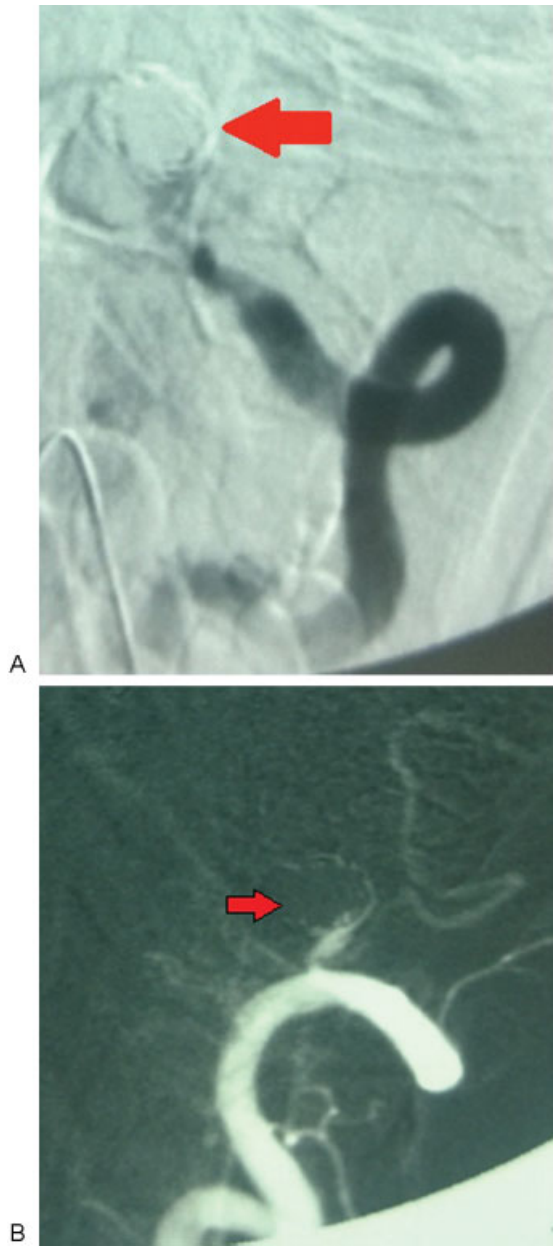

Fig. 4 Images after postcoiling DSA shows complete occlusion of aneurysm with patent flow in left PICA (A) AP view and (B) lateral view.

Discussion

Traumatic intracranial pseudoaneurysms are very rare occurring in less than 1% of patient with cerebral aneurysm.[3] Because of the unique bone protection inherent to the second portion and the deep anatomical location of the first, reports of vertebral artery pseudoaneurysm of these two segments are rare. In reviewing the literature on traumatic pseudoaneurysm of the vertebral artery, several etiological factors are found, such as: penetrating injuries due to knife wounds or bullets, contusion due to blunt cranial trauma, sports, and forced movements of rotation hyperextension of the neck, considered physiologic.[4] Vertebrobasilar ischemia after manipulations by masseurs working on the cervical spine is also described.[4] These aneurysms are mostly extracranial in location. As this is a case of intracranial pseudoaneurysm, the probable reason for V4 segment dissecting aneurysm may be due to tears of vertebral artery. The V4 region represents the most proximal part of the intracranial artery. This segment is likely subjected to a higher degree of traumatic forces at the skull base, such as head rotation and flexion[5] Furthermore, the tunica media and adventitia of the VA become thinner as the vessel pierces the dura.[5] These physical and anatomical factors surely predispose this arterial segment to injury and aneurysm formation. These aneurysms may present late with a variety of ways hemisensory or motor deficit, dizziness, syncope, vertigo, tinnitus, peril-oral numbness, gait ataxia, dysarthria, poor memory, diplopia, and occipital or neck aches.[6] In our case the patient presented with headache, vomiting, and vertigo. Gold standard test for diagnosing these cases remains DSA.[7] Management of vertebral artery pseudoaneurysm varies. Location and presentation of the patient influence the management. Immediate exploration is mandatory in the patient who presents with uncontrollable bleeding, expanding hematoma, or airway compromise.[3] However, when the patient presents late and has developed vertebral artery aneurysm, the option available to the surgeons are surgical explorations or radiologic interventions. In one of the largest series of vertebral artery trauma, Reid and Weigelt[7] suggested that surgical exploration with proximal and distal ligation was the procedure of choice. Among the most frequently used forms of treatment for these lesions are trapping of the pseudoaneurysm and arterial ligation, as well as direct approach to this lesion, which, however, present high morbidity and mortality rates.[7] Other therapeutic alternatives such as embolization and arterial revascularization have also been used.

Recently, the evolution of endovascular intervention has provided effective alternative means to treat these complex lesions, with reports of favorable outcomes as high as 89%.[8] Endovascular therapy offers the clear advantages of dramatically reduced operative time, minimally invasive technique, and elimination of donor vessel preparation for bypass procedures. Traditional therapies largely consisted of vessel sacrifice with permanent occlusion of the diseased vessel segment. Prior to complete exclusion of the vessel from the circulation, a diagnostic angiogram is performed to evaluate for the presence of collateral circulation, determine the length of the dissected segment, and identify vertebral artery dominance. A balloon occlusion test is also recommended when possible. This paradigm was again limited by cases of aneurysm recurrence and repeated hemorrhage.[9] Further with the development of increasingly sophisticated stent and balloon technology, the goal of endovascular surgery has often shifted from vessel sacrifice to preserve parent vessel or endoluminal reconstruction.[8] Subsequently, coil occlusion of the artery at the lesion site was adopted in patients in whom the aneurysm location was distinct from the origin of the PICA and the spinal artery.[9] Cases involving either of the aforementioned sites mandate a reconstructive endovascular approach, that is,

stent-supported coil embolization.[5] Other techniques such as double-stent insertion and covered stent placement have been used less frequently.[5] Long-term follow-up of patients treated with parent vessel preservation has often revealed acceptable results without significant complications.

This technique should always be considered for the resolution of these lesions because it reduces risks of surgery and its complications, by diminishing the hospital stay, as occurred in this report. Our patient was treated by endovascular embolization of pseudoaneurysm of V4 segment of the vertebral artery. During 3-month follow-up the patient is completely asymptomatic.

Conclusion

Posttraumatic intracranial vertebral artery pseudoaneurysms are very rarely noticed in literature. Because of its difficult location, surgical treatment is less preferable as compared with endovascular treatment. In our patient endovascular occlusion was performed successfully with uneventful postoperative period and good recovery.

References

1 Matas R. Traumatisms and traumatic aneurysms of the vertebral artery and their surgical treatment, with report of a cured case. Ann Surg 1893;18(5):477–521
2 Shimizu J, Nakagawa Y, Fuji Y, Nakase H, Mannen T. [Wallenberg's syndrome due to vertebral artery dissection following minimal neck injury—report of two cases] [in Japanese]. Rinsho Shinkeigaku 1992; 32(4):430–435
3 Jeffery P. Immelman E, Beningneld S. A review of the management of vertebral artery injury. Eur J Vasc Endovasc Surg. 1995;10:391–393
4 Katirji MB, Reinmuth OM, Latchaw RE. Stroke due to vertebral artery injury. Arch Neurol 1985;42(3):242–248
5 Anxionnat R, de Melo Neto JF, Bracard S, et al. Treatment of hemorrhagic intracranial dissections. Neurosurgery 2003;53(2): 289–300, discussion 300–301
6 Molnar RG, Naslund TC. Vertebral artery surgery. Surg Clin North Am 1998;78(5):901–913
7 Reid JDS, Weigelt JA. Forty-three cases of vertebral artery trauma. J Trauma 1988;28(7):1007–1012
8 Lee JW, Jung JY, Kim YB, Huh SK, Kim DI, Lee KC. Spontaneous dissecting aneurysm of the intracranial vertebral artery: management strategies. Yonsei Med J 2007;48(3):425–432
9 MacKay CI, Han PP, Albuquerque FC, McDougall CG. Recurrence of a vertebral artery dissecting pseudoaneurysm after successful stent-supported coil embolization: case report. Neurosurgery 2003;53(3):754–759, discussion 760–761