

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: <http://www.elsevier.com/locate/pjnns>

Case report

Sensorimotor C5 and C6 radiculopathy caused by thrombosed vertebral artery dissection and successfully treated with limited oblique corpectomy – Case report



Przemysław Kunert, Marek Prokopienko*, Tomasz Czernicki, Arkadiusz Nowak, Andrzej Marchel

Department of Neurosurgery, Medical University of Warsaw, Warsaw, Poland

ARTICLE INFO

Article history:

Received 13 August 2015

Accepted 14 October 2015

Available online 25 October 2015

Keywords:

Radiculopathy

Vertebral artery dissection

Oblique corpectomy

ABSTRACT

The authors report the case of an exceptional presentation of vertebral artery dissection. A 44-year-old man who presented with left shoulder weakness, radicular pain and numbness of the left forearm and thumb was admitted to our hospital with an initial diagnosis of cervical disc herniation. Due to the inconsistency between the levels of radiculopathy (C5 and C6) and discopathy (C6–C7), neuroimaging examinations were extended. Based on MRI, MRA, CTA and DSA, left vertebral artery dissection with intramural hematoma was diagnosed. The patient underwent surgical decompression of the affected nerve roots using the anterolateral approach described by Bernard George. The radicular pain resolved immediately and sensorimotor deficit completely disappeared within 4 months. MRI/MRA performed 6 months after surgery showed the normal image of the vertebral artery. There were no ischemic events within 2.5 years of follow-up.

© 2015 Polish Neurological Society. Published by Elsevier Sp. z o.o. All rights reserved.

1. Case report

A 44-year-old man presented with a 3-week history of pain in the left side of the neck radiating to the left shoulder and with increasing left hand weakness. Complaints appeared suddenly after lifting and rotating the head to the left during a walk in a park. The patient was referred

from the Neurological Ward with an initial diagnosis of cervical disc herniation. Neurological examination on admission to the Neurosurgical Department revealed proximal weakness of the left hand (deltoid muscle 2/5, biceps 3/5 according to the Lovett scale) and hypoesthesia of the lateral forearm surface and on the thumb (Fig. 2D). The patient negated bruit and there was no history of vertebrobasilar insufficiency.

* Corresponding author at: Department of Neurosurgery, Medical University of Warsaw, Banacha Street 1a, 02-097 Warsaw, Poland. Tel.: +48 604 902 632; fax: +48 22 658 36 53.

E-mail address: mpro76@tlen.pl (M. Prokopienko).

Abbreviations: MRA, magnetic resonance angiography; CTA, computed tomography angiography; DSA, digital subtraction angiography; TIA, transient ischemic attack; OC, oblique corpectomy; VAD, vertebral artery dissection; VA, vertebral artery.

<http://dx.doi.org/10.1016/j.pjnns.2015.10.007>

0028-3843/© 2015 Polish Neurological Society. Published by Elsevier Sp. z o.o. All rights reserved.

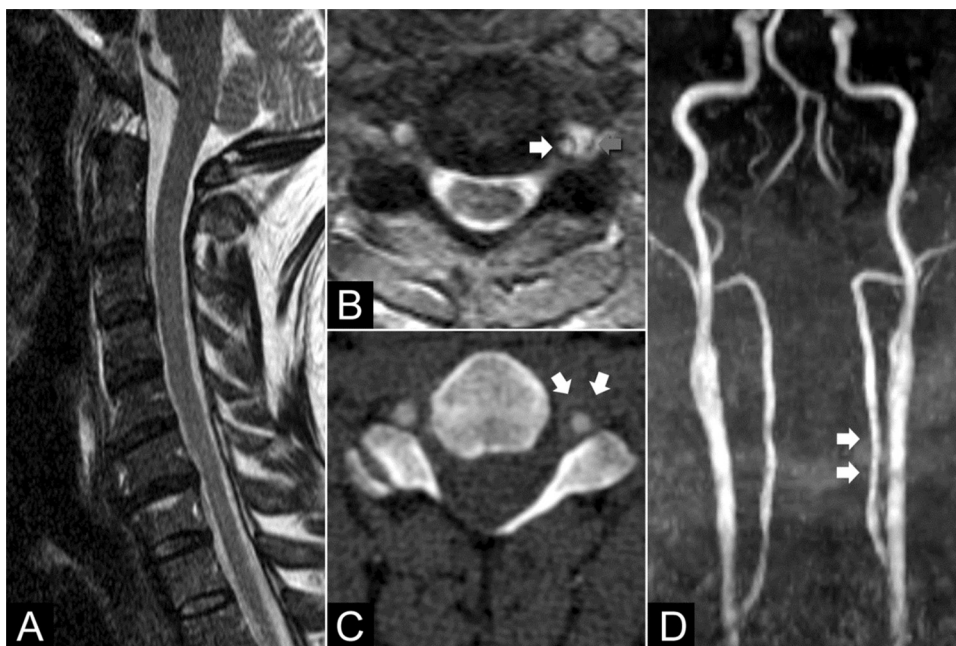


Fig. 1 – Neurological findings. (A) Sagittal and axial T2-weighted MR of cervical spine obtained one day after onset. Multilevel cervical disc degenerations with predominant changes at level C6–C7. (B) Axial T2-weighted MR images revealed hyperintense rim (gray arrow) around the vertebral artery on the left (white arrow) and no significant compression of the spine or narrowing of the lateral recesses by disc herniation. (C) Multidetector CT angiography performed on admission (3 weeks after onset) did not reveal pseudoaneurysm or intimal flap but demonstrated barely visible isodense wall hematoma suspicion (white arrows). (D) MR angiography performed on admission showed slight narrowing of the left VA in the proximal V2 portion (white arrows).

Magnetic resonance imaging (MRI) of the cervical spine revealed multilevel cervical disc degenerations. However, changes at the C3, C4, C5, and C6 levels were not significant and neither spinal cord compression nor narrowing of the lateral recesses was demonstrated (Fig. 1A). The herniation at C6–C7 was more expressed but it could not explain C5 and C6 radiculopathy. Axial T2-weighted images showed a hyperintense rim around the vertebral artery on the left (Fig. 1B). Due to VAD suspicion, MR angiography and CT angiography followed by digital subtraction angiography (DSA) were performed. DSA did not reveal a string sign, pseudoaneurysm or intimal flap. Contralateral VA was normal in preoperative DSA. MRI and MR angiography combined with CT angiography showed a slight narrowing of the proximal C2 portion of the left VA with intramural hematoma (Fig. 1B–D). Based on neuroimaging findings, a thrombosed dissecting aneurysm of the left vertebral artery was diagnosed and the patient was qualified for surgery. The aim of the procedure was the unilateral decompression of the cervical roots C5 and C6.

The patient was operated under general anesthesia in the supine position with the head slightly rotated to the right. The skin was incised along the anterior ridge of the left sternocleidomastoid muscle. The anterolateral surface of the cervical spine was approached using the Bernard George mode [1]. By palpation and fluoroscopy, C5 and C6 vertebral bodies as well as corresponding transverse processes were identified. After dissection of the longus colli muscle, the left VA was freed by opening the C5 and C6 transverse processes in

the subperiosteal plane. Then limited oblique corpectomy on C4–C5–C6 was performed for adequate decompression of the nerve roots. The vertebral artery, surrounded by vein plexus and partially surrounded by periosteum, was thickened and was less springy than usual. The wound was closed in layers. The postoperative course was uneventful. Immediately after surgery, the radicular pain disappeared. However, the proximal hand weakness was unchanged on discharge, but it started to improve 4 weeks later. The paresis and sensory deficit resolved completely within 4 months (Fig. 2E). Follow-up MRI and MR angiography performed 6 months after surgery showed no signs of dissection or narrowing of the VA and demonstrated disappearance of the wall hematoma. Currently, 2.5 years after surgery, the patient is able to carry on normal activity and work at his previous employment.

The patient did not receive any anticoagulants or antiplatelet therapy during hospitalization because there were no ischemic events for 3 weeks before admission and the patency of VA was proved preoperatively. No antiplatelet or anticoagulation therapy was advised after discharge.

2. Discussion

Various vascular causes of radiculopathy were summarized by Benny et al. [2]. They included epidural and subdural spinal hematomas, spinal arteriovenous malformations, vertebral hemangiomas, spinal epidural cavernous hemangiomas,

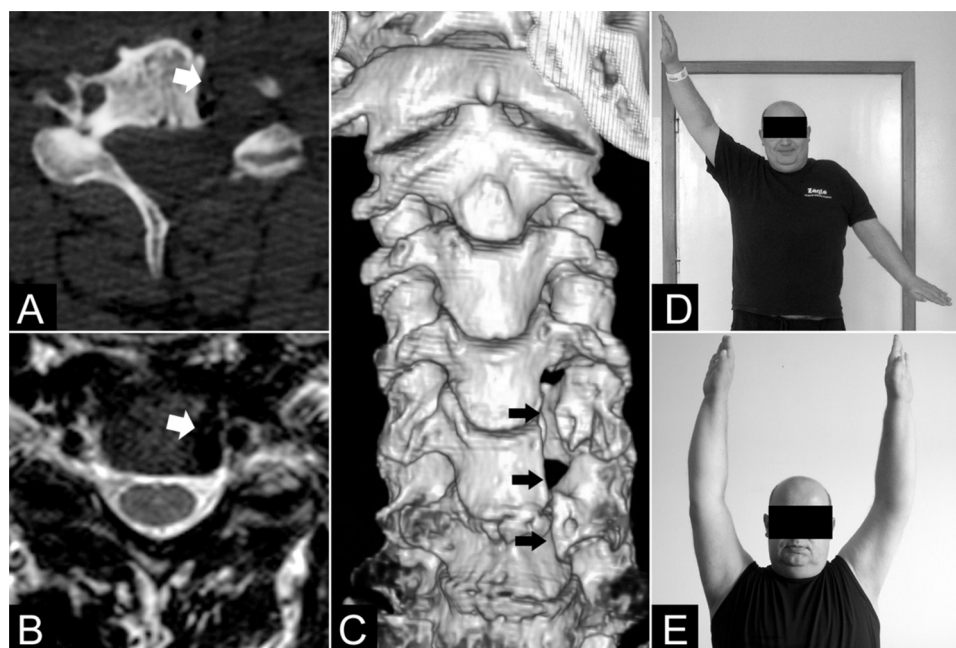


Fig. 2 – (A, C) Postoperative CT of cervical spine showing the range of limited resection of the vertebral bodies and transverse processes (white arrows and black arrows). (B) T2-axial MR images obtained 6 months after surgery showed disappearance of the hyperintense rim encircling the left vertebral artery (white arrow – range of bony resection). (D) Proximal left hand paresis on admission. (E) No deficit at 4-month follow-up.

vertebral artery anomalies (tortuosity or dissection), aortic aneurysms, hemorrhagic synovial cysts, ligamentum flavum hematomas, and venous varices as potential causes of nerve root compression.

Vertebral artery dissection (VAD) is less frequent than cervical artery dissection, nonetheless it is a potentially life threatening and perhaps underdiagnosed condition [3,4]. The annual incidence is estimated at 1–1.5 per 100,000 [4]. Young adults are most commonly affected [4]. Spontaneous VADs are most often located in the V2 (35%) and V3 (34%) portions [5].

Cerebral or spinal cord ischemia is the main (89%) and the most severe sequel of spontaneous VAD [6]. Local symptoms comprise headache, neck pain, ipsilateral radiculopathy or pulsatile tinnitus. Occipital headache and/or neck pain, usually ipsilateral, occur in the majority of patients [5]. However, if they are the only symptoms (without ischemia) then they may be misdiagnosed as resulting from spine degenerative changes. Only 11% of patients with VAD present with local symptoms without ischemic events [6].

In the series of 195 spontaneous VADs published by Arnold et al., only one (0.5%) manifested with cervical radiculopathy [5]. The most common level of radiculopathy caused by VAD is C5 and only about 20 similar cases have been reported to date [7–10]. Combined sensorimotor radiculopathy with multilevel involvement has only recently been described for the first time, in 2008, by Tabatabai et al. [11]. Because of the anatomical conditions in crossover of VA and the nerve roots, motor radiculopathy is much more probable than sensory deficit. The rarity of this condition makes the diagnosis challenging [7].

Tabatabai et al. reported a case presenting a syndrome almost the same as described by us [11]. Two-level unilateral

sensorimotor deficit triggered by an intramural hematoma of VA. They achieved a satisfactory outcome with anticoagulation and physical therapy alone.

Vascular malformations of the extracranial VA may be managed with endovascular embolization or stent placement. However, sometimes they need occlusion of the parent vertebral artery. In a case of VAD with dilated pseudo-lumen and cervical radiculopathy, Uemura et al. successfully applied a proximal occlusion using a detachable balloon and coils [12]. Similarly, the radicular pain disappeared immediately after embolization of the aneurysm and the parent vertebral artery in the case reported by Peyre et al. [13].

We decided to perform a limited oblique corpectomy for decompression of the affected nerve roots. There was no major risk of VA rupture because the pseudo-lumen was thrombosed and no significant bleeding was encountered during surgery. Direct decompression led to the immediate disappearance of the radicular pain and gradual deficit withdrawal. Furthermore, the VA dissection was spread over two disc levels hence the true arterial lumen could be additionally restricted in the vertebral foramina. The vertebral processes opening provided VA decompression and the patency of VA was maintained with no ischemic sequel in follow-up. Oblique corpectomy was developed by George in 1993 [1], however, the approach to the whole length of VA was reported by him much earlier, in 1980 [14]. Despite the publication of many anatomical and clinical reports, those approaches are still rarely employed. This exceptional kind of neurovascular conflict may be the next, not previously described, indication for this technique.

The technique was effective but it should be emphasized that it was safe in this particular case because the false-lumen was thrombosed. Therefore, such an aggressive treatment

should not be recommended in patients with active false-lumen.

Conflict of interest

None declared.

Acknowledgement and financial support

None declared.

Ethics

The work described in this article has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans; Uniform Requirements for manuscripts submitted to Biomedical journals.

REFERENCES

- [1] George B, Zerah M, Lot G, Hurth M. Oblique transcorporeal approach to anteriorly located lesions in the cervical spinal canal. *Acta Neurochir (Wien)* 1993;121(3/4):187–90.
- [2] Benny BV, Nagpal AS, Singh P, Smuck M. Vascular causes of radiculopathy: a literature review. *Spine J* 2011;11(January (1)):73–85. <http://dx.doi.org/10.1016/j.spinee.2010.09.027>
- [3] von Babo M, De Marchis GM, Sarikaya H, Stapf C, Buffon F, Fischer U, et al. Differences and similarities between spontaneous dissections of the internal carotid artery and the vertebral artery. *Stroke* 2013;44(June (6)):1537–42. <http://dx.doi.org/10.1161/STROKEAHA.113.001057>
- [4] Redekop GJ. Extracranial carotid and vertebral artery dissection: a review. *Can J Neurol Sci* 2008;35(May (2)):146–52.
- [5] Arnold M, Bousser MG, Fahrni G, Fischer U, Georgiadis D, Gandjour J, et al. Vertebral artery dissection: presenting findings and predictors of outcome. *Stroke* 2006;37(October (10)):2499–503.
- [6] Arnold M, Kurmann R, Galimanis A, Sarikaya H, Stapf C, Gralla J, et al. Differences in demographic characteristics and risk factors in patients with spontaneous vertebral artery dissections with and without ischemic events. *Stroke* 2010;41(April (4)):802–4. <http://dx.doi.org/10.1161/STROKEAHA.109.570655>
- [7] McGillion SF, Weston-Simons S, Harvey JR. Vertebral artery dissection presenting with multilevel combined sensorimotor radiculopathy: a case report and literature review. *J Spinal Disord Tech* 2009;22(August (6)):456–8. <http://dx.doi.org/10.1097/BSD.0b013e318185d31a>
- [8] Hardmeier M, Haller S, Steck A, Lyrer P, Engelter S, Renaud S. Vertebral artery dissection presenting with fifth cervical root (C5) radiculopathy. *J Neurol* 2007;254(May (5)):672–3.
- [9] Quinn C, Salameh J. Vertebral artery dissection causing an acute C5 radiculopathy. *Neurology* 2013;81(September (12)):1101. <http://dx.doi.org/10.1212/WNL.0b013e3182a2cc27>
- [10] Eberhardt O, Topka H. Compressive cervical radiculopathy due to vertebral artery dissection. *J Stroke Cerebrovasc Dis* 2015;24(5):e115–6. <http://dx.doi.org/10.1016/j.jstrokecerebrovasdis.2015.01.002>
- [11] Tabatabai G, Schöber W, Ernemann U, Weller M, Krüger R. Vertebral artery dissection presenting with ipsilateral acute C5 and C6 sensorimotor radiculopathy: a case report. *Cases J* 2008;1(September (1)):139. <http://dx.doi.org/10.1186/1757-1626-1-139>
- [12] Uemura H, Kuroda S, Ushikoshi S, Seki T, Ishikawa T, Hida K, et al. Complete resolution of radiculopathy due to cervical vertebral artery dissection after intravascular treatment: a case report. *No Shinkei Geka* 2004;32(April (4)):361–5.
- [13] Peyre M, Ozanne A, Bhangoo R, Pereira V, Tadié M, Lasjaunias P, et al. Pseudotumoral presentation of a cervical extracranial vertebral artery aneurysm in neurofibromatosis type 1: case report. *Neurosurgery* 2007;61(September (3)):E658 [discussion E658].
- [14] George B, Laurian C. Surgical approach to the whole length of the vertebral artery with special reference to the third portion. *Acta Neurochir (Wien)* 1980;51(3/4):259–72.