

Haemodynamic compensation in a patient with bilateral vertebral artery

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Bilateral vertebral artery dissection (VAD) is often related to sudden mechanical injury of the arteries such as that following direct trauma or rotational forces. The natural course of bilateral VAD is variable, from recanalisation to fatal subarachnoid haemorrhage.¹ We report a patient with bilateral VAD and favourable clinical course due to adequate carotid haemodynamic compensation despite progressive vertebrobasilar insufficiency.

In February 2007, a 42-year-old man presented with acute, stabbing neck pain, radiating to his occipital area and persisting for 5 days after performing yoga exercises while standing on his head. He showed no neurological deficit except for limited neck motion due to pain. Serial magnetic resonance angiography (MRA) 5, 12, and 19 days later revealed progressive bilateral VAD with consequent vertebrobasilar flow insufficiency (Fig 1). Cerebral angiography 25 days after this dissection revealed compensated retrograde filling of the basilar artery (Fig 2). The MRA taken 50 days after dissection showed much more aggravated steno-occlusive changes in the entire vertebrobasilar circulation (Fig 3). Unlike the progressive deterioration of vertebrobasilar circulation, the patient's neck pain gradually resolved without neurological deficit.

Cerebral angiography performed after the first three MRA studies showed nearly complete occlusion of the vertebral arteries just distal to the bilateral posterior inferior cerebellar artery. This protected the patient against neurological deficit. It is unclear why the fourth MRA at 1 month later showed further deterioration of vertebra-basilar circulation.

The potential explanation for this finding may be related to the increased compensatory carotid artery flow through the collateral circulation. The presence of adequate haemodynamic compensation from the carotid artery territory constitutes an important positive prognostic factor of the low-flow ischaemia in a patient with bilateral VAD.^{1,2}

Funaki et al³ reported that serial MRA could be of great use to monitor restorative bilateral VAD haemodynamics. In contrast, our patient showed progressive deterioration of vertebrobasilar circulation. This suggests that the haemodynamic status of bilateral VAD can variably alter, so serial MRA can help monitor the progression of dissection in some patients.²

The present case suggests that the haemodynamics of bilateral VAD are variable and adequate haemodynamic compensation may constitute a positive prognostic factor.

Author contributions

Concept or design: BD Ku.

Acquisition of data: All authors.

Analysis or interpretation of data: All authors.

Drafting of the manuscript: BD Ku.

Critical revision of the manuscript for important intellectual content: All authors.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

The authors have disclosed no conflicts of interest.

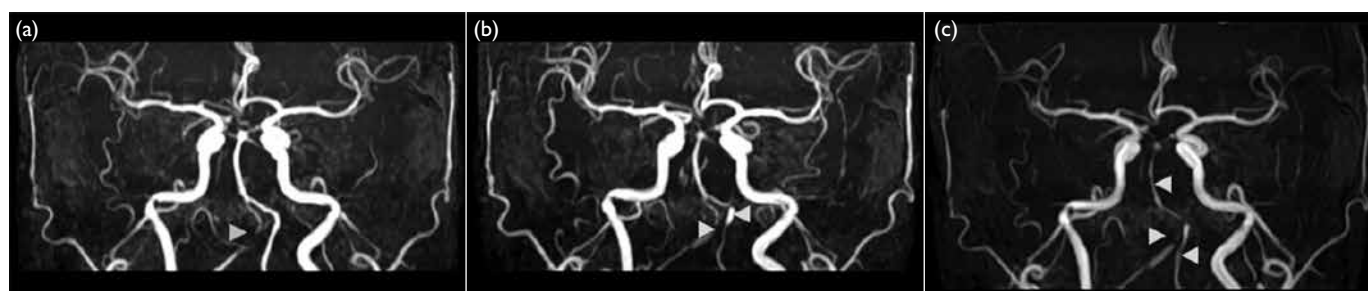


FIG 1. The serial magnetic resonance angiography taken (a) 5, (b) 12, and (c) 19 days after onset of neck pain showing progressive steno-occlusion of vertebral arteries and deterioration of vertebrobasilar flow (arrow heads). (a) Short segmental stenosis at the right vertebral artery at the distal portion of the right posterior inferior cerebellar artery. (b) Progressive segmental stenosis of the right vertebral artery and newly developed pseudoaneurysmal dilatation in the left vertebral artery. (c) Progressive aggravated stenosis of both vertebral arteries and insufficient vertebrobasilar flow

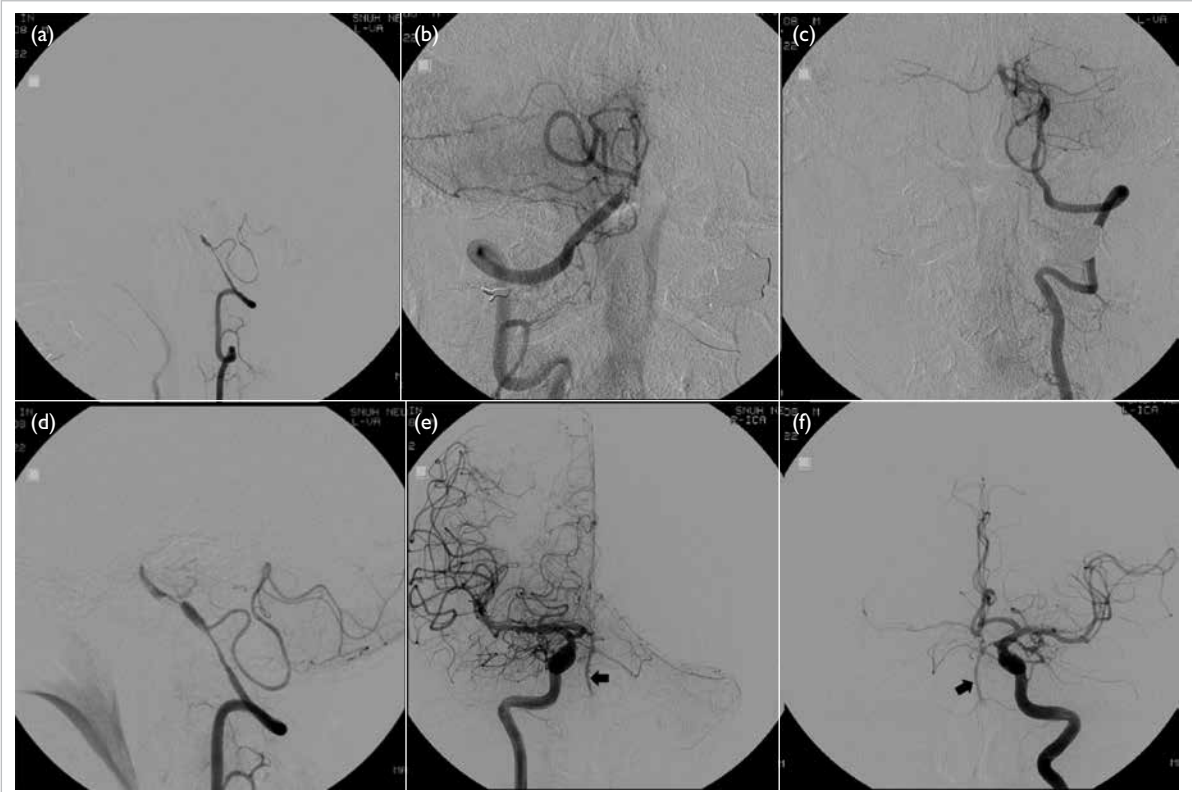


FIG 2. Cerebral angiography taken 25 days after dissection. (a, b) Tapered occlusion of the right vertebral artery just distal to the right posterior inferior cerebellar artery. (c, d) Pseudoaneurysmal dilatation with string-and-pearl sign in the left vertebral artery. (a-d) Steno-occlusive changes of bilateral vertebral arteries, and (e, f) compensated retrograde filling of basilar artery from compensated carotid circulation (arrows)

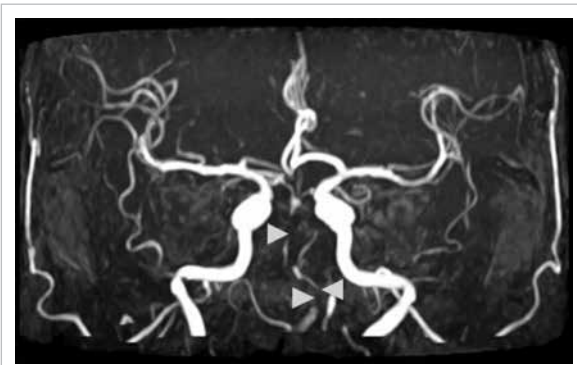


FIG 3. The magnetic resonance angiography taken 50 days after onset of neck pain, showing much more aggravated steno-occlusive changes in the entire vertebra-basilar circulation (arrow heads)

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Ethics approval

This study was conducted in accordance with the principles outlined in the Declaration of Helsinki.

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