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CASE REPORT

# Bilateral Abducens Paralysis Secondary to Compression of Abducens Nerve Roots by Vertebrobasilar Dolichoectasia

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## ABSTRACT

Vertebrobasilar dolichoectasia is characterized by dilatation, tortuosity, and marked elongation of the vertebral and basilar arteries. Dolichoectatic arteries usually have thin arterial walls secondary to degeneration of the internal elastic lamina, reticular fibre deficiency, and smooth muscle atrophy. This anomaly is relatively uncommon and generally asymptomatic. Clinical manifestations of dolichoectasia result from the compression and displacement of adjacent structures, causing cranial nerve palsy, obstructive hydrocephalus, or ischaemic stroke. The authors present a case in which vertebrobasilar dolichoectasia led to the development of bilateral abducens nerve paralysis in a 9-year-old girl.

**Keywords:** Abducens nerve paralysis; dolichoectasia; magnetic resonance angiography

## INTRODUCTION

Intracerebral dolichoectasia involving the large vessels in the brain is a rare disease that occurs principally in the vertebrobasilar artery.[1] Vertebrobasilar dolichoectasia (VBD) is characterized by dilatation, tortuosity, and marked elongation of the vertebral and basilar arteries.[2] Dolichoectasia is associated with multiple vascular risk factors such as age, male sex, hypertension, and abnormal connective tissue composition and function in the large arteries but not with carotid atherosclerosis.[3] Genetic, infectious, inflammatory, immunological, and degenerative factors can play an important role in children.

The clinical manifestations are varied or may be asymptomatic. VBD can also present the following list as distinct symptoms: (a) lower cranial nerve dysfunction due to compression of the cranial nerves or brainstem, (b) transient ischaemic attacks, (c) hydrocephalus, (d) subarachnoidal haemorrhage and midbrain infarction, and (e) ischaemia in the vertebrobasilar territory.[4,5] Magnetic resonance imaging (MRI) is a non-invasive and very important modality to demonstrate the VBD and brain pathology secondary to dolichoectasia.[6,7]

## CASE REPORT

A 9-year-old girl was referred to our clinic with a 4-year history of esotropia (Figure 1). Her eye examination was normal, apart from 60Δ esotropia with bilateral lateral rectus underaction. There were no additional abnormalities in her past medical or trauma history or physical examination. Cranial magnetic resonance imaging (MRI) was planned to determine the cause of the problem. T2-weighted and 3D-CISS (three-dimensional constructive interference in steady state) MRI images revealed basilar artery ectasia to be present focally between the cisternal parts of the abducens nerves and compressing both nerves and the pons (Figure 2a–f). Magnetic resonance

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angiography (MRA) images confirmed the dolichoectatic basilar artery (Figure 3a–c).

VBD is very rare in childhood, and bilateral sixth-nerve paralysis due to compression caused by VBD has not been previously reported in the literature. Therefore, we present neuroimaging findings in this unusual case of bilateral sixth-nerve paralysis secondary to compression of VBD.

FIGURE 1 Esotropia secondary to bilateral sixth-nerve palsy.

## DISCUSSION

VBD is a rare but well-recognized entity. Dolichoectasia refers to the marked elongation, dilatation, and tortuosity of an artery.[2] It means that the intracranial arteries are longer and wider than normal. The mean diameter of the normal basilar artery is 3.17 mm at the level of the pons, and the major criterion for the diagnosis of VBD is a diameter of over 4.5 mm. The incidence of intracranial dolichoectasia ranges from 0.06% to 5.8%.[8,9] The intracranial vertebral arteries and basilar artery are preferentially involved in dolichoectasia.[8]

VBD is usually recognized in adults but may occur in children and adolescents. Dolichoectasia is usually asymptomatic. The most frequently diagnosed complication of VBD is the compression of structures adjacent to the vertebral and basilar arteries. Dysfunction of one of the ocular motor cranial nerves such as isolated abducens nerve paralysis due to VBD is very rare.[10] Our case has bilateral abducens nerve paralysis and VBD. A literature search did not reveal any reports of paediatric abducens paresis due to VBD. Imaging modalities used in diagnosing VBD are

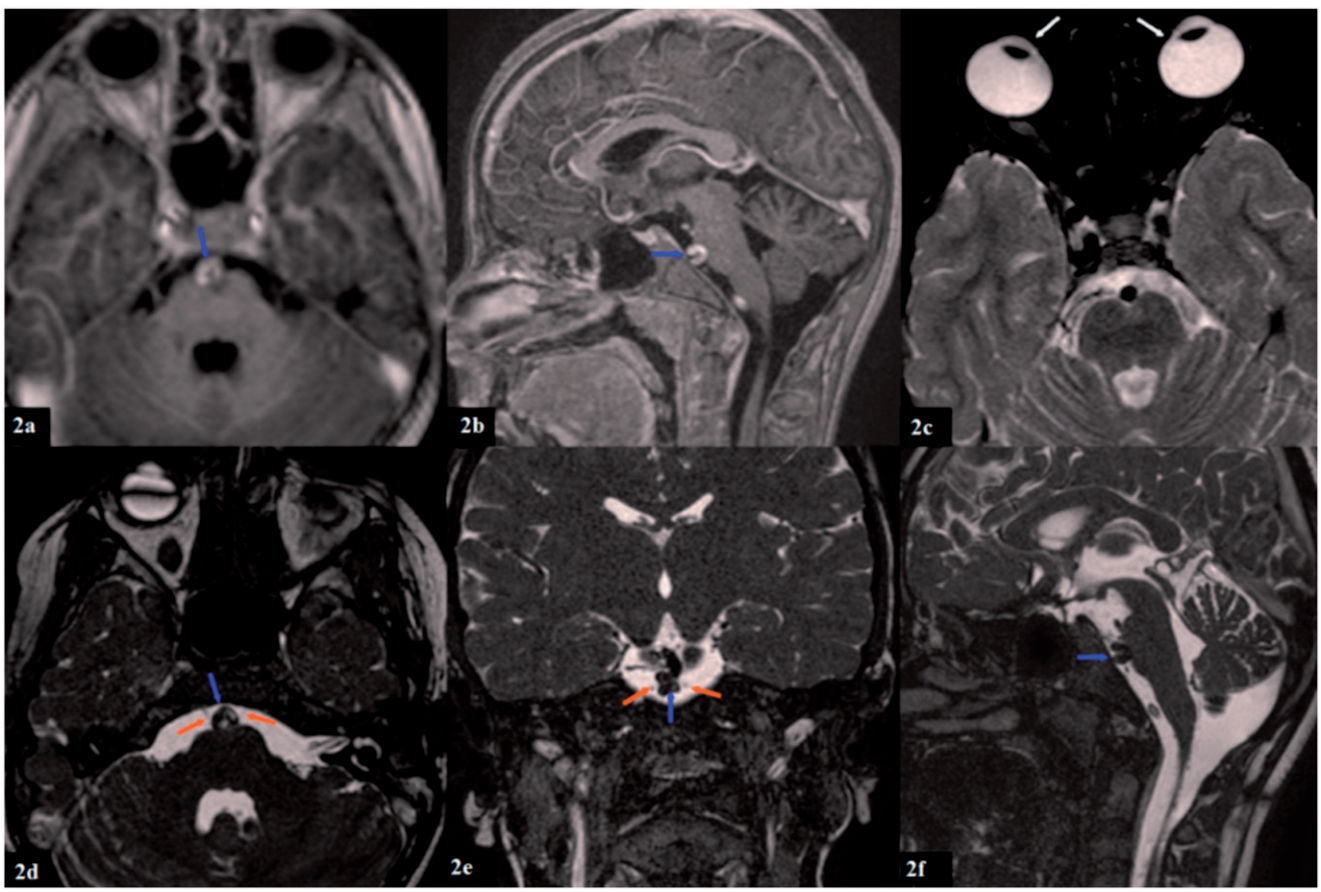


FIGURE 2 (a–f) A contrast-enhanced axial and sagittal T1-weighted MRI shows the ectatic basilar artery (blue arrows) (a–b); an axial T2-weighted MRI shows medial deviation of the bilateral ocular globe secondary to bilateral sixth-nerve palsy (white arrows) (c); axial and coronal 3D-CISS MRG images reveal the localized ectatic basilar artery (blue arrows) in between the sixth nerves (orange arrows) and compressing them (d–e); a sagittal 3D-CISS image shows the pons compressing the ectatic basilar artery (blue arrow) (f).

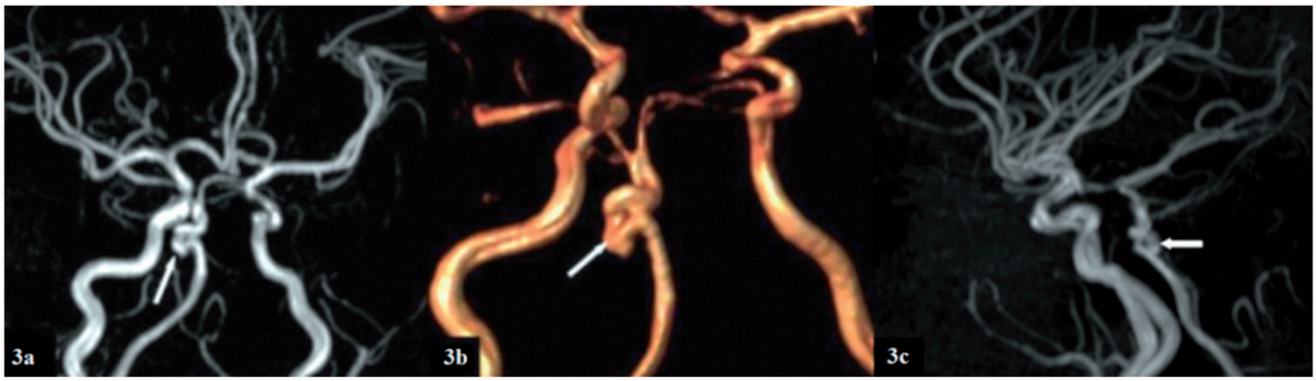


FIGURE 3 (a–c) Three-dimensional time-of-flight MRA images reveal the dolicoectatic basilar artery (white arrows).

conventional intra-arterial digital subtraction angiography, ultrasound, multi-slice computed tomography angiography, MRI, and MRA. MRI and MRA are constantly improving and are playing an increasingly important role in diagnosing vertebrobasilar disorders[10] and these investigations allow for more accurate vascular and brain tissue diagnosis in a single non-invasive examination and should be recommended as a primary neuroradiological procedure in abducens nerve palsy or paralysis. Bilateral abducens nerve and pontine compression was clearly shown by MRI and MRA in our case.

## CONCLUSION

VBD causes various clinical manifestations such as nerve paralysis secondary to compression of structures adjacent to the vertebral and basilar arteries, subarachnoidal haemorrhage, midbrain infarct, and ischaemia in the vertebrobasilar territory secondary to thromboembolic episodes. MRA allows for more accurate vascular and brain tissue diagnosis in a single non-invasive examination in cases of abducens nerve palsy or paralysis.

***Declaration of interest***: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

***Note***: Figures 1, 2, and 3 appear in colour online at informahealthcare.com/oph.

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