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Case report

Vertebrobasilar dolichoectasia presenting simultaneously with ischemic and hemorrhagic strokes

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ABSTRACT

Background: Vertebrobasilar dolichoectasia (VBDE) can present with brainstem- compressive symptoms, cerebral ischemia, or hemorrhage. Herein we describe a unique patient with VBDE who presented with hemorrhage and cerebral ischemia simultaneously.

Case: Patient is a 76-year-old man presenting with an acute, symptomatic left pontine ischemic stroke heralded by ataxic dysarthria and right ataxic-hemiparesis. MRI scan of the brain demonstrated acute cerebral ischemia in the left pons, a small right thalamic hemorrhage, and evidence of VBDE.

Conclusion: The perforating vessels branching off of the pathologic VBDE may result in both ischemia and hemorrhage. This is the first known case, to our knowledge, in which hemorrhage and cerebral ischemia occurred simultaneously.

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1. Case description

A 76-year-old man with a history of hyperlipidemia and mild cognitive impairment presented with acute dysarthria, incoordination, and gait ataxia. He was initially hypertensive at 200/123 mm Hg. CT head demonstrated acute intracerebral hemorrhage (ICH) in the right thalamus, a chronic infarct in the left thalamus, and diffuse intracranial dolichoectasia (Fig. 1 Row A). Neurologic examination was significant for ataxic dysarthria and mild right ataxic hemiparesis. His gait was also ataxic.

MRI of the brain revealed an acute ischemic stroke (AIS) in the left pons likely responsible for patient's presenting symptoms. In addition, there were chronic infarcts in bilateral thalami and a 5 mm ICH in the right thalamus (Fig. 1 Row B). The cross-sectional diameter of the basilar artery was 10 mm. The basilar tip indented the floor of the 3rd ventricle without resultant hydrocephalus. MRA head confirmed vertebrobasilar dolichoectasia (VBDE) in addition to dolichoectasia of the supraclinoid carotid arteries.

Additional evaluation was unremarkable for a cardiac source of the ischemic stroke. Thus, the cerebral ischemia was attributed to small-vessel disease ultimately related to the VBDE. Similarly, the small, deep hemorrhage was attributed to perforating artery

friability related to parent-vessel pathology. As VBDE can be associated with diffuse vascular disease extracranially [1,2], an aortic ultrasound was pursued and demonstrated a 3.1 cm fusiform aneurysm of the abdominal aorta. Management comprised of resuming a full-dose daily aspirin 7 days following hemorrhage, blood pressure control, and initiating statin therapy. Due to the diffuse nature and length of the VBDE and the patient's recent ischemic stroke, no endovascular intervention was recommended.

2. Discussion

VBDE is a condition characterized by ectasia (enlargement) and tortuosity of the vertebrobasilar system [3,4]. Patients with VBDE may present with ischemic stroke, hemorrhage, or brainstem-compressive symptoms, or VBDE may be an incidental finding [1,3,4]. We report the first case, to our knowledge, of a patient presenting with both cerebral ischemia and intracranial hemorrhage simultaneously leading to a dilemma in medical management.

Proposed mechanisms of cerebral infarction in patients with VBDE include low flow, thromboembolism, dissection, or compression of perforating vessels [2,5–7]. Some have proposed that the elongation and tortuosity of the vertebrobasilar arteries can stretch the perforating branches leading to reduced flow as a mechanism as well [8,9]. In addition, Pico and colleagues demonstrated that VBDE was independently associated with small-vessel, lacunar strokes [9]. Such is the case with our patient, who had a small vessel infarct in the pons.

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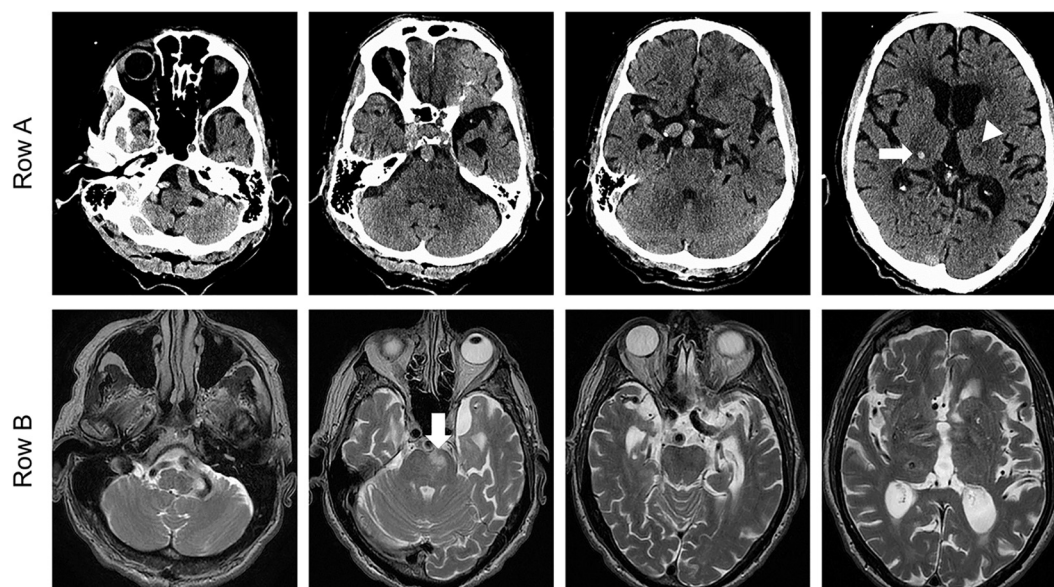


Fig. 1. VBDE with Stroke. Row A: CT head showing vertebrobasilar dolichoectasia as well as ectasia of the right supraclinoid internal carotid artery, intracerebral hemorrhage in right thalamus (arrow), and a chronic left thalamic ischemic stroke (arrowhead). Row B: T2 MRI sequences demonstrate similar findings as the CT as well as a new infarct in the left pons (arrow).

Hemorrhage can occur due to VBDE and either result in subarachnoid hemorrhage (SAH) due to rupture of the large vessel (e.g., basilar artery), or intracranial hemorrhage (ICH) due to diseased perforating vessels off the main large vessel [1,3,10,11]. Pathology of VBDE that make these vessels vulnerable to hemorrhage includes fragmentation of the internal elastic lamina, thinning of the media, and areas of chronic dissection [12]. In smaller vessels, arteriolar damage may be due to parent-vessel pathology in addition to hypertensive degeneration. In the case of VBDE, ICH commonly occurs in the pons, thalamus, or midbrain [10,11]. Thus, we believe the right thalamic small, deep hemorrhage was also due to the VBDE.

We theorize that this friability of perforating vessels off the basilar artery and posterior cerebral artery in a patient with VBDE resulted in simultaneous pontine cerebral ischemia and thalamic ICH. This simultaneous presentation with hemorrhage and ischemia posed management dilemmas. Given that recurrent stroke is a greater risk than bleeding in patients with VBDE [1,3,11] and the patient's bleed was intracranial due to a perforating vessel rupture, rather than subarachnoid, we opted to initiate medical therapy aimed at reducing future ischemic stroke risk.

Author contributions and disclosures

Tia Chakraborty, M.D., authored, conceptualized, acquired data, drafted, and revised the manuscript. She had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. She reports no disclosures or conflict of interest.

Kelly Flemming, M.D., conceptualized revised the manuscript. She reports no disclosures or conflict of interest.

Giuseppe Lanzino, M.D., conceptualized and revised manuscript. He reports no disclosures or conflicts of interest.

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CRediT authorship contribution statement

Tia Chakraborty: Methodology, Data curation, Writing - review & editing. **Giuseppe Lanzino:** Writing - review & editing. **Kelly D. Flemming:** Conceptualization, Data curation, Methodology, Writing - review & editing.

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