Sudden Simultaneous Cerebellar Infarction in the Territories of the Medial Division of Posterior Inferior Cerebellar Arteries

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Abstract
Strokes involving posterior inferior cerebellar arteries (PICA) are rare and usually unilateral. They can involve either the lateral division or the medial division of PICA. Sudden simultaneous cerebellar infarctions in the medial PICA territories are extremely rare. We report one such patient who presented with acute bilateral cerebellar infarctions in the medial PICA territories. She was a diabetic and had features of diffuse atherosclerotic vertebrobasilar disease. We discuss the anatomical peculiarities of PICA and its blood supply along with the clinical features differentiating the medial and lateral PICA infarctions. We also list out the possible mechanisms of bilateral medial PICA territory infarction. Though bilateral they generally have a good prognosis considering the very small area of blood supply.

Introduction
Strokes in the distribution of the posterior inferior cerebellar artery (PICA) are rare. It is usually unilateral, as the origin of PICA arises from a single vertebral artery (VA). Sudden simultaneous cerebellar infarctions in the medial PICA territories are extremely rare. Only few such cases are reported in literature so far.¹⁻⁴ Here we report a lady who presented with bilateral cerebellar infarctions in the medial PICA territories and discuss the possible causes of such a presentation.

Case Report
A 48-years lady, a diabetic presented in the emergency room with sudden onset of vertigo and unsteadiness. On examination, she had bilateral horizontal gaze evoked nystagmus and limb ataxia. There were no signs of involvement of other long tracts and cranial nerves. There was no past medical history of hypertension and cardiovascular disease. Blood counts and biochemical analysis were normal. Random blood sugar was 178 mg% and HbA1c 8.2 %. MRI of the brain showed bilateral, nearly symmetrical PICA infarction (Figures 1A, 1C and 1D). Time-of-flight (TOF) Magnetic resonance angiography (MRA) (Figure 1B) showed diffuse vertebrobasilar disease. The relatives did not consent for a digital subtraction angiogram.

Electrocardiogram and transthoracic echocardiogram were within normal limits. Work up for procoagulant states was negative. She was managed conservatively with antiplatelets, statins and physiotherapy and showed good clinical improvement.

Discussion
About 2% of acute strokes involve the cerebellum. PICA territory strokes form about 40% of them. PICA arises from the vertebral artery (VA) and courses transversely along the medulla. It forms three loops, one at the cerebello-medullary junction, second at the cranial part of cerebellar tonsil and the third at the inferior vermis.⁵ A medial branch and a lateral branch are given between the first two loops. The medial branch of PICA supplies the medial cerebellum (the inferior vermis and the internal parts of the tonsil as well as the inferior semilunar and

![Fig. 1: Acute symmetrical bilateral cerebellar infarction in the territories of the medial division of posterior inferior cerebellar arteries seen on FLAIR images (A). Diffusion weighted imaging (C) with corresponding apparent diffusion coefficient map (D) show restricted diffusion in the same territories. Time-of-flight MR angiography at the time of infarct shows diffuse atherosclerotic vertebrobasilar disease (B) ](image-url)
gracile lobules) and the dorsal medulla oblongata and the lateral branch supplies the inferoposterolateral aspect of the cerebellum.

Of all the major arteries supplying the brain, the PICAs have the most varied anatomy. They can be totally absent with the anterior inferior cerebellar artery (AICA) supplying the PICA territory on these occasions. One PICA can either partially or totally feed the territory of the other. Amarenco et al describe three autopsy-proven cases of bilateral PICA infarcts due to occlusion of a single “extensive” PICA.

**PICA Infarction: Medial vs. Lateral**

Cerebellar infarction in the distribution of the medial PICA produces vestibular signs including acute rotatory vertigo, primary position nystagmus, or truncal ataxia associated with marked axial lateropulsion when the medulla is spared and complete or incomplete Wallenberg’s syndrome, when the medulla is involved. On the other hand, unilateral limb ataxia without dysarthria or vestibular signs suggests isolated lateral PICA territory infarction. Lateral PICA territory infarcts do not provoke a vestibular type of dysfunction and never results in medullary infarction. They do not produce dysarthria, unlike superior cerebellar artery territory infarcts.

**Hypothesis to Explain Bilateral Medial PICA Infarction**

Sudden bilateral medial PICA infarction could be due to both the PICAs originating from an occluded basilar artery or both the medial branches originating from PICA of one side. It can also occur because of the pressure effect caused by a large PICA infarct on one side compressing arteries in the cerebellar cistern and culminating in a smaller infarct on the opposite side. A hemodynamic mechanism wherein vertebrobasilar hypoperfusion affecting the most peripheral branches is also considered. Lastly a double, simultaneous embolism involving medial branches of both PICAs is a rare possibility. Our patient probably had an atherosclerotic or embolic occlusion of a dominant PICA, which supplied the territories of the medial branches of both PICAs, resulting in bilateral stroke. Since the territory supplied by the medial PICA is small, it generally results in a small infarction and the possibility of the resultant edema leading to coma or death is very less. Thus the prognosis of these patients with sudden bilateral infarction in the territories of the medial PICA is generally good.

In conclusion, this case report serves to emphasize the need for high index of suspicion to diagnose and prognosticate this rare treatable stroke syndrome.

**References**