White Heart in Pons—A Rare Imaging Sign in Bilateral Pontine Infarction

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An 89-year-old hypertensive male presented to a local hospital with a history of sudden onset dizziness and two episodes of vomiting after having dinner. On neurological examination, he was drowsy with mild weakness in all the four limbs. He progressively developed tetraplegia within 2 hours of admission and was immediately shifted to our tertiary care center in the emergency department, where he suddenly developed loss of consciousness. He became non-responsive with a Glasgow coma scale (GCS) of E2V1M2. His plantar reflex was bilaterally extensor. He urgently required ventilator support. Routine biochemical tests including serum electrolytes, electrocardiogram, and transthoracic echocardiogram were within normal limits. Magnetic resonance imaging (MRI) brain was performed, which showed acute infarct in bilateral pons with characteristic white heart appearance on diffusion-weighted image (DWI), T2-weighted and fluid-attenuated inversion recovery (FLAIR) axial images (►Fig. 1). Contrast-enhanced MRI (CEMRI) was also performed, which showed filling defect in midbasilar artery, suggestive of thrombus, resulting in near complete occlusion with posterior eccentric filling. There was normal opacification of distal basilar artery partially, because of retrograde flow from right posterior communicating (PCom) artery (►Fig. 2). Mechanical thrombectomy was not offered in view of large volume infarct in pons. The patient died of cardiopulmonary complications on the second day of his admission.

The heart-shaped sign in medulla on MRI due to bilateral medullary infarction is uncommon, however many cases are featured in literature.¹² The pattern of vascular-ization of pons is somewhat similar to that of medulla, and thus it may encounter similar heart-shaped appearance in pons also. However, white heart appearance on MRI in bilateral pontine infarction is extremely rare. To date, there are only four cases of white heart appearance in the pons on MRI axial images reported in the literature (►Table 1).³⁻⁶ In addition to that, Kumral et al⁷ mentioned 14 cases of bilateral anteromedial pontine infarcts, out of which 7 cases had the heart-shaped appearance, although they never mentioned this rare appearance. In most of the previously reported cases of heart-shaped appearance of pons, there was normal basilar artery on angiography.³⁻⁶ Venkatesan et al⁴ also reported a case of heart-shaped infarct in pons due to underlying severe atherosclerotic changes in vertebral and basilar artery. This suggests the likely possibility of small artery disease or basilar artery atheroma as an etiology for white heart-shaped appearance of pontine infarct. The present case is another example of bilateral pontine infarction due to thrombus in basilar artery, resulting in near complete occlusion; however, the presence of associated underlying atherosclerotic disease cannot be ruled out, as the contrast angiography or digital subtraction angiography (DSA) was not done in our case. The blood supply to the pons from basilar artery is via three branches and is depicted schematically in ►Fig. 3. The paramedian branches (7-10) supply the anteromedial pons;

Fig. 1 Magnetic resonance imaging (MRI) brain. (A, B) Diffusion-weighted image (DWI) and corresponding apparent diffusion coefficient (ADC) map show acute pontine infarct with a characteristic “heart appearance.” (C, D) Axial T2-weighted and fluid-attenuated inversion recovery (FLAIR) images show the same “heart-shaped” hyperintensity in pons.
short circumferential branches (5-7) supply the anterolateralpons and the middle and superior cerebellar peduncles; and paired long circumferential branches (superior cerebellar and anterior inferior cerebellar arteries) supply the lateral territory.3,4 There should be bilateral involvement of the anteromedial and the anterolateral arterial territories, with sparing of the lateral territories to have the white heart appearance of infarct in the pons.

This characteristic appearance of white heart may also mimic pontine glioma and osmotic myelinolysis. Diffuse pontine glioma occurs in children, usually expands, and distorts the pons with no or minimal diffusion restriction on MRI. Osmotic myelinolysis presents with a history of rapid correction of hyponatremia, and it usually spares the periphery of the pons.3 Overall outcome of bilateral pontine infarction is poor with severe morbidity and mortality (Table 1). Therefore, early clinical diagnosis and detection of subtle findings on MRI is critical in these cases, so that appropriate timely intervention can be offered to such patients.

### Table 1  Reported case of heart-shaped appearance of infarct in pons

<table>
<thead>
<tr>
<th>Author’s name (year)</th>
<th>Age/sex</th>
<th>Clinical presentation</th>
<th>Location of heart-shaped infarct</th>
<th>Angiography findings/CEMRI findings</th>
<th>Final outcome of the patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ishizawa et al5</td>
<td>87Y/M</td>
<td>Tetraparesis</td>
<td>Pons</td>
<td>Normal basilar artery on MRA</td>
<td>Tetraplegic</td>
</tr>
<tr>
<td>Venkatesan et al4</td>
<td>53Y/M</td>
<td>Vertigo, slurred speech, tetraparesis</td>
<td>Pons</td>
<td>Diffuse atherosclerotic disease of the vertebral and basilar arteries on MRA</td>
<td>Tetraplegic</td>
</tr>
<tr>
<td>Sen et al3</td>
<td>60Y/M</td>
<td>Dizziness, Unsteady gait, tetraparesis</td>
<td>Pons</td>
<td>Normal basilar artery on MRA</td>
<td>Died of cardiorespiratory complications</td>
</tr>
<tr>
<td>Zhou et al6</td>
<td>67/F</td>
<td>Vertigo, nausea, vomiting, dysarthria, bilateral facial weakness, tetraplegia</td>
<td>Pontomedullary junction</td>
<td>Normal basilar and vertebral artery on DSA</td>
<td>Tetraplegic (upper and lower limb with grade 2 power), dysarthria, bilateral facial weakness and nasal feeding</td>
</tr>
<tr>
<td>Present case</td>
<td>89Y/M</td>
<td>Vomiting, altered sensorium and tetraplegia</td>
<td>Pons</td>
<td>Near complete occlusion of basilar artery on CEMRI</td>
<td>Died of cardiopulmonary complications</td>
</tr>
</tbody>
</table>

Abbreviations: CEMRI, contrast-enhanced magnetic resonance imaging; DSA, digital subtraction angiography; MRA, magnetic resonance angiography.
Conflict of Interest
None declared.

References