Symptomatic unruptured capillary telangiectasia of the brain stem: report of three cases and review of the literature

C Scaglione, F Salvi, P Riguzzi, M Vergelli, C A Tassinari, M Mascalchi

Abstract
Three young patients with transient or intermittent focal neurological signs suggesting brain stem involvement are described, in whom high field MRI showed focal areas of hyperintensity in T2 weighted spin echo images, hypointensity in T2* weighted gradient echo images, and enhancement in postcontrast T1 weighted images consistent with unruptured capillary telangiectasia of the brain stem. The first patient was a 28 year old woman who complained of recurrent left ear tinnitus, exacerbated during the menstrual period; MRI demonstrated that the vascular anomaly involved the left acoustic pathway. The second patient was a 30 year old woman who had three episodes of paroxysmal left lip movement 4 weeks after child delivery; MRI showed capillary telangiectasia in the right corticonuclear pathway. The third patient, a 36 year old man, had a transient right Bell’s palsy; MRI disclosed two circumscribed areas consistent with capillary telangiectasia in the left corticospinal tract and medial longitudinal fasciculus.

Keywords: telangiectasia; vascular anomalies; brain stem; magnetic resonance imaging

Capillary telangiectasia consist of irregular clusters of dilated capillaries intermixed with normal brain parenchyma and are most often located in the pons.1 Based on their relatively common incidental discovery at necropsy in people without overt neurological manifestations, brain stem capillary telangiectasia were traditionally considered benign asymptomatic vascular anomalies.1–3 Due to the extremely slow flow, their demonstration in vivo is not possible with arteriography, but can be obtained with MRI.2 We report on three patients with symptomatic brain stem capillary telangiectasia unrelated to vascular rupture.

Case reports

CASE 1
A 28 year old woman presented with a left ear tinnitus which awoke her one night. The tinnitus, which she described as a roaring of a van, recurred during the next months with catamnestic exacerbation. Neurological examination showed a mild weakness of the right arm and leg with diffusely increased deep tendon reflexes. Her hearing was normal. Routine blood laboratory tests, search for anti-DNA, anti-ANA, and anti-ENA antibodies, and results of coagulation studies were unremarkable. Somatosensory evoked potentials showed prolonged latencies and reduced amplitude of N20 and P39 waves on the right side. Brain stem auditory evoked potentials showed prolonged interwave I-V latency on the left. Brain MRI at 0.5 T showed an oval shaped mottled hyperintensity in proton density and T2 weighted images in the left paramedian region at the pontomesencephalic junction (fig 1). No other brain abnormalities were seen. The area of signal change enhanced after intravenous contrast administration (fig 1). She was examined 2 weeks later on a 1.5 T system using a gradient echo T2* which showed hypointensity in the brain stem lesion (fig 1). Tinnitus and neurological and MRI findings were unchanged 5 years later.

CASE 2
A 30 year old woman without relevant history complained of paroxysmal left lip movements, which suddenly appeared 4 weeks after the delivery of her first child. The involuntary movements spontaneously subsided 5 hours later but recurred twice in the next week. Neurological examination and EEG were normal. Routine blood laboratory tests, search for anti-DNA, anti-ANA, and anti-ENA antibodies, and results of coagulation studies were unremarkable. Motor, somatosensory, and brain stem auditory evoked potentials were normal. MRI at 1.5 Tesla showed a focal mottled area of hyperintensity in T2 weighted...
images in the lower right side of the pons which enhanced after intravenous contrast administration. No other brain abnormalities were found. Six months later symptoms had not recurred, neurological examination was negative, and MRI findings were unchanged; gradient echo T2* weighted sequence at 1.5 T showed hypointensity of the pontine lesion.

CASE 3
A 36 year old man presented with right Bell’s palsy. Neurological examination showed complete right facial palsy. Routine blood and CSF laboratory analysis were unremarkable. He was treated with prednisone and the facial nerve palsy almost recovered in a few days. Cranial MRI at 0.5 T showed two small dots hyperintense in proton density weighted images which enhanced after intravenous contrast administration in the left paramedian central portion of the brain stem. No other brain abnormalities were found. Brain MRI at 1.5 T 1 month later showed hypointensity of the dots in gradient echo T2* weighted sequences.

Discussion
Capillary telangiectasia have characteristic MRI features which enable their in vivo detection and differentiation from other brain stem diseases including multiple sclerosis, infarction, and neoplasm. These features reflect the extremely slow flow in the vessels and the normality of the intermixed brain parenchyma. Accordingly, the vessels appear as isointense or hypointense areas compared with the normal brain parenchyma in T1 weighted unenhanced spin echo images and as isointense or hyperintense areas in proton density and T2 weighted spin echo and fast spin echo images. Above all, they exhibit hypointensity in T2* weighted gradient echo images, especially if obtained on high field (≥1.0 T) MRI systems. This appearance reflects the higher sensitivity of gradient echo sequences to the high deoxyhaemoglobin content of the stagnant blood in the abnormal vessels, which determines a shortening of T2 relaxation time of blood and a decrease in signal. Typically, the vessels enhance after contrast administration creating a mesh of enhanced structures on a
Table 1 Patients presenting with symptoms due to unruptured capillary telangiectasia of the brain stem

<table>
<thead>
<tr>
<th>Patient (ref)</th>
<th>Age</th>
<th>Clinical presentation</th>
<th>Neurological examination</th>
<th>Location of the lesion</th>
<th>Follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>47 y</td>
<td>Right hearing loss, headache, vertigo</td>
<td>Decreased corneal reflexes</td>
<td>Right midpons</td>
<td>Unchanged 6 months</td>
</tr>
<tr>
<td>2</td>
<td>44 y</td>
<td>Intermittent ataxia</td>
<td>Decreased corneal reflexes</td>
<td>Right rostral pons</td>
<td>Unchanged 3 months</td>
</tr>
<tr>
<td>3</td>
<td>53 y</td>
<td>Vertigo, tinnitus</td>
<td>Decreased corneal reflexes</td>
<td>Left rostral pons</td>
<td>Unchanged 3 months</td>
</tr>
<tr>
<td>4</td>
<td>69 y</td>
<td>Hearing loss</td>
<td>Decreased corneal reflexes</td>
<td>Left midpons</td>
<td>Unchanged 3 months</td>
</tr>
<tr>
<td>5</td>
<td>30 y</td>
<td>Recurrent vertigo, unsteadiness</td>
<td>Decreased corneal reflexes</td>
<td>Right midpons</td>
<td>Unchanged 6 months</td>
</tr>
<tr>
<td>6</td>
<td>63 y</td>
<td>Transient dizziness, diplopia</td>
<td>Decreased corneal reflexes</td>
<td>Midrostral pons</td>
<td>Unchanged 1 month</td>
</tr>
<tr>
<td>7</td>
<td>55 y</td>
<td>Weakness of both legs, slurring speech</td>
<td>Decreased corneal reflexes, abnormal lip movement</td>
<td>Pons and medulla</td>
<td>Unchanged 3 y 4 months</td>
</tr>
<tr>
<td>8</td>
<td>15 y</td>
<td>Deterioration of speech, ataxic gait</td>
<td>Decreased corneal reflexes</td>
<td>Lesion extending from the inferior colliculus through the midpons to the upper medulla</td>
<td>Unchanged 8 months</td>
</tr>
<tr>
<td>9</td>
<td>77 y</td>
<td>Left tinnitus</td>
<td>Decreased pinprick sensation in the left side of the face</td>
<td>Ventral middle part of pons</td>
<td>Unchanged 3 y 1 month</td>
</tr>
<tr>
<td>10</td>
<td>61 y</td>
<td>Diplopia, right ptosis</td>
<td>Decreased corneal reflexes</td>
<td>Left parasagittal pars of pons</td>
<td>Unchanged 2 y 1 month</td>
</tr>
<tr>
<td>11</td>
<td>39 y</td>
<td>Paraesthesia in all four limbs, numb tongue</td>
<td>Decreased pinprick sensation in four limbs</td>
<td>Left parasagittal pars of pons</td>
<td>Unchanged 3 y 9 months</td>
</tr>
<tr>
<td>12</td>
<td>42 y</td>
<td>Slurred speech, facial drop</td>
<td>Decreased corneal reflexes</td>
<td>Dorsal middle part of pons</td>
<td>Unchanged 2 y 1 month</td>
</tr>
<tr>
<td>13</td>
<td>67 y</td>
<td>Left sided weakness, hyperreflexia</td>
<td>Decreased corneal reflexes</td>
<td>Right side of the pons, dorsal left side of pons</td>
<td>10 months</td>
</tr>
<tr>
<td>14</td>
<td>31 y</td>
<td>Dizziness, vertigo, nausea, vomiting, right sided weakness</td>
<td>Decreased corneal reflexes</td>
<td>Lower middle part of pons, lower left side of pons</td>
<td>1 y</td>
</tr>
<tr>
<td>15</td>
<td>55 y</td>
<td>Hearing loss, tinnitus</td>
<td>Decreased corneal reflexes</td>
<td>Right side of the pons</td>
<td>8 months</td>
</tr>
<tr>
<td>16</td>
<td>55 y</td>
<td>Dizziness, dysequilibrium</td>
<td>Decreased corneal reflexes</td>
<td>Left middle part of pons</td>
<td>1 y 2 months</td>
</tr>
<tr>
<td>17</td>
<td>30 y</td>
<td>Diplopia</td>
<td>Decreased corneal reflexes, abnormal lip movement</td>
<td>Quadrigeminal area</td>
<td>Intermittent, Death</td>
</tr>
<tr>
<td>18</td>
<td>62 y</td>
<td>Diplopia</td>
<td>Decreased corneal reflexes, abnormal lip movement</td>
<td>Right facial and abducens nerves paresis</td>
<td>Unchanged 1 year</td>
</tr>
<tr>
<td>19</td>
<td>55 y</td>
<td>Diplopia</td>
<td>Decreased corneal reflexes, abnormal lip movement</td>
<td>Complete facial palsy of the right side, and inability to gaze toward the right side</td>
<td>Unchanged 6 months</td>
</tr>
<tr>
<td>20</td>
<td>28 y</td>
<td>Left Bell's palsy and gaze palsy</td>
<td>Complete facial palsy of the right side, and inability to gaze toward the right side</td>
<td>Lower midpons on the right</td>
<td>Unchanged 6 months</td>
</tr>
</tbody>
</table>

NA = not available.

The frequency of brain stem capillary telangiectasia is unknown. In 1968 McCormick et al. reported 27 pathologically verified cases of pontine telangiectasia in a series of 164 vascular malformations of the posterior cranial fossa. More recently Barr et al. and Lee et al. described the clinical and MRI features of 12 and 15 cases of pontine telangiectasia. Over a period of 5 years we found, in addition to the three symptomatic patients reported herein, two more cases of brain stem capillary telangiectasia demonstrated by MRI in which no clinical counterpart was found. One patient was examined for a pituitary amenorrhoea and the other for headache.

In a review of the English literature we found 20 cases of unruptured brain stem capillary telangiectasia presenting with transient or permanent symptoms. Location and presenting symptoms in these 20 cases along with our three cases are summarised in Table 1. The age of presentation ranged from 15 months to 71 years, but was predominantly in the third and fourth decade. Symptoms included vertigo or diplopia in five of 20 (25%) patients, hearing loss, dizziness, focal weakness, or ataxia in four (20%), tinnitus, or speech disturbances in three (15%), hyperreflexia, monocular ptosis, and paraesthesia in one instance each.

In our three patients the lesion location was consistent with clinical features. In case 1 the malformation involved the acoustic pathway (lateral lemniscus), possibly explaining the tinnitus and the prolonged interwave I-V latency of the brain stem auditory evoked potentials, on the same side. The involvement of the left corticonuclear fasciculus might explain the abnormal lip movement in our case 2. In case 3 the involvement of the left corticonuclear tract explains the Bell’s palsy.

In our findings and in previously reported cases, symptoms related to brain stem capillary telangiectasia had a transient or intermittent course resembling transient ischaemic attacks or inflammatory diseases. The pathophysiology underlying transient or intermittent symptoms in patients with capillary telangiectasia is not established. It is noteworthy that in two of our patients, symptoms developed or were exacerbated during the menstrual period or after pregnancy. Some vascular malformations, such as orbital angioma, present steroid receptors in both muscular and endothelial cells.10 11 We submit that stimulation of steroids receptors expressed by endothelial cells in telangiectasia could be the triggering event of neurological symptoms through a vasomotor or a haemodynamic mechanism.
A difficult problem related to frequency and natural history of brain stem capillary telangiectasia concerns the possibility that these vascular anomalies present dramatically with vascular rupture without any possibility of documenting the native vascular malformation that is cancelled out by the haemorrhage. The frequency of haemorrhagic complication of capillary telangiectasia is unknown. Although instances of intraparenchymal or subarachnoid haemorrhages due to ruptured capillary telangiectasias are reported in the literature, haemorrhagic complications did not occur, neither in 27 patients of MRI documented brain stem capillary telangiectasia followed up for a period ranging from 1 month to 4 years, nor in our patients. Furthermore, none of the 27 cases of pontine capillary telangiectasia reported by McCormick et al were associated with significant haemorrhage.

Awareness of the MRI features of capillary telangiectasia may help in defining the real incidence and clinical correlates of this vascular malformation. In addition, longitudinal studies might help to assess the risk of vascular rupture.

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