Trigeminal Neuralgia Caused by Venous Angioma
—Case Report—

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Abstract

A 34-year-old female presented with trigeminal neuralgia caused by a venous malformation in the right cerebello-pontine region. Computed tomography and magnetic resonance imaging demonstrated the abnormal draining veins from the venous malformation. The dilated vessels extended around the trigeminal nerve and compressed the root entry zone. Microvascular decompression (MVD) was performed, and her trigeminal neuralgia was completely relieved without neurological deficits. The offending vessel in most cases of trigeminal neuralgia is an arterial branch. Veins may also be associated with trigeminal neuralgia. The present rare case shows that MVD may be useful for the treatment of trigeminal neuralgia associated with venous malformation. Good outcome depends on decompression of the root entry zone without injury to the vessel. Surgical injury in this region can cause severe neurological deficits. Several treatment options should be prepared for the surgery, such as MVD or rhizotomy.

Key words: trigeminal neuralgia, microvascular decompression, venous malformation, three-dimensional computed tomography angiography, surgical treatment

Introduction

Trigeminal neuralgia is usually caused by vascular compression of the root entry zone (REZ) of the trigeminal nerve. The offending vessel in most cases of trigeminal neuralgia is an arterial branch, such as the superior cerebellar artery, anterior inferior cerebellar artery, and others.5) Veins such as the petrosal vein or the transverse pontine vein may also be associated with trigeminal neuralgia. Brain tumor and arteriovenous malformation have also been reported as rare causes of trigeminal neuralgia.13)

We describe a rare case of trigeminal neuralgia caused by venous angioma compressing the REZ of the trigeminal nerve, and present the neuroimaging and surgical findings.

Case Report

A 34-year-old female suffered pain attack on the right cheek of her face. She was conservatively treated with carbamazepine medication for several years under a diagnosis of trigeminal neuralgia. However, the pain worsened, and became refractory to medication. She was referred to our hospital. Neurological examination identified a trigger point in the right side of the nose. She complained of dysesthesia around the trigger point located in the right V2 territory.

Fig. 1 Computed tomography scans (upper row) with contrast medium and T1-weighted magnetic resonance images (lower row) showing the abnormally dilated draining veins of venous angioma (arrowheads) in the brain stem and cerebellum.
Computed tomography (CT) with contrast medium showed areas of abnormal enhancement in the right cerebello-pontine cistern, the right cerebellum, and the pontine. T1-weighted magnetic resonance (MR) imaging demonstrated these areas as flow voids. The draining vein extends anterolaterally through the pons to the fifth nerve REZ (Fig. 1). Anatomical MR imaging also revealed an abnormally dilated vessel next to the REZ of the right trigeminal nerve. MR venography also revealed the abnormal dilated veins which was able to be part of the venous angioma (Fig. 2). Three-dimensional CT (3D-CT) showed the abnormal vessels draining the brain stem and the right cerebellum, associated with normal petrosal veins. Therefore, the abnormal vessels draining into the superior petrosal sinus with normal venous system (Fig. 3).

Microvascular decompression (MVD) was performed for treatment of the trigeminal neuralgia. Intraoperative views are shown in Fig. 4. The normal petrosal vein was recognized just above the right trigeminal nerve. The abnormal veins, which formed the major draining system of the venous angioma and drained into the main trunk of petrosal vein, were located both rostral and caudal to the trigeminal nerve. The draining vein (D3 in Fig. 4) that extended through the upper pons had clearly compressed the REZ of the trigeminal nerve from the ventral side. Moreover, the trigeminal nerve was pinched by draining veins (D1, D2, and D3 in Fig. 4), not only by compression of the REZ.

The draining veins were identified as the offending vessels, and were carefully dissected away from the REZ to avoid the possibility of venous infarction (Fig. 5). Teflon pieces were placed between the nerve and the draining vein (D1). Another prosthesis (arrow) was inserted between the brain stem and the draining vein (D3). T: tentorium.
veins. One prosthesis was inserted between the brain stem and the draining vein (D3 in Fig. 4), and the REZ was significantly decompressed. Another prosthesis was interposed between the normal petrosal vein and the draining vein (D1 in Figs. 4 and 5) to avoid contact with the nerve. An indentation was observed in the trigeminal nerve after release from compression by the draining veins (Figs. 4 and 5). Postoperatively, the patient was completely free of trigeminal pain. She has not complained of recurrence of the pain for 3 years.

Discussion

Trigeminal neuralgia caused by venous malformation is rare, although cases caused by the normal venous system are also encountered. Previous case reports of trigeminal neuralgia caused by venous angioma are presented in Table 1. Patients with trigeminal neuralgia caused by venous angioma tend to be younger than those with typical trigeminal neuralgia. The offending vessel is quite easy to identify with modern imaging methods without the need for invasive conventional angiography. In most cases, MR imaging could delineate the presence of the vascular anomaly surrounding the trigeminal nerve. However, the morphology of the abnormal vessels must be evaluated in such cases. In our case, 3D-CT angiography was very useful for the diagnosis of venous malformation and to detect the offending vessels.

Recently, several treatment options have been introduced for trigeminal neuralgia, such as medication, gamma knife radiotherapy, and MVD. MVD is reported to be the most effective method. MVD may be the optimal treatment for trigeminal neuralgia associated with venous angioma. Identification of the REZ is the most important factor in MVD for cases with or without venous angioma. If the vessel has an unexpected course around the trigeminal nerve, the dilated vein cannot be easily sacrificed. The draining vein from venous angioma is shared with the normal venous system, and drains into the dilated petrosal vein or directly into the petrosal sinus in the posterior fossa. Any draining vein injury caused by the surgical procedure may result in congestive ischemic brain damage such as brain stem infarction or cerebellar infarction. Therefore, vascular injuries to the venous angioma as well as the normal venous system, including the petrosal vein and transverse pontine vein, must be avoided. Consequently, glycerol rhizotomy could be one of the important surgical options for the preservation of the venous system during MVD. In the present case, the possibility that normal arteries such as the superior cerebellar artery or the anterior inferior cerebellar artery were the offending vessel could not be completely denied, although this was most unlikely with the abnormally dilated veins compressing the REZ. Surgery is the most definitive option to clarify the offending structure. We decided to determine the optimal treatment for the patient after clearly identifying the responsible vessel. If scarification of the draining veins was necessary, radiosurgery might be considered as another treatment option if the surgical invasion must be minimized.

In the present case, neuroimaging examination demonstrated the typical features of venous angioma. Compression of the REZ of the trigeminal nerve by the dilated draining veins was confirmed at surgery. These operative findings were correlated with the neuroimaging findings. 3D-CT angiography was very useful for the diagnosis and planning of surgery. The trigeminal neuralgia was completely resolved without neurological complications as the drainage veins were carefully transposed away from the REZ.

Conflicts of Interest Disclosure

The authors have no personal financial or institutional interest in any of the drugs, materials, or devices in the article. All authors who are members of The Japan Neurosurgical Society (JNS) have registered online Self-reported COI Disclosure Statement Forms through the website for JNS members.

Table 1  Cases of trigeminal neuralgia associated with venous angioma

<table>
<thead>
<tr>
<th>Author (Year)</th>
<th>Age (yrs), Sex</th>
<th>Treatment</th>
<th>Pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelz et al. (1983)</td>
<td>30, M</td>
<td>resection*</td>
<td>pain-free</td>
</tr>
<tr>
<td>Martin et al. (1984)</td>
<td>NA</td>
<td>resection*</td>
<td>relieved</td>
</tr>
<tr>
<td>Isu et al. (1985)</td>
<td>35, M</td>
<td>MVD</td>
<td>pain-free</td>
</tr>
<tr>
<td>Nagata et al. (1995)</td>
<td>29, M</td>
<td>MVD</td>
<td>pain-free</td>
</tr>
<tr>
<td>Peterson et al. (2002)</td>
<td>23, M</td>
<td>rhizotomy</td>
<td>pain-free</td>
</tr>
<tr>
<td>Present case</td>
<td>34, F</td>
<td>MVD</td>
<td>pain-free</td>
</tr>
</tbody>
</table>

*Resection means that the patient was treated by resection of the responsible draining vein. F: female, M: male, MVD: microvascular decompression, NA: not available.

References


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