Trigeminal Neuralgia Associated with Venous Angioma

—Case Report—

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Abstract

A 35-year-old male presented with trigeminal neuralgia associated with venous angioma at the root entry zone. Magnetic resonance imaging and angiography demonstrated a venous angioma with a dilated petrosal draining vein, and displacement of the anterior inferior cerebellar artery (AICA). The AICA and dilated petrosal vein were both decompressed, resulting in complete relief from symptoms of trigeminal neuralgia for 30 months. Microvascular decompression rather than resection of venous angioma is recommended for treatment of such cases. The possibility of a venous anomaly should be considered in younger patients with trigeminal neuralgia.

Key words: trigeminal neuralgia, venous angioma, microvascular decompression, magnetic resonance imaging

Introduction

Trigeminal neuralgia is frequently associated with vascular compression at the root entry zone of the trigeminal nerve, especially compression by an arterial component such as the superior cerebellar artery (SCA),^{2,3,7)} the anterior inferior cerebellar artery (AICA), the posterior inferior cerebellar artery, the basilar artery, and the vertebral artery, and also veins such as the petrosal vein²⁾ and/or transverse pontine vein.¹⁴⁾ Brain tumor,¹⁷⁾ arteriovenous malformation,¹¹⁾ calcified chronic subdural hematoma,⁸⁾ and primitive trigeminal artery^{10,18)} are less frequently involved in trigeminal neuralgia.

We describe a patient with trigeminal neuralgia associated with venous angioma at the root entry zone.

Case Report

A 35-year-old male had severe pain attacks of less than 30 second duration in the left lower jaw, trig-

gered by chewing or speaking, occurring at intervals of 4–5 months for about 6 years. His physician diagnosed trigeminal neuralgia and prescribed tegretol medication. However, he became unable to eat in May, 1991 due to intolerable severe pain, and was referred to our hospital.

Physical examination found a trigger point and paresthesia in the left lower jaw. Postcontrast computed tomography (CT) showed a linear high density area in the cerebellopontine angle (Fig. 1). T₁- and T₂-weighted magnetic resonance (MR) imaging showed a dilated petrosal vein as a linear signal void area and venous angioma as a linear high signal intensity area which was enhanced with gadolinium-diethylenetriaminepenta-acetic acid (Gd-DTPA) (Fig. 2). Vertebral angiography showed the left vertebral artery was elongated and the meatal loop of the AICA deviated superiorly, but no other abnormal vessels in the arterial phase (Fig. 3 *upper*). The venous phase revealed a caput medusae-like venous angioma draining into the dilated petrosal vein (Fig. 3 *lower*).

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Fig. 1 Precontrast CT scan (*left*), showing no abnormalities. Postcontrast CT scan (*right*), revealing a linear high density area in the left cerebellopontine angle.

Left suboccipital craniotomy, larger than usual (5×5 cm), was performed through a retromastoid lateral cerebellar approach. The root entry zone of the trigeminal nerve was directly compressed by the AICA dorsolaterally, and an indentation was observed there. The petrosal vein, which was slightly reddish and enlarged to about three times its usual size, compressed both the AICA and indirectly the root entry zone of the trigeminal nerve toward the ventral side. The AICA appeared to be interposed between the petrosal vein and the root entry zone (Fig. 4). The AICA and petrosal vein were retracted superiorly, and a teflon felt was placed between the AICA and the root entry zone at the brain stem.

The pain attacks have completely ceased since the second postoperative day, and he has required no medication for 30 months nor developed any neurological deficit.

Discussion

Only three cases of trigeminal neuralgia associated with venous angioma have been reported (Table 1). These cases of trigeminal neuralgia were caused by dilated petrosal vein,¹³ a draining vein from venous angioma,⁹ and the SCA and dilated draining vein at two different points.⁶ In our patient, the AICA compressed the root entry zone directly, but the dilated petrosal vein draining from the venous angioma was also involved because it directly compressed the AICA and therefore indirectly compressed the root entry zone. A series of 32 patients with trigeminal neuralgia treated surgically during the last 7 years showed that the trigeminal nerve was often compressed from the lower ventral or dorsal aspect when the responsible artery was the SCA.⁴ Compression by the AICA also arose from the inferior aspect in two of three cases, while in the third case the AICA penetrated the trigeminal nerve from the ventral to dorsal direction. Nerve fibers at the root entry zone are generally distributed as follows: the first division of the trigeminal nerve runs dorso-medially, the third division runs ventrolaterally, and the second division is located between the first and third divisions.⁵ However, the location of trigeminal neuralgia caused by compression of the root entry zone is not always consistent with this ana-

Fig. 2 T₁-weighted MR image (*left*), showing a dilated petrosal vein as a linear signal void area (*arrowhead*) and a venous angioma as a linear high signal intensity area (*arrow*). T₂-weighted MR image (*center*), showing a dilated petrosal vein as a linear signal void area (*arrowhead*) and a venous angioma as a linear high signal intensity area (*arrow*). T₁-weighted MR image with Gd-DTPA (*right*) demonstrated enhancement of the venous angioma (*arrow*).

Fig. 3 Left vertebral angiograms, arterial phase (*upper*), showing no abnormalities except for the elongated left vertebral artery and deviation of the meatal loop of the AICA superiorly. Venous phase (*lower*), showing a caput medusae-like venous angioma draining into the dilated petrosal vein.

tomical distribution.¹²⁾

In our patient, T₁- and T₂-weighted MR imaging demonstrated the dilated petrosal vein as a linear signal void area and the venous angioma as a linear high signal intensity area enhanced with Gd-DTPA, which were consistent with previous observations.^{1,15,19)} Augustyn *et al.*¹⁾ found the most characteristic feature of venous angioma by MR imaging was a curvilinear streak of very low signal intensity on T₂-weighted images corresponding to the transcerebral draining vein in six of seven patients with angiographically proved cerebral venous angioma. The draining vein could not be definitely identified by means of T₁-weighted imaging alone.

Fig. 4 Intraoperative photograph, showing the AICA (*arrow*) compressing the root entry zone of the trigeminal nerve (*double arrow*) directly, and the petrosal vein (*arrowhead*), which was slightly reddish and enlarged to about three times its usual size, directly compressing the AICA and indirectly compressing the root entry zone of the trigeminal nerve ventrally.

Previous patients with trigeminal neuralgia associated with venous angioma have been treated by resection of the responsible draining vein with satisfactory postoperative results.^{9,13)} However, the dilated draining vein may also provide a normal venous pathway,¹⁶⁾ so microvascular decompression is the treatment of choice.⁶⁾ In our patient, venous angioma was detected by preoperative examination, so we operated based on the diagnosis of trigeminal neuralgia caused by the venous angioma or the AICA. We found that the venous angioma did not compress the root entry zone directly, but the AICA and venous angioma were decompressed at the same time. In such cases, the responsible component should be decompressed while the venous angioma is maintained intact. A larger craniotomy or craniectomy than usual is recommended to obtain a large operative field in case of complications such as bleeding or venous congestion.

The onset of trigeminal neuralgia occurred at age

Table 1 Trigeminal neuralgia associated with venous angioma

Author (Year)	Age*	Sex	Cause	Treatment	Pain
Pelz <i>et al.</i> (1983) ¹³⁾	30	M	petrosal vein	resection	disappeared
Martin <i>et al.</i> (1984) ⁹⁾	?	?	draining vein	resection	relieved
Isu <i>et al.</i> (1985) ⁶⁾	35	M	SCA, draining vein	decompression	disappeared
Present case	29	M	AICA, petrosal vein	decompression	disappeared

*Onset age.

29 years in our patient, 30 years in Pelz's,¹³⁾ and 35 years in Isu's,⁶⁾ a lower age than usual. The possibility of a venous anomaly should be carefully evaluated preoperatively in younger patients with trigeminal neuralgia.

References

- 1) Augustyn GT, Scott JA, Olson J, Gilmor RL, Edwards MK: Cerebral venous angiomas: MR imaging. *Radiology* 156: 391-395, 1985
- 2) Dandy WE: Concerning the cause of trigeminal neuralgia. *Amer J Surg* 24: 447-455, 1934
- 3) Fukushima T: Neurosurgical management of trigeminal neuralgia. Historical review and the results of microvascular decompression. *Shikei Kenkyu No Shinpo* 26: 982-991, 1982 (in Japanese)
- 4) Goya T, Wakisaka S, Kinoshita K: Microvascular decompression for trigeminal neuralgia with special reference to delayed recurrence. *Neurol Med Chir (Tokyo)* 30: 462-467, 1990
- 5) Gudmundsson K, Rhoton AL Jr, Rushton JG: Detailed anatomy of the intracranial portion of the trigeminal nerve. *J Neurosurg* 35: 592-600, 1971
- 6) Isu T, Sasaki H, Koyanagi I, Imai T, Takikawa S, Nakagawa Y, Abe H: One case of trigeminal neuralgia associated with venous angioma. *Geka Chiryō* 53: 223-226, 1985 (in Japanese)
- 7) Jannetta PJ: Observations on the etiology of trigeminal neuralgia, hemifacial spasm, acoustic nerve dysfunction and glossopharyngeal neuralgia. *Neurochirurgia (Stuttg)* 20: 145-154, 1977
- 8) Kondoh T, Tamaki N, Takeda N, Shirataki K, Matsumoto S: Contralateral trigeminal neuralgia as a false localizing sign in calcified chronic subdural hematoma: A case report. *Surg Neurol* 32: 471-475, 1989
- 9) Martin NA, Wilson CB, Stein BM: *Venous and Cavernous Malformations*. Baltimore, Williams & Wilkins, 1984, pp 234-245
- 10) Morita A, Fukushima T, Miyazaki S, Shimizu T, Atsuchi M: Tic douloureux caused by primitive trigeminal artery or its variant. *J Neurosurg* 70: 415-419, 1989
- 11) Niwa J, Yamamura A, Hashi K: Cerebellar arteriovenous malformation presenting as trigeminal neuralgia. *No Shinkei Geka* 16: 753-756, 1988 (in Japanese)
- 12) Ohmoto T: Sansa shinkeitsu no takakuteki chiryo, in Takakura K (ed): *Kinou No Shinkei Geka*. Tokyo, Gendai Iryosha, 1989, pp 97-111 (in Japanese)
- 13) Pelz DM, Vineula F, Fox AJ: Unusual radiologic and clinical presentations of posterior fossa venous angiomas. *AJNR* 4: 81-84, 1983
- 14) Sato O, Kanazawa I, Kokunai T: Trigeminal neuralgia caused by compression of trigeminal nerve by pontine vein. *Surg Neurol* 11: 285-286, 1979
- 15) Scott JA, Augustyn GT, Gilmor RL, Mealey J Jr, Olson EW: Magnetic resonance imaging of a venous angioma. *AJNR* 6: 284-286, 1985
- 16) Senegor M, Dohrmann GJ, Wollmann RL: Venous angiomas of the posterior fossa should be considered as anomalous venous drainage. *Surg Neurol* 19: 26-32, 1983
- 17) Snow RB, Fraser RAR: Cerebellopontine angle tumor causing contralateral trigeminal neuralgia: A case report. *Neurosurgery* 21: 84-86, 1987
- 18) Tokimura H, Atsuchi M, Kawasaki T, Sato E, Todoroki K, Asakura T, Fukushima T: Trigeminal neuralgia associated with primitive trigeminal artery: Report of two cases. *No Shinkei Geka* 18: 209-213, 1990 (in Japanese)
- 19) Wilms G, Marchal P, Van Hecke L, Van Fraeyenhoven E, Decrop E, Baert AL: Cerebral venous angiomas. *Neuroradiology* 32: 81-85, 1990

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