—Case Reports—

Trigeminal Neuralgia due to Venous Compression Successfully Transposed by Suprameatal Tubercle Drilling

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A patient with trigeminal neuralgia due to venous compression was successfully treated by transposition achieved by drilling the suprameatal tubercle. A 53-year-old woman presented with classical trigeminal neuralgia affecting the maxillary division of the right trigeminal nerve. MRI and CT revealed a bony prominence, called the suprameatal tubercle, above the opening of the internal acoustic meatus. MRI showed a thick venous flow void interposed between the suprameatal tubercle and trigeminal nerve. The patient underwent retrosigmoid craniotomy. The bony prominence restricted transposition of the compressed vein, so the compressed vein was successfully transposed after drilling the prominence. The patient's symptoms resolved completely. Drilling the suprameatal tubercle is useful for transposing sandwiched compression vessels. (J Nippon Med Sch 2024; 91: 586–589)

Key words: trigeminal neuralgia, suprameatal tubercle, venous compression

Introduction

Trigeminal neuralgia (TN) is a painful, shock-like facial condition caused by neurovascular conflict. Because nerve compression can occur anywhere along the trigeminal root length, the trigeminal nerve should be explored from the pons to Meckel's cave[1,2]. However, certain anatomical factors, such as the prominence of the petrous tubercle, may complicate surgery[3,4]. In such cases, several surgical techniques are required for sufficient exploration. Microvascular decompression is an important surgical procedure for management of TN. McLaughlin et al.[5] established a standard procedure in which Teflon felt pledgets were interposed with the offending vessels. However, because of the high recurrence rate, a transposition method is recommended. As a surgical strategy for microvascular decompression (MVD), transposition should be considered first; however, it may not be sufficient because of the state of the responsible blood vessel and surrounding structures.

Here, we report a case of an offending vein sandwiched by a prominent suprameatal tubercle (SMT) that was successfully transposed after drilling out this prominence.

Case Report

A 53-year-old woman presented with a 4-year history of severe intermittent pain in the right cheek. Pain was confined to the right infraorbital nerve.

CT showed a 4×5 mm lesion on the inner surface of the right petrous bone, just anterior to the internal auditory canal (**Fig. 1A**). MRI revealed that venous flow void intensity, sandwiched by the bony prominence, strongly compressed the trigeminal nerve (**Fig. 1B**).

The patient underwent surgery using a right suboccipital retrosigmoid approach. After dissecting the petrous fissure and exposing the trigeminal nerve, a prominent SMT was observed. A large vein ran beneath this tubercle and firmly compressed the trigeminal nerve (**Fig. 2A**). The tubercle was so prominent that it prevented adequate transposition of the compressed vein. This prominence was drilled out with caution to avoid vein damage. After drilling out the tubercle and concealing the trigeminal nerve behind it, we exposed the nerve entirely and mobilized the offending vein (**Fig. 2B**). The compressed vein was subsequently transposed from the nerve (**Fig. 2C**) and fixed with a Teflon sheet and fibrin

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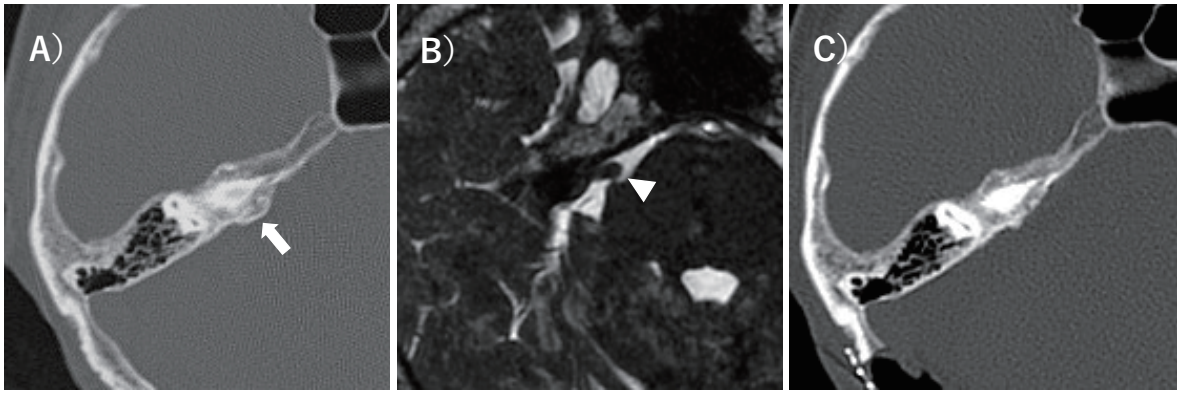

Fig. 1 Pre and post operative image
A) Preoperative bone-image CT shows the right prominent suprameatal tubercle (arrow).
B) Preoperative MRI shows a large petrous vein (arrowhead) near the suprameatal tubercle.
C) Postoperative bone-image CT shows complete drilling of the right suprameatal tubercle.

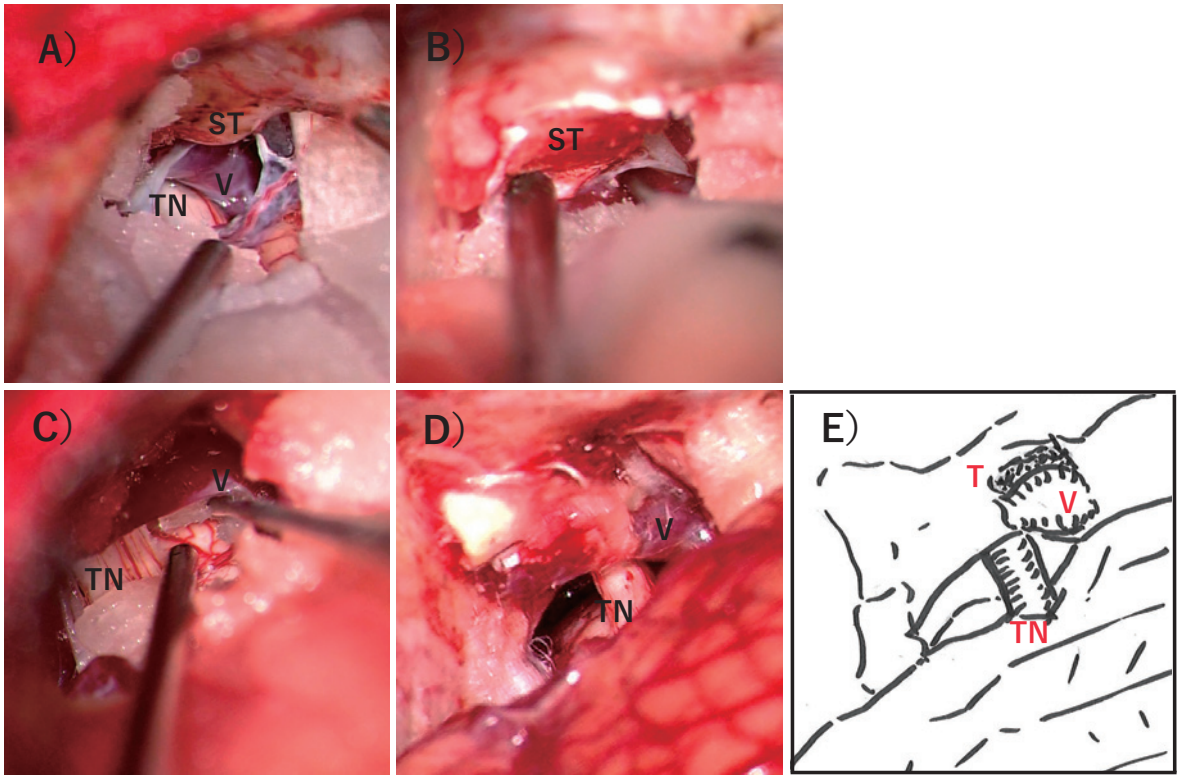

Fig. 2 Intraoperative view at the level of the right cerebellar pontine angle
A) A prominent suprameatal tubercle (ST) is observed. Beneath this tubercle is a large vein (V) running across and compressing the trigeminal nerve (TN)
B) Drilling of the suprameatal tubercle
C) Dissecting the vein from the trigeminal nerve
D) The transposed vein is fixed with Teflon felt (T) and fibrin glue
E) Schematic intraoperative view

glue (**Fig. 2D**). The postoperative course was uneventful, and TN resolved immediately after surgery. Postoperative bone-window CT scanning confirmed the drilled bone area at the petrous apex (**Fig. 1C**).

Informed consent was obtained from the patient for the publication of this report, which adheres to the principles of the Declaration of Helsinki.

Discussion

To completely relieve pain, it is necessary during surgery

for TN to observe the entire root of the trigeminal nerve and transpose the responsible blood vessel. However, obstructions that prevent observation of the trigeminal nerve may make it difficult to expose it. Such obstructions include the SMT being located above and anterior to the internal auditory meatus. Surgical techniques should be used when SMTs are large, bony, or bulging. Rennert et al.[6] reported that the SMT had to be removed in 10% of SPV-associated TN cases.

In a previous study, endoscopy was used when the conflict could not be clearly identified with a microscopic view, and the authors reported that compression sites were identified with an endoscope in 8.5% of cases[7]. The advantage of endoscopy over microscopy is particularly evident in cases with a large SMT. Shenouda et al.[3] reported 15 cases of TN obscured by petrosal endostosis. The trigeminal nerve was observed by drilling the endostosis or using an endoscope. After identifying the conflicting vessels, the responsible artery was transposed and fixed using fibrin glue. The ponto-trigeminal vein obliquely crossing the trigeminal nerve was coagulated and divided.

In our patient, the compressed vein ran along the trigeminal nerve, passed beneath the SMT, and entered Meckel's cave. This was a large main venous drainage, as there were no other draining veins around the petrosal and supratentorial surfaces. To transpose the compression vein, vein sacrifice was indicated but was not possible because of the risk of venous congestion. Some surgeons believe that the vein responsible for nerve compression can be removed without significant complications; however, a growing number of studies have reported mild to serious complications related to venous sacrifice during posterior cranial fossa surgery[8–10]. There is no reliable method for discerning specific drainage patterns during surgery. Therefore, whether this vein can be divided safely is controversial. Thus, the superior petrosal vein should be preserved, particularly the main stem. While coagulation is dangerous, Teflon felt pledgets are interposed in the gap between the trigeminal nerve and culprit vein to protect the nerve and preserve the main drainage. The inserted Teflon felt pledgets form granulomas and cause TN recurrence[11]. Transposition, which avoids direct contact between the prosthetic material and trigeminal nerve, is currently recommended[12]. Therefore, to release compression of the trigeminal nerve by the vein, the SMT must be drilled out and transpose the vein. We therefore drilled the tubercle and exposed the trigeminal nerve behind it. After exposing the entire nerve, the offending vein was transposed in front of the nerve.

To our knowledge, this is the first report of TN caused by a vein sandwiched between the SMT and trigeminal nerve. The petrosal vein was successfully transposed by drilling into the SMT.

Conflict of Interest: None declared.

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