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Endoscopic-assisted microvascular decompression for trigeminal neuralgia secondary to vertebrobasilar dolichoectasia: A case report

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ABSTRACT

INTRODUCTION AND IMPORTANCE: Trigeminal neuralgia (TN) secondary to vertebrobasilar dolichoectasia (VBD) was a rare condition. This paper reported a successful endoscopic-assisted microvascular decompression (MVD) for TN secondary to VBD.

CASE PRESENTATION: A 53-year-old male with a history of myocardial infarction and heart failure complained of left refractory facial pain three years prior to admission. His pain was intermittent, electrical-like, severe, sharp, and radiated along the maxillary and mandibular branches. He used carbamazepine 600 mg daily. Brain magnetic resonance imaging revealed a neurovascular conflict between VBD and the left trigeminal nerve. The endoscopic-assisted MVD was indicated. The shredded neurosurgical sponges were interposed between VBD and trigeminal nerve. The 0° and 30° rigid rod-lens endoscope was used to explore and confirm the complete decompression. Postoperatively, TN was disappeared entirely. At a three-month postoperative, no facial pain and paraesthesia were found. The patient discontinued carbamazepine permanently.

CLINICAL DISCUSSION: MVD was still the most effective treatment. An inspection of root entry zone (REZ) and complete MVD with a solely operating microscope were challenging due to the massive diameter of VBD and multiple offending arteries behind the VBD. However, the wide viewing field and high-quality resolution of endoscopes allowed better visualization of REZ and neurovascular conflicts behind neural structures and least cerebellar retraction. This is essential in case of less potential space created by VBD.

CONCLUSION: Endoscope-assisted MVD allowed better visualization of REZ and neurovascular conflicts behind neural structures and least cerebellar retraction in management of trigeminal neuralgia secondary to VBD.

1. Introduction

Trigeminal neuralgia (TN), also known as tic douloureux, is characterized by recurrent unilateral brief shock-like pain, abrupt onset and termination, limited to the distribution of one or more trigeminal divisions and triggered by innocuous stimuli [1]. The prevalence of trigeminal neuralgia ranged from 0.03 % to 0.3 %, with a female-to-male ratio was 2 [2]. The neurovascular conflict was the leading cause of trigeminal neuralgia. While superior cerebellar artery (SCA) and anterior inferior cerebellar artery (AICA) were often the offending vessels, trigeminal neuralgia secondary to vertebrobasilar dolichoectasia (VBD) was a rare condition with a general incidence of about 1 % [3].

Vertebrobasilar dolichoectasia (VBD) is featured by ectasia, elongation, and tortuosity of the vertebrobasilar artery. Some case reports showed treatment options for trigeminal neuralgia secondary to vertebrobasilar dolichoectasia, such as medications, microvascular decompression (MVD), Cyberknife stereotactic radiosurgery, and nerve blocks but not endoscopic-assisted MVD [4–8]. This paper aims to report successful endoscopic-assisted microvascular decompression for trigeminal neuralgia secondary to vertebrobasilar dolichoectasia.

The work has been reported in line with the SCARE criteria [9].

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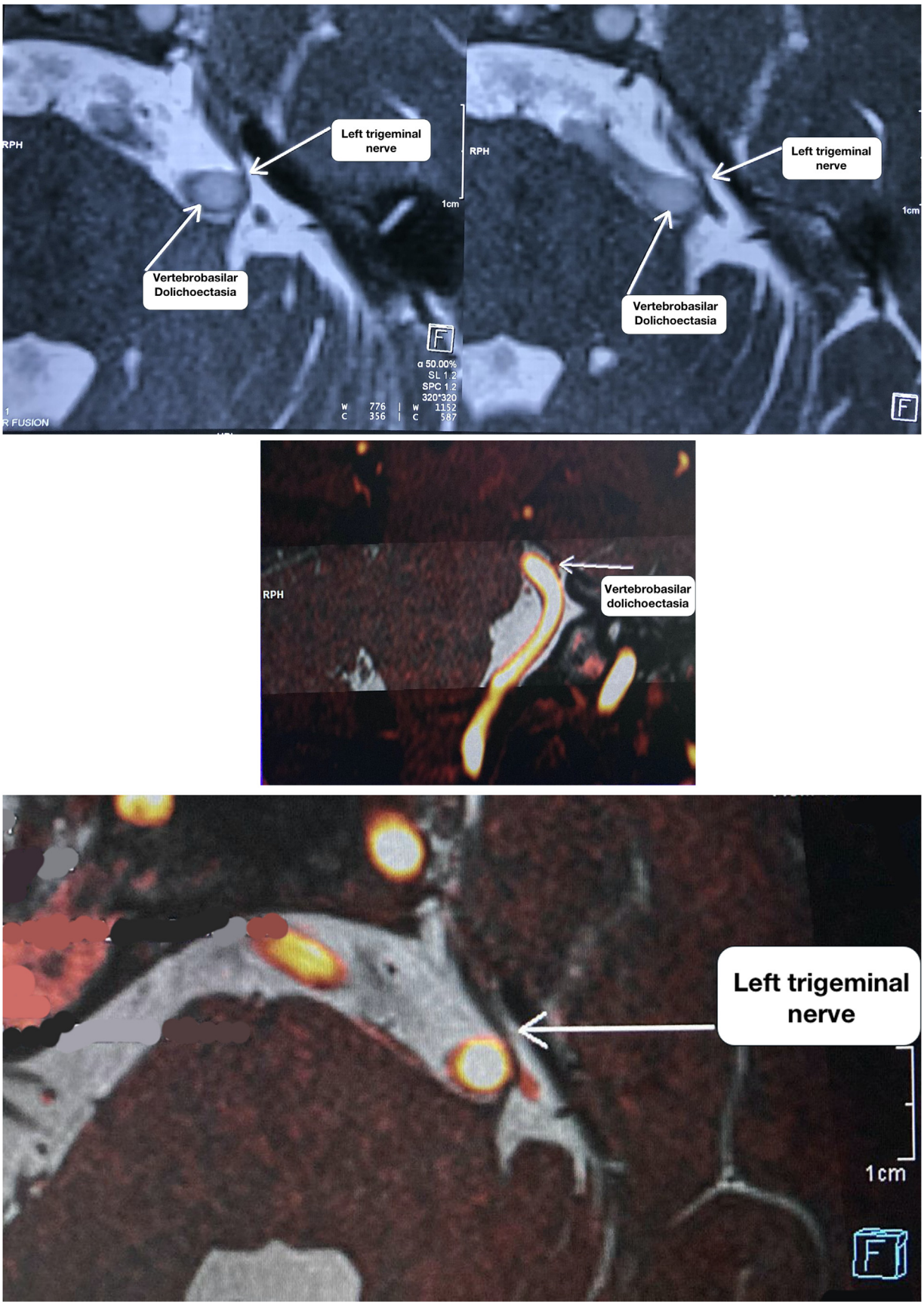

Fig. 1. Brain magnetic resonance imaging with gadolinium contrast revealed a neurovascular conflict between vertebrobasilar dolichoectasia and left trigeminal nerve on three-dimensional constructive interference in steady state (3D CISS) and contrast-enhanced SPACE sequence.

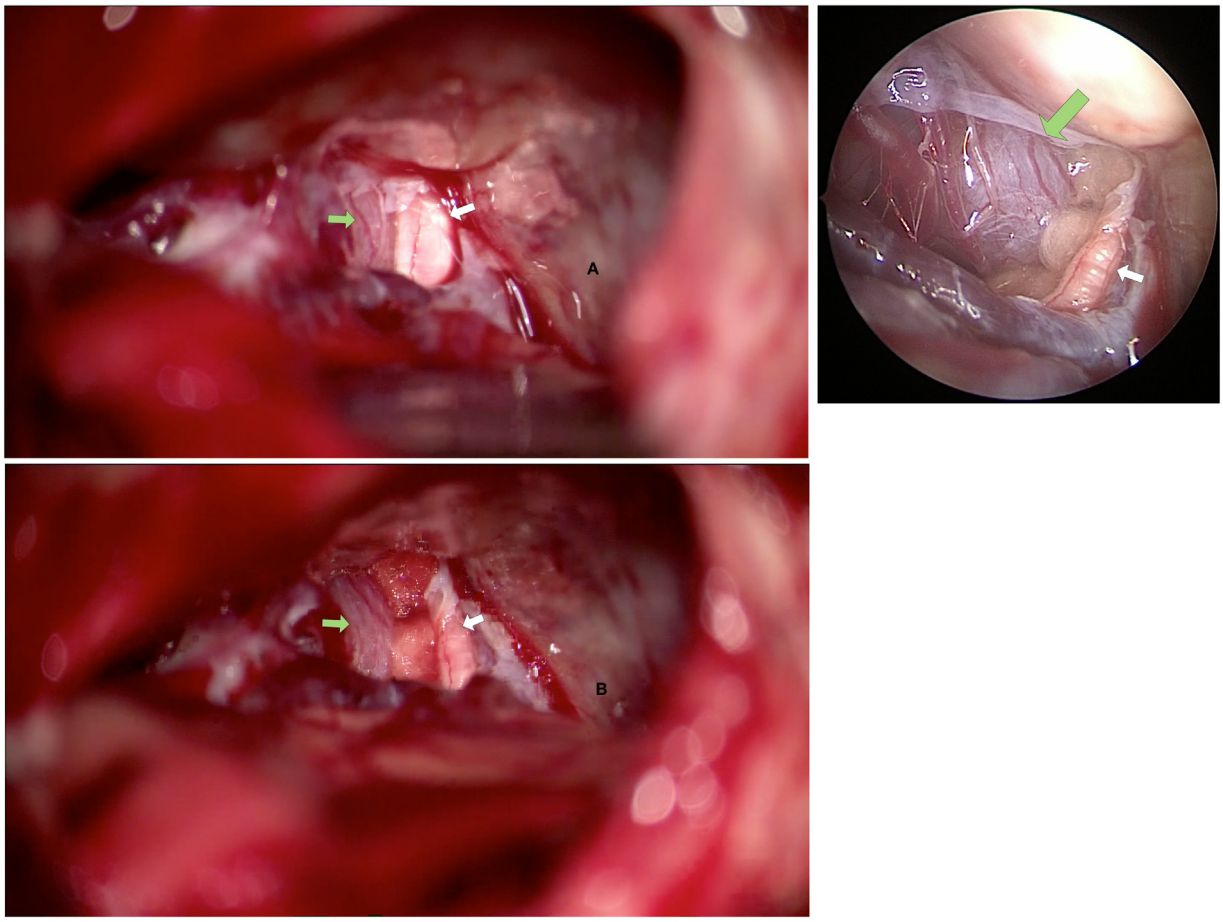

Fig. 2. The trigeminal nerve (white arrow) and vertebrobasilar dolichoectasia (green arrow) before (A, microscope) and after (B, microscope; C,endoscope) microvascular decompression.

2. Presentation of case

A 53-year-old male with a history of myocardial infarction and heart failure complained of left refractory hemifacial pain for three years prior to admission. His episodes of left hemifacial pain were intermittent, electrical-like, severe, sharp, and piercing. The pain radiated along with the sensory distribution of the maxillary and mandibular branches of the trigeminal nerve. It was triggered by talking, washing his face, eating, and brushing his teeth. The visual analog scale (VAS) was seven out of ten. His facial pain was refractory to carbamazepine (Tegretol ®) 200 mg with three tablets twice daily. The patient had a heart failure and myocardial infarction history, which was treated with three coronary stent placements in 2016 and 2017. He has been using clopidogrel (Plavix ®) 75 mg a tablet per day for four years ever since.

On examination, the patient was alert and oriented. The motor and sensory functions of the trigeminal nerve and corneal reflex were intact. Oculomotor, trochlear, and abducens cranial nerves were normal. No neurological deficit was found.

Brain magnetic resonance imaging (MRI) with gadolinium contrast revealed a neurovascular conflict between vertebrobasilar dolichoectasia and left trigeminal nerve on three-dimensional constructive interference in steady state (3D CISS) and contrast-enhanced SPACE sequence (Fig. 1). The conflict was grade III (marked indentation in the root) [10].

Clopidogrel was temporarily discontinued for seven days preoperative, and enoxaparin (Lovenox ®) was replaced. The endoscopic-assisted microvascular decompression was indicated. The patient was in a park bench position, and keyhole retrosigmoid craniotomy was used. After opening the dura, we slowly drained cerebrospinal fluid (CSF) and relaxed the cerebellum. After that, the entire trigeminal root was explored from the root entry zone (REZ) at the brainstem to the porus of Meckel's cave with endoscopic assistance. The root was freed from all arachnoid adhesions. The offending vessel was a vertebrobasilar dolichoectasia, which compressed and made a significant indentation in the left trigeminal nerve. Fig. 2 showed the trigeminal nerve and vertebrobasilar dolichoectasia before and after microvascular decompression. The shredded neurosurgical sponges were interposed between vertebrobasilar dolichoectasia and trigeminal nerve. Again, 0° and 30° rigid rod-lens endoscope was used to explore and confirm the complete decompression.

Postoperatively, trigeminal neuralgia was disappeared entirely on the first day postoperative. No neurological deficit and bleeding complications were reported. The patient was discharged after a week. At a three-month postoperative follow-up, no facial pain and sensory abnormalities were found. The patient did not need to use carbamazepine anymore. He was happy to return his normal life.

3. Discussion

Trigeminal neuralgia secondary to vertebrobasilar dolichoectasia (VBD) was a rare condition, and microvascular decompression (MVD) was still the most common and most effective treatment options. In 2009, Noma et al. reported three cases with first-line therapy of carbamazepine [4]. After carbamazepine was failed to control trigeminal neuralgia, two of them received radiofrequency thermocoagulation (RFTC), and one of them was operated on with

microvascular decompression. Of two RFTC cases, one case had paraesthesia, and one patient had contralateral hemifacial spasm posttreatment. In contrast, the MVD case disappeared neuralgia for a long term and experienced temporarily ipsilateral hearing impairment. Besides, Campos et al. also illustrated a satisfactory surgical decompression outcome of trigeminal neuralgia due to vertebrobasilar dolichoectasia [8]. Besides, gamma knife surgery was the second-most common choices. However, a previous study demonstrated that trigeminal neuralgia with VBD had lower pain control rates of gamma knife surgery than those without VBD [11]. Last but not least, Cyberknife radiosurgery was a new and promising alternative for TN secondary to VBD [7].

Microvascular decompression of vertebrobasilar dolichoectasia was more challenging than those other arteries due to its colossal vessel diameter and the weakness of the arterial wall, especially in patients with hypertension and atherosclerosis. Furthermore, coagulation therapy made the risk of intraoperative bleeding complication and vessel damage more dangerous in our case than in the others. Yang et al. recommended choosing the latero-inferior cerebellar approach and dissect the caudal cranial nerve at first. Then he moved VBD proximally to avoid rebounding of the large artery [5]. In our study, we have to move the trigeminal nerve laterally and then put the neurosurgical sponges between the offending artery and the nerve.

In trigeminal neuralgia secondary to vertebrobasilar dolichoectasia, an inspection of root entry zone (REZ) and complete microvascular decompression with a solely operating microscope were more challenging due to huge diameter of VBD and multiple offending arteries behind the VBD. However, the wide viewing field and high-quality resolution of endoscopes allowed better visualization of REZ and neurovascular conflicts behind neural structures and least cerebellar retraction. This is more essential in case of less potential space created by a huge offending artery, vertebrobasilar dolichoectasia. The efficacy and safety of endoscopic-assisted microvascular decompression had been shown in the management of hemifacial spasm [12].

4. Conclusion

Trigeminal neuralgia secondary to vertebrobasilar dolichoectasia was an uncommon condition and could be treated effectively by microvascular decompression. Endoscope-assisted microvascular decompression with the wide viewing field and high-quality resolution allowed better visualization of REZ and neurovascular conflicts behind neural structures and least cerebellar retraction.

Conflicts of interest

None.

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Ethical approval

The study was approved by the Research Ethics Committee of Hanoi Medical University. The procedures used in this study adhere to the tenets of the Declarations of Helsinki.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Registration of research studies

Not applicable – this is a single case report, not a systematic review or meta-analysis. Moreover, we attest that it is not a 'first in man' study, either.

Guarantor

Tam Duc Le.

Provenance and peer review

Not commissioned, externally peer-reviewed.

CRediT authorship contribution statement

Ha Dai Duong: Conceptualization, Methodology, Investigation, Writing - review & editing, Supervision. **Anh Hoang Pham:** Conceptualization, Methodology, Investigation, Writing - original draft, Writing - review & editing, Visualization. **Tam Duc Le:** Conceptualization, Methodology, Investigation, Writing - original draft, Writing - review & editing, Visualization. **Hung Thanh Chu:** Visualization, Writing - original draft, Writing - review & editing. **Dung Tuan Pham:** Visualization, Writing - original draft, Writing - review & editing. **He Van Dong:** Conceptualization, Resources, Supervision.

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Nothing to declare.

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