Trans-Inferior Turbinate Approach for Endoscopic Sphenopalatine Artery Ligation

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ABSTRACT

Background and Objectives With the recent development of endoscopic nasal surgery, endoscopic sphenopalatine artery ligation allows for secure control of posterior epistaxis with considerably low recurrence and complications. Surgical approaches to the sphenopalatine foramen to ligate the sphenopalatine artery are transantral, intranasal, and transseptal. However, the procedures have considerable limitations. Therefore, we have revised the transturbinal approach, which was described by Togawa for intranasal vidian neurectomy in 1977, to ligate the sphenopalatine artery in two patients of intractable posterior epistaxis, and describe our technique of the trans-inferior turbinate approach for endoscopic sphenopalatine artery ligation.

Surgical Technique A longitudinal incision is made along the lower border of the inferior turbinate, and the mucoperiosteal flaps are developed to the lateral nasal wall. The posterior two-thirds of the inferior turbinate bone is removed from the lateral nasal wall. The posterior lateral nasal artery on the upper flap is positively identified, and followed to the posterior end of the middle turbinate bone. The sphenopalatine foramen can be localized after removing the posterior end of the middle turbinate bone, and the sphenopalatine artery is ligated with hemoclips or divided with bipolar electocautery.

Results With the trans-inferior turbinate approach, it was possible to identify and ligate the sphenopalatine artery and its branches in the sphenopalatine foramen with no immediate or delayed complications.

Conclusion The trans-inferior turbinate approach provides unobscured surgical access to the posterior nasal cavity, and enough working space for endoscopic manipulation. The posterior lateral nasal artery is a reliable surgical landmark leading to the sphenopalatine foramen.

KEY WORDS Epistaxis · Trans-inferior turbinate approach · Endoscopic sphenopalatine artery ligation · Sphenopalatine foramen · Posterior lateral nasal artery.

INTRODUCTION

Arterial ligation is one effective treatment of intractable epistaxis, which persists despite nasal packing and nasopharyngeal balloon tamponade. With the recent development of endoscopic nasal surgery, endoscopic sphenopalatine artery ligation allows for secure control of posterior epistaxis with considerably low recurrence and complications.

It has been reported that surgical approaches to the sphenopalatine foramen to ligate the sphenopalatine artery are transantral, intranasal, and transseptal. Transantral approach has significant complications related to the procedure such as marked cheek swelling, analgesia or neuralgia over the cheek and teeth, and postoperative maxillary sinusitis. Intranasal approach can avoid the complications associated with transantral approach. However, the intranasal approaches described by Budrovich and Saetti, and Pritikin, et al. have considerable difficulties with finding the sphenopalatine foramen because of the anatomic location related to the middle turbinate. Transseptal approach has been proposed to overcome the technical difficulties in intranasal approach. However, transseptal approach has a very narrow and deep surgical field and is still difficult to manipulate instruments with endoscope.

In 1977, Togawa in Japan described a transturbinal approach for intranasal vidian neurectomy as an alternative to transseptal approach. He reported that transturbinal approach provides a more direct and easy access to the
vidian nerve than transseptal approach. In this report, we have revised the Togawa’s transturbinal approach to ligate the sphenopalatine artery in two patients of intractable posterior epistaxis, and describe our technique of the trans-inferior turbinate approach for endoscopic sphenopalatine artery ligation.

SURGICAL TECHNIQUE

Surgery is carried out under general anesthesia with controlled hypotension. A longitudinal incision is made along the lower border of the inferior turbinate, and the mucoperiosteal flaps are developed to the lateral nasal wall. The posterior two-thirds of the inferior turbinate bone is removed from the lateral nasal wall. The posterior lateral nasal artery (* on the upper mucoperiosteal flap is positively identified. C The membranous ostium, the perpendicular plate of palatine bone, and the posterior end of the middle turbinate bone are exposed. Following the posterior lateral nasal artery to the posterior end of the middle turbinate bone, the sphenopalatine foramen can be localized after removing the posterior end of the middle turbinate bone.

Case 1

A 44-year man was referred to the emergency room for refractory epistaxis. Several trials with anterior packing were tried, but failed to control the bleeding. He had posterior epistaxis in the left nose. Eventually, he had posterior packing with a Foley catheter, and was admitted to the ward. Bleeding re-developed after removing the posterior packing three days later. The endoscopic trans-inferior turbinate approach was done under general anesthesia. After clipping and dividing the
posterior lateral nasal artery, the sphenopalatine foramen was exposed and the artery was ligated with a hemoclip. In this case, the posterior lateral nasal artery passed through an independent foramen just inferior to the sphenopalatine foramen. Saline spray was continued postoperatively for two weeks. He had no recurrent epistaxis postoperatively. No immediate or delayed postoperative complications were attributed to this procedure during the follow-up period of three months.

**Case 2**

A 59-year-old man was admitted to the emergency room for profuse nasal bleeding that had developed suddenly. He had several episodes of nasal bleeding, and several trials of nasal packing over the course of three days. He was hypertensive and had posterior epistaxis in the right nose. He had posterior packing with a Foley catheter, and was admitted to the ward. Bleeding redeveloped one day after removing the posterior packing. Therefore, the endoscopic trans-inferior turbinate approach was done under general anesthesia. The posterior lateral nasal artery passed through the sphenopalatine foramen, and the artery was ligated with a hemoclip in the sphenopalatine foramen. An episodic transient rebleeding happened seven days after surgery. However, there was no more evidence of bleeding after controlling the blood pressure. Saline spray was continued postoperatively for two weeks. He had no immediate or delayed postoperative complications during the follow-up period of more than six months.

**DISCUSSION**

The optimal treatment for recurrent or persistent posterior epistaxis is still controversial. The most common treatments for intractable epistaxis include endoscopic cautereization, percutaneous embolization, and arterial ligation. However, the procedures have variable efficacy and significant complication rates. It has been reviewed that endoscopic cautereization has failure rates of 17% to 33% and risks of thermal injury of the optic nerve and the greater palatine nerve, and arterial ligation has a significant risk for developing severe neurologic complications in up to 50% of patients. With the recent development of endoscopic nasal surgery, endoscopic sphenopalatine artery ligation allows secure control of posterior epistaxis with considerably low recurrence and complications.

The ligation of the sphenopalatine artery and its branches in the sphenopalatine foramen has the obvious goal of treatment of intractable posterior epistaxis with a high success rate and minimal complications. Simpson, et al., and Winstead reported on the use of transantral sphenopalatine artery ligation. However, transantral approach has significant complications related to the procedure. Budrovich and Saetti, and Pritikin, et al., reported endoscopic intranasal approaches through a vertical incision from the middle turbinate to the inferior turbinate in the posterior middle meatus. Intranasal approach can avoid the complications associated with transantral approach, but may have considerable difficulties with finding the sphenopalatine foramen because of the anatomic location related to the middle turbinate. The sphenopalatine foramen is located at the superior meatus (85%), or bridged by the posterior end of the middle turbinate (10%). It is located in the middle meatus in only 5% of cases. Therefore, it appears that the posterior end of the middle turbinate obscures the sphenopalatine foramen in most cases with intranasal approach. El-Guindy reported an endoscopic transseptal approach to overcome the limitation in intranasal approach. Transseptal approach may have less difficulties to find the sphenopalatine foramen, but needs extended dissection along the nasal septum and the anterior surface of the body of the sphenoid, and is still difficult to manipulate instruments with endoscope within a very limited surgical field.

Togawa described a transturbinal approach for intranasal vidian neurectomy as an alternative to transseptal approach. We revised the Togawa’s transturbinal approach to ligate the sphenopalatine artery in two patients of intractable posterior epistaxis, and ligated the sphenopalatine artery in the sphenopalatine foramen after positive identification. The trans-inferior turbinate approach, which we revised for endoscopic sphenopalatine artery ligation, has at least two definite advantages. First, submucosal resection of the posterior two-thirds of the inferior turbinate bone provides unobscured surgical access to the posterior nasal cavity, and enough working space to manipulate instruments with endoscope. Second, the posterior lateral nasal artery, running from the posterior to anterior on the posterior end of the upper flap, is a reliable surgical landmark leading to the sphenopalatine foramen. Other surgical landmarks are the membranous ostium, the perpendicular plate of
the palatine bone, and the posterior end of the middle turbinate bone. In surgery, we followed the posterior lateral nasal artery to the posterior end of the middle turbinate bone, and localized the sphenopalatine foramen after removing the posterior end of the middle turbinate bone.

No immediate or delayed postoperative complications were attributed to this procedure. The sensory and autonomic nerve (not meaning the Vidian nerve) fibers pass with the sphenopalatine artery through the foramen. Interruption of the innervation may be inevitable, especially using electrocautery to divide the artery. Our patients experienced decreased pain sense in the nose after surgery. However, there was no evidence of palatal anesthesia, or dry eye, a sign of vidian nerve denervation. However, the long term follow-up related with interruption of the innervation should be followed.

In conclusion, the trans-inferior turbinate approach for endoscopic sphenopalatine artery ligation allows secure control of intractable posterior epistaxis with no immediate or delayed complications. This approach provides unobscured surgical access to the posterior nasal cavity, and enough working space for endoscopic manipulation. The posterior lateral nasal artery is a reliable surgical landmark leading to the sphenopalatine foramen.

REFERENCES