

OPEN

# Pseudoaneurysm in the Internal Maxillary Artery Occurring After Endoscopic Sinus Surgery

Eun Jung Lee, MD, Hye Jin Hwang, MD, and Kyung-Su Kim, MD, PhD

**Abstract:** Pseudoaneurysm is defined as blood leaking out of a vessel that does not have true 3 arterial walls like a true aneurysm, and is susceptible to rupture. Only 4 patients of pseudoaneurysm after endoscopic sinus surgery have been reported so far in English literature. Recently, the authors encountered a pseudoaneurysm in the internal maxillary artery after endoscopic sinus surgery, which was immediately and successfully managed with endovascular embolization. There was no bleeding or complications 6 months after the embolization.

**Key Words:** Embolization, endoscopic sinus surgery, internal maxillary artery, pseudoaneurysm

(*J Craniofac Surg* 2016;27: 1013–1014)

Pseudoaneurysm is generally reported as a delayed complication of LeFort osteotomy and hypophyseal surgery.<sup>1,2</sup> Unlike true aneurysms, which include all 3 layers of the arterial wall, the pseudoaneurysm shows a direct communication of blood flow existing between the vessel lumen and the aneurysm lumen through the hole in the vessel wall. Therefore, the pseudoaneurysm consists of blood leaking completely out of a vessel, and confined close to the vessel by the surrounding tissue.<sup>3</sup> Although early open surgical ligation has been recommended for managing pseudoaneurysms in the past, angiographic embolization has become popular recently.<sup>4,5</sup> A review of the literature showed that the occurrence of pseudoaneurysm due to severe postoperative bleeding after endoscopic sinus surgery (ESS) has been reported in 4 patients.<sup>6–9</sup> In contrast to these patients, we recently encountered a pseudoaneurysm in the internal maxillary artery (IMA) after ESS, which was immediately and successfully treated by endovascular embolization. Therefore, we decided to report this patient and review the literature.

## CLINICAL REPORT

A 48-year-old man presented with progressive nasal obstruction and right facial pain. He had undergone a Caldwell-Luc operation 30 years ago, and had no history of medical disease. The right nasal cavity was not visible because of bulging from the inferior meatus, which almost

reached the septum. Images of the paranasal sinus revealed a 6 × 5-cm-sized well-demarcated cystic mass filling the right maxillary sinus and nasal cavity (Fig. 1 A and C). The bulging mass led to erosion of the posterior wall of the maxillary sinus and pterygoid plate causing anatomical deformity and sphenoid sinusitis (Fig. 1A and B). Endoscopic decompression and sphenoid sinusotomy were performed, considering it to be a patient of postoperative maxillary cyst with sphenoid sinusitis. The anterior cystic wall was removed and thick mucinous fluid was sucked out. The sphenoid sinus ostium was located using an image-guided system (Fiacon GmbH, Berlin, Germany), and massive bleeding was noted during the widening of the ostium. The estimated blood loss was about 1500 cc and the bleeding was temporarily controlled by nasal packing using Rapid Rhino (Smith & Nephew, Austin, TX) and Merocel (Medtronic, Mystic, CT). Since right facial swelling was gradually progressive, we performed immediate angiography, which revealed a thrombosed large pseudoaneurysm feeding from the right IMA (Fig. 1D). Materials used for embolization were n-butylcyanoacrylate (33%) and 3 × 8 mm platinum detachable coils (Covidien, Axium, Plymouth, MN). (Fig. 1E). After embolization, no bleeding was noted on angiography (Fig. 1F). After 6 months, there was no bleeding or any other complications.

## DISCUSSION

In this patient, since the postoperative maxillary cyst was huge and bulging onto adjacent structures, normal anatomic structure was altered, and the course of the IMA was also displaced. Thus, the injury to the IMA was accidental. Even though compact nasal packing was performed, the bleeding continued. This continuous bleeding also contributed to the formation of the pseudoaneurysm. The diagnosis of pseudoaneurysm can be confirmed by duplex ultrasonography, computed tomography angiography, or conventional angiography.<sup>3</sup> In this patient, even though the bleeding was temporarily controlled by nasal packing, immediate computed tomography angiography was performed because of progressive facial swelling. The optimal treatment for pseudoaneurysm is either ligation or embolization with angiography. Several studies showed that the success and complication rates are quite comparable between surgical ligation and embolization.<sup>4,5</sup> Although embolization is a minimally invasive technique, there are many possible complications including skin ischemia, temporary hemiparesis, temporary monocular visual field loss, monocular blindness, peripheral facial nerve paralysis, and cerebral infarction.<sup>10</sup> Therefore, the application of embolization should depend on the anatomical factors, patient preference, and availability of experienced interventional staff. In this patient, immediate embolization was successfully performed, and there were no complications after 6 months.

In review of the literature, the pseudoaneurysms occurred following a postoperative delay of 2 days to 4 months (Table 1).<sup>6–9</sup> Previous patients required a transfusion or even resuscitation, due to delayed massive bleeding. It is clinically significant that we did not require a transfusion despite encountering uncontrolled massive bleeding after the compact nasal packing, since we immediately performed an intervention procedure. Another point of clinical significance is that this is the first patient

From the Department of Otorhinolaryngology, Yonsei University College of Medicine, Seoul, Republic of Korea.

Received January 25, 2016; final revision received February 24, 2016.

Accepted for publication March 12, 2016.

Address correspondence and reprint requests to Kyung-Su Kim, MD, PhD, Department of Otorhinolaryngology, Gangnam Severance Hospital, Yonsei University College of Medicine, 211 Eonju-ro, Gangnam-gu, Seoul, Republic of Korea; E-mail: ydrhinol@yuhs.ac

The authors report no conflicts of interest.

This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially.

Copyright © 2016 by Mutaz B. Habal, MD

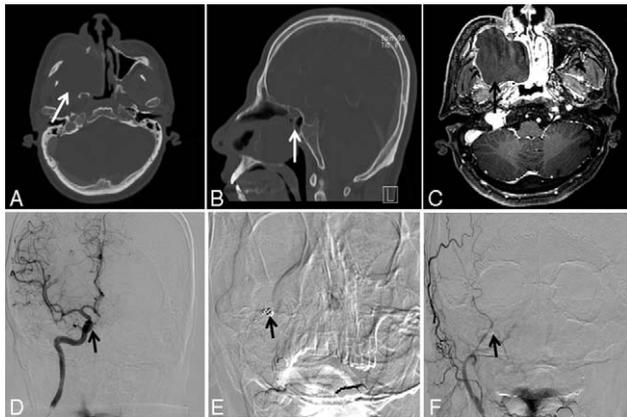
ISSN: 1049-2275

DOI: 10.1097/SCS.0000000000002667

TABLE 1. Previously Reported Patients of Pseudoaneurysm After Endoscopic Sinus Surgery

Author (Yr)	Age in Years/Sex	Artery	Transfusion or Resuscitation	Sinuses	Duration (Days)	Treatment
Gökdoğan (2014) <sup>6</sup>	26/F	SPA	4U erythrocyte suspension	Ethmoid frontal sphenoid	2	Embolization
Campbell (2012) <sup>7</sup>	76/F	SPA	2U platelets, 1U packed RBC	Sphenoid	13	Embolization (PVA particle+ platinum coil)
Pawar (2010) <sup>8</sup>	87/M	Cavernous carotid	Resuscitation	Sphenoid	120	Coil occlusion
Biswas (2009) <sup>9</sup>	65/F	ICA	Resuscitation	Sphenoid	4	ICA multiple coiling

ICA, internal carotid artery; PVA, polyvinyl alcohol; RBC, red blood count; SPA, sphenopalatine artery; U, unit.



**FIGURE 1.** (A) Axial and (B) coronal images of paranasal sinus computed tomography. The bulging mass shows a homogenous density occupying right maxillary sinus with erosion of the posterior wall of maxillary sinus and sphenoid sinusitis (arrow). (C) Axial image of paranasal sinus T1-gadolinium enhanced magnetic resonance imaging. A 6 × 5-cm-sized, gadolinium-enhanced mass with internal cystic change (arrow) can be seen and the lesion is well demarcated with smooth margins. (D) Preembolization angiography. Blood circulation of right internal carotid artery and external carotid artery was checked before embolization. Large pseudoaneurysm (arrow) is noted with feeder of right IMA. (E) Postembolization angiography. Embolization of right IMA (arrow) was done using n-butylcyanoacrylate and platinum coils. (F) Postembolization angiography. After embolization, no bleeding is noted from right IMA (arrow). IMA, internal maxillary artery.

of pseudoaneurysm occurring in IMA after ESS. Therefore, this patient highlights the importance of the application of immediate embolization in the management of pseudoaneurysm occurring due to intractable bleeding after ESS.

## REFERENCES

1. Procopio O, Fusetti S, Liessi G, et al. False aneurysm of the sphenopalatine artery after a Le Fort 1 osteotomy: report of 2 cases. *J Oral Maxillofac Surg* 2003;61:520–524
2. Raymond J, Hardy J, Czepko R, et al. Arterial injuries in transsphenoidal surgery for pituitary adenoma; the role of angiography and endovascular treatment. *AJNR Am J Neuroradiol* 1997;18:655–665
3. Saad NE, Saad WE, Davies MG, et al. Pseudoaneurysms and the role of minimally invasive techniques in their management. *Radiographics* 2005;25(Suppl 1):S173–S189
4. Strong EB, Bell DA, Johnson LP, et al. Intractable epistaxis: transantral ligation vs. embolization: efficacy review and cost analysis. *Otolaryngol Head Neck Surg* 1995;113:674–678
5. Sokolof J, Wickborn I, McDonald D, et al. Therapeutic percutaneous embolization in intractable epistaxis. *Radiology* 1974;111:285–287
6. Gökdoğan O, Kizil Y, Aydil U, et al. Sphenopalatine artery pseudoaneurysm: a rare cause of intractable epistaxis after endoscopic sinus surgery. *J Craniofac Surg* 2014;25:539–541
7. Campbell RG. Sphenopalatine artery pseudoaneurysm after endoscopic sinus surgery: a case report and literature review. *Ear Nose Throat J* 2012;91:E4–E11
8. Pawar SS, Loehrl TA, Michel MA, et al. Cavernous carotid pseudoaneurysm after endoscopic sphenoid mucoccele marsupialization. *Arch Otolaryngol Head Neck Surg* 2010;136:407–410
9. Biswas D, Daudia A, Jones NS, et al. Profuse epistaxis following sphenoid surgery: a ruptured carotid artery pseudoaneurysm and its management. *J Laryngol Otol* 2009;123:692–694
10. Willems PW, Farb RI, Agid R. Endovascular treatment of epistaxis. *AJNR Am J Neuroradiol* 2009;30:1637–1645