

**Case Report**

Treatment of Post Traumatic Internal Carotid Artery Pseudo Aneurysm with Intravascular Coil Embolization

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Abstract

Introduction: Vascular complications such as bleeding and pseudoaneurysm following an endoscopic trans-sphenoidal approach for the basal skull pathology are rare but when it occurs it brings a significant risk of morbidity and mortality along with it. Intraoperative bleeding can be managed with manual packing and in case of pseudoaneurysm formation, it can be successfully managed with endovascular coiling.

Case presentation: One month after an endoscopic sphenoidal resection of mucocele. A 49-year-old female presented with massive left sided epistaxis due to formation and rupture of pseudoaneurysm at left cavernous segment of internal carotid artery. She was managed with multiple coil embolization of pseudoaneurysm.

Conclusion: A patient with pseudoaneurysm formation following an endoscopic trans-sphenoidal approach for a mucocele resection was successfully managed by the emergency endovascular coiling, with complete obliteration of the aneurysm and bleeding while maintaining the vessel patency. This approach is less invasive, quick as well as safe and do not require long term anticoagulation. However, long term follow and larger sample are required to evaluate its efficacy.

Keywords: epistaxis; aneurysm; endovascular approach; sphenoid mucocele

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Introduction

Vascular complications such as bleeding and pseudoaneurysm following an endoscopic trans-sphenoidal approach for the basal skull pathology are rare but when it occurs it brings a significant risk of morbidity and mortality along with it. Intraoperative bleeding can be managed with manual packing and in case of pseudoaneurysm formation, it can be successfully managed with endovascular coiling.

Case Presentation

A 49-year-old female was referred to our center in march 2012 for the evaluation of her 6 years' history of headache and diplopia. Her initial physical examination was not significant except for the double vision. She wasn't under any medication and denied history of previous hypertension, diabetes, sinus surgery, head/facial injury or radiation. In admission computed tomographic (CT) imaging revealed an expansile sphenoid sinus lesion suggesting a sphenoid mucocele (*image 1a*). Subsequent magnetic resonance imaging (MRI) was performed to further clarify the diagnosis (*image 1b,c*). There was no evidence of intracranial extension or preexisting internal carotid artery (ICA) aneurysm in MRI. Patient underwent an endoscopic surgery through the sphenoid sinus. Purulent mucocele was resected after opening the anterior floor of sphenoid sinus. Immediately after resecting a mucocele, heavy arterial bleeding occurred from the left cavernous and sphenoid sinuses. Bleeding was managed immediately by packing the left parietal cavernous and sphenoid sinuses with muscle, fat, biogel and a gelfoam mixture followed by the insertion of tamponade in to the nose and nasopharynx. 48 hours after the nasal surgery, nasal packing was carefully removed, subsequent CT angiography showed normal internal and external carotids. Three days later, the patient was discharged home and advised to follow up after a month. A day before her follow up, she suffered from a massive left sided epistaxis which was managed by nasal packing at nearest emergency center and later she was sent to us for the further management. Immediate CT showed abnormal lesion in the sphenoid sinus . Digital subtraction angiography showed large irregular left internal carotid artery (LICA) aneurysm with the maximum diameter of 3 cm extending in to the sphenoid sinus from the cavernous segment of the LICA (*image 2a,b*). Carotid compression test revealed the collateral flow from the right internal carotid artery (RICA) and posterior circulation was not significant. Therefore, we decided not to do balloon occlusion of the parent artery. The patient underwent multiple coil embolization of the pseudoaneurysm (*image 2c,d*). Post-operative angiography revealed almost complete occlusion of the pseudoaneurysm. She recovered rapidly without any neurological deficits and was discharged 7 days after the endovascular intervention.



Image-1; 1a Axial bone window CT shows an expansile lesion within the sphenoid sinus and the lesion accompanies with bone wall erosion. 1b sagittal dynamic enhance MRI demonstrates the lesion invading the posterior ethmoid sinus and is not contrasted in the ethmoid sinus. 1c sagittal T2 weighted MRI reveals that the lesion is hyperintense signal suggestive of cystic mass with high protein content.

Image 2;

A: ICA injection showed rent at the carvenous segment, through which blood sprayed into sphenoid sinus
B: microcatheter was navigated into the sphenoid sinus via rent
C: coils were deployed firstly
D: with nondetachable compliant balloon inflated, Onyx was injected, and allowed to diffuse within and around the coil scaffold, which finally occluded the rent completely



Discussion

The sphenoid sinuses are air filled sacs lies on the either side of the nasal cavity deep in the skull, contained within the body of the sphenoid bone. Histologically, these sinuses are lined by the mucous secreting cells. Several sensitive anatomical structures are located nearby it such as, pituitary fossa superiorly, clivus posteriorly, ethmoid region anteriorly and orbits laterally. It is obvious that any pathology associated with the sphenoid sinus could affect the function of various surrounding structures like, pituitary gland, optic chiasm, cranial nerves (upper 6), carotid artery and cavernous sinus.

The first case of sphenoid sinus mucocele was described by Berg in the year 1889. Ever since, several cases have been reported despite its rarity. A review done by Y.NG and D. Sethi on 2011 by collecting a 366 cases published in different papers summarized that the commonest isolated sphenoidal lesions are inflammatory (50.3%) among them 20.2 % of the cases were mucocele¹. Etiology behind mucocele includes; congenital anomalies, trauma or surgery of the sphenoid sinus and choric sinusitis². It usually arises when secretions are retained inside a sinus cavity or when a mucous gland dilates gradually. The most common presenting symptoms are headache, visual disturbances, ophthalmoplegia, exophthalmia and proptosis, nasal symptoms such as anosmia³. Physical examination is often normal and other diagnostic modality of choice are either CT or MR scan. Evidence of bony expansion or erosion are well shown by CT scans and MRI is helpful for distinguishing between the mucocele and surrounding inflammation based on density. The differential diagnosis of mucocele includes; Rathke’s cleft cyst, arachnoid cyst, primary intrasella pituitary cyst, dermoid or epidermoid cyst and cystic sarcosis. Mucocele are mainly managed by endoscopic marsupialization with the higher success rate⁴.

In the recent years, the endoscopic endonasal trans-sphenoidal approach for a space occupying lesions of the sellar or basal skull lesion has gained increasing popularity over the traditional microsurgical intervention. Particularly, this approach is minimally invasive and maximally effective⁵ which is due to degree of intraoperative visualization and the higher extent of mass resection and lower complication rate when compared to the traditional microsurgical approach⁶. Nevertheless, complications can occur

with this approach and among them vascular hemorrhagic complication are most feared. Vascular injury and epistaxis following the trans-nasal endoscopic procedure is not rare (3.4%)⁷ and brings a significant morbidity and mortality specially when it involves major vessels such as ICA (1.1%)⁷. The reason behind ICA injury could be due to close anatomic relationships between cavernous carotid and the sella. There are several other conditions which could increase the risk of injury to the ICA; previous surgery, head trauma, previous radiotherapy, anomalies of the sphenoid bone such as honeycomb configuration. Patient presenting with the massive bleeding following a trans-nasal procedure should raise a suspicion of internal carotid artery pseudoaneurysm^{8,9}. As described in our report, an iatrogenic injury to ICA usually appears with huge intraoperative bleeding, however, some patients do present later with profuse epistaxis^{10,11}. It has been reported as early as 4 to 20 days to late up to years following a trauma or a surgery¹².

This natural history demands a modern neuro-radiological follow-up by means of non-invasive imaging studies; post-operative angio-CT and MRI are able to show the presence of the aneurysm > 2 mm and stratification of the thrombus in the sac¹³. In the presence of pseudoaneurysm, various treatment strategies can be implemented these days; direct clipping, wrapping, trapping and ligation. Since, transcranial aneurysms are difficult to approach and are equally a fragile lesion they are considered very tricky to manipulate. Given above challenges endovascular approach seems promising and are preferred to the direct surgical approach.

We choose coil ligation approach to avoid future morbid conditions such as bleeding/ischemic disorder due to anticoagulation therapy such as; stents. Main artery ligation which is usually considered a last resort was certainly not a choice as patient's showed fewer collaterals from the opposite side during the carotid compression test. This approach has already been described by P. Cappabianca and et al. in their case report which was published in *Acta Neurochirurgica* published in 2001¹⁴.

Conclusion

A patient with pseudoaneurysm formation following an endoscopic trans-sphenoidal approach for a mucocele resection was successfully managed by the emergency endovascular coiling, with complete obliteration of the aneurysm and bleeding while maintaining the vessel patency. This approach is less invasive, quick as well as safe and do not require long term anticoagulation. However, long term follow and larger sample are required to evaluate its efficacy.

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