CASE REPORT

Endoscopic endonasal removal of a sphenoidal sinus foreign body extending into the intracranial space

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ABSTRACT

Sphenoidal sinus foreign bodies are very rare entities that are often associated with a cranial and/or orbital trauma. In this paper, a case of a metallic foreign body that pierced the sphenoid sinus and penetrated into the intracranial space due to a work accident is presented. A 29-year-old male was referred to our clinic due to a right orbital penetrating trauma. Skull X-ray and computed tomography (CT) scans demonstrated a foreign body inside the sphenoidal sinus, extending to the left temporal fossa. The foreign body was removed using an endoscopic endonasal technique, and the skull base was reconstructed with a multilayer closure technique. There were no complications during or after the operation. Postoperative result was perfect after three months of follow up.

Key words: Endoscopic endonasal; foreign body; intracranial; sphenoid sinus.

INTRODUCTION

Paranasal sinus foreign bodies are very uncommon in the literature.[1] Most incidences of these objects usually occur with trauma, penetrating injuries, motor vehicle accidents, and iatrogenic and intracranial lesions.[2-5] In addition, paranasal sinus foreign bodies are found in the frontal and maxillary sinuses relatively more often than the ethmoidal and sphenoid sinuses.[2,6,7] The foreign body usually reaches the sphenoid sinus through the orbit or the nostril.[8] Their close relationship to the adjacent vascular and neural structures makes sphenoidal sinus injuries a potentially life-threatening occurrence.[9]

An endoscopic endonasal approach is usually selected for the removal of these objects.[9-12] If the foreign body is completely intracranial, an open surgical approach could be selected.[3,5,10] Because of better illumination and direct visualization, the endoscopic endonasal approach has proven accuracy for removal of these paranasal sinus foreign bodies. Furthermore, endoscopic endonasal approach demands a well-known anatomy of the spheno-ethmoidal region because of the presence of important and vital structures such as the ICA, optic nerves and the ethmoidal arteries.[13]

In this paper, a successful endoscopic endonasal removal of an uncommon case of a metallic foreign body located in the sphenoidal sinus extending into the intracranial space due to an orbital injury is presented.

CASE REPORT

A 29-year-old man, working as a professional mason, came to the emergency room for a work accident. The accident occurred when a metallic piece broke off of a marble cutting machine and became enlodged in his head through his right lower eyelid. His wound was sutured and the patient was referred to our clinic. He had a right periorbital ecchymosis, conjunctival hemorrhage and a sutured wound on his right lower eyelid (Figure 1). The neurological examination was completely normal without any vision impairment. A skull X-ray showed a radiopaque foreign body in the sphenoidal sinus region (Figure 2). A computed tomography (CT) scan showed a probable metallic, 4 cm long foreign body that fractured the vomer and the nasal septum, pierced the lateral wall of the sphenoidal sinus and reached into the pteriogopalatine fossa, and settled next to the Internal Carotid Artery (ICA) (Figure

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Figure 1. Preoperative photograph of the patient demonstrating a right periorbital ecchymosis, conjunctival hemorrhage and a sutured lower eyelid wound.

3). A digital subtraction angiography (DSA) was performed to determine if the left ICA was injured (Figure 4).

Later, the patient underwent surgery via binostril endoscopic endonasal transsphenoidal approach, using 0- and 30-degree rigid endoscopes. A 40x3 mm metallic foreign body that pierced into the vomer and nasal septum was visualized during the procedure (Figure 5a). There was no bleeding or cerebrospinal fluid (CSF) leakage. The posterior nasal septum and anterior wall of the sphenoidal sinus were removed to mobilize the foreign body before it was gently removed (Figure 5b). A 3 mm diamater laceration and CSF leakage was observed in the left lateral wall of the sphenoidal sinus where the deep end of the foreign body was enlodged. The dura defect was closed with multilayer skull base reconstruction technique using free fat and tensor fascia lata autografts combined with fibrin sealant. Nasal packing was not used.

There were no postoperative complications, neurological deficits or CSF rhinorrhea. Postoperative CT scan shows total removal of the foreign body (Figure 5c). The patient was

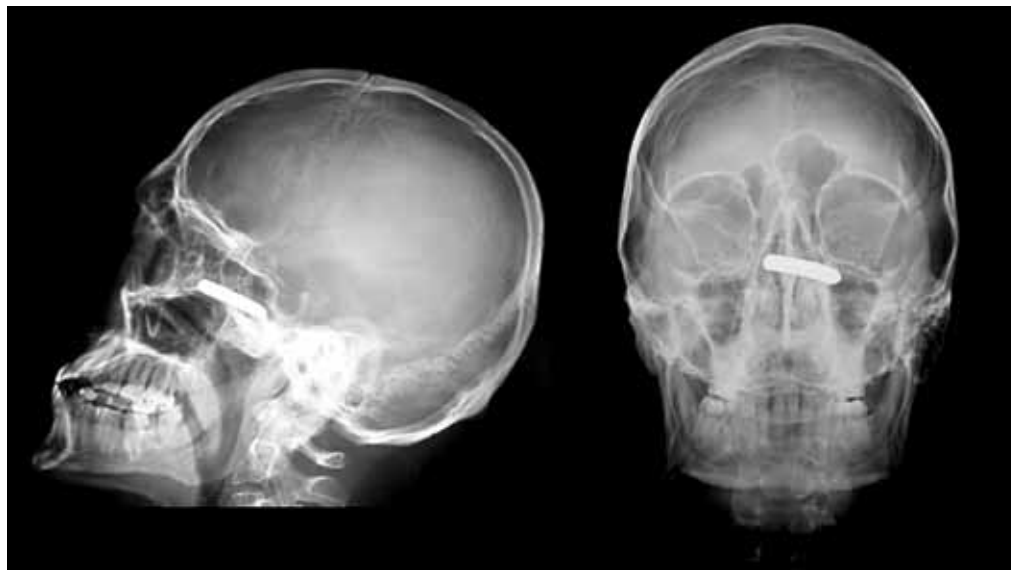

Figure 2. Preoperative lateral and anteroposterior (left to right respectively) x-rays showing a radiopaque foreign body extended into the sphenoid sinus.

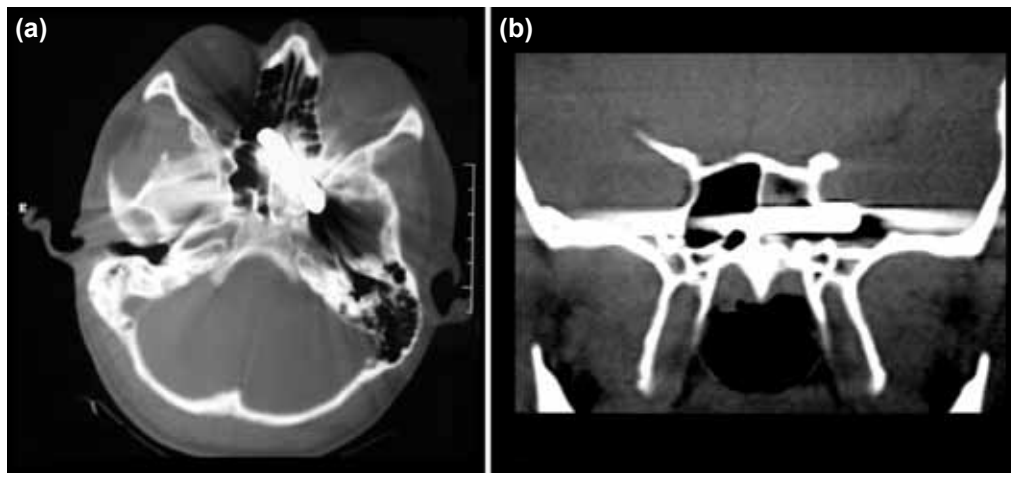

Figure 3. Preoperative axial **(a)** and coronal **(b)** CT scan showing the localization of a probable metallic foreign body.

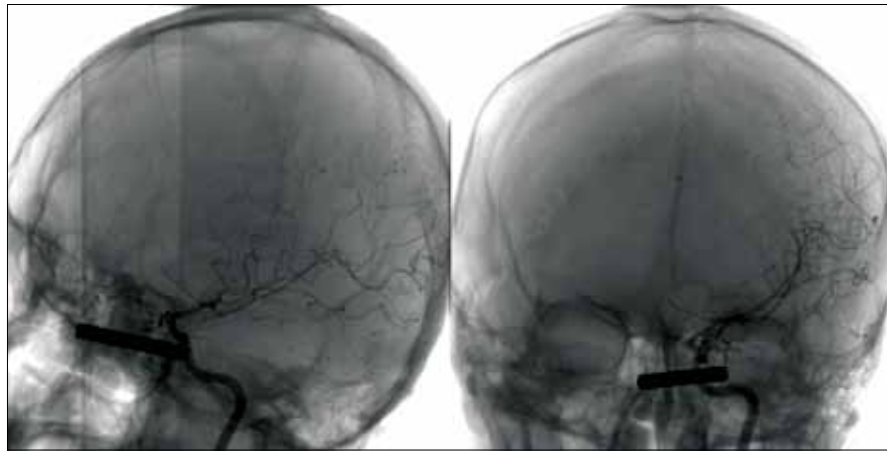

Figure 4. Preoperative DSA images with lateral and anteroposterior projections (left to right respectively) demonstrating the relation of the foreign body with left ICA.

discharged three days after the operation. There were no complications or rhinorrhea after three months of follow up.

DISCUSSION

Foreign bodies in paranasal sinuses are rare. They are found in the frontal and maxillary sinuses relatively more commonly than in the ethmoid and sphenoidal sinuses.[2,6,7] There are only few reported cases involving the sphenoidal sinus.[2] From a literature review, in the majority of cases, the foreign body was made of a metallic substance and was often associated with an orbital and/or maxillofacial trauma.[13] In this case, our patient was exposed to a high-energy orbital trauma and a metallic foreign body penetrated into his sphenoidal sinus and intracranial space.

To diagnose a foreign body of the brain or paranasal sinuses, CT scan is the most useful technique. Locating the exact position of the object and its relationship with nearby vital structures such as the basillary artery and ICA is very important. If the foreign body is not radiopaque, such as bamboo sticks, MRI can be used.[4,11] Digital subtraction angiography (DSA) can also be used to expose potential vascular injury and pseudoaneurysm of ICA or basillary artery. In the present case, cranial and paranasal CT as well as DSA were performed to locate the foreign body and to determine its relationship with the neighboring vital structures.

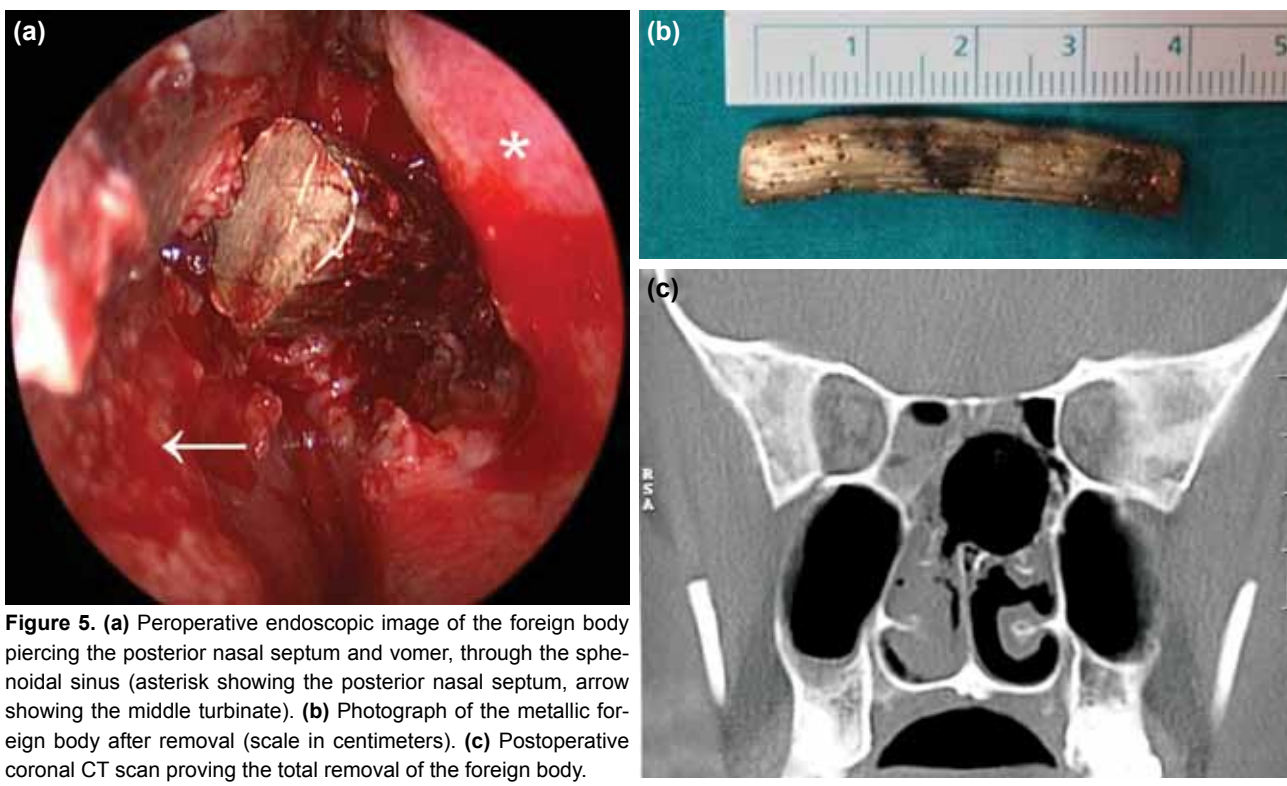

Figure 5. (a) Peroperative endoscopic image of the foreign body piercing the posterior nasal septum and vomer, through the sphenoidal sinus (asterisk showing the posterior nasal septum, arrow showing the middle turbinate). **(b)** Photograph of the metallic foreign body after removal (scale in centimeters). **(c)** Postoperative coronal CT scan proving the total removal of the foreign body.

Intracranial penetrations of foreign bodies can cause sudden intracranial complications such as subarachnoidal or intraparenchymal cerebral hemorrhages, CSF rhinorrhea and pneumocephalus as well as delayed severe complications including meningitis or cerebral abscess.[13] If early and life threatening intracranial complications occur, the foreign body should be removed immediately with an open or endoscopic approach. If the neurological examination is normal without any early intracranial complications, the surgical approach for foreign body removal should be planned after radiological evaluation. All foreign bodies in the paranasal sinuses may serve as an infection nidus.[2] Because of the close relationship between the sphenoidal sinus, optic nerve, cavernous sinus, ICA and other important structures of the skull base, sphenoidal sinusitis secondary to a foreign body may cause catastrophic results.[14,15] For all these reasons, the sphenoidal sinus foreign body must be completely removed.

In this paper, we presented a successful endoscopic endonasal removal of a 4 cm metallic foreign body pierced into the sphenoidal sinus through the orbit that penetrated into the intracranial space.

Surgical technique usded depends on the surgeon's experience. We preferred to use an endoscopic endonasal approach to remove the foreign body from the sphenoidal sinus and to repair the skull base. Endoscopic endonasal technique has some advantages such as direct visualization, good illumination and minimal morbidity as compared to open procedures. Also, skull base reconstruction is easier and more accurate with an endoscopic approach in experienced hands.

In conclusion, sphenoidal sinus foreign body with intracranial extension is uncommon. Because of the potentially serious complications, all foreign bodies in the sphenoidal sinus should be treated. In recent years, with an increasing popularity, an endoscopic endonasal approach is becoming the choice of treatment due to its safe and efficient nature in these clinical events.

Conflict of interest: None declared.

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OLGU SUNUMU - *ÖZET*

İntrakraniyal uzanımı olan sfenoid sinüs içi yabancı cismin endoskopik endonazal tedavisi

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Sfenoid sinüs içi yabancı cisim genellikle kraniyal ve/veya orbital travma ve intrakraniyal lezyonlarla ilişkili olarak görülen çok nadir olaylardır. Biz bu yazıda iş kazası sonrasında gelişen, intrakraniyal uzanımı olan sfenoid sinüs içi metalik yabancı cisim olgusunu sunmaktayız. Yirmi dokuz yaşında erkek hasta sağ orbial travma sonrası kliniğimize gönderildi. Çekilen kafa grafisi ve bilgisayarlı tomografide sol temporal fossaya invazyon gösteren sfenoid sinüs içinde yabancı cisim saptandı. Hasta endoskopik endozal teknikle ameliyat edilerek yabancı cisim çıkartıldı ve defekt bulunan kafa kaidesi çok tabakalı olarak tamir edildi. Ameliyat anında ve sonrasında komplikasyon görülmeyen hastanın üç aylık takiplerinde de sorun yaşanmadı.

Anahtar sözcükler: Endoskopik endonazal; intrakraniyal; sfenoid sinüs; yabancı cisim.

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