

Sphenoid Sinus Injury Leading Pneumocephalus as a Complication of Conventional Septoplasty

Konvansiyonel Septoplasti Komplikasyonu: Pünömosefalusa Yol Açan Sfenoid Sinüs Hasarı

Case Report
Olgu Sunumu

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Abstract

Septoplasty is the most commonly performed operation in otolaryngology. Other than the more common complications such as hemorrhage, septal hematoma and abscess, perforation and postoperative deformities, the surgeon must also be aware of the rare but life-threatening ones such as skull base and intracranial injury, cerebrospinal fluid rhinorrhea, meningitis, pneumocephalus, subarachnoid hemorrhage, intracranial abscess

and cavernous sinus thrombosis. Herein, we present the case of a sphenoid sinus posterior wall injury leading to pneumocephalus as a complication of conventional septoplasty treated with obliteration and a fascia lata graft endoscopically.

Key Words: Cerebrospinal fluid, sphenoid sinus, nasal septum, pneumocephalus

Özet

Septoplasti kulak burun boğaz pratiğinde sıklıkla uygulanan bir ameliyattır. Cerrah daha sıklıkla görülen kanama, septal hematoma ve apse, perforasyon ve postoperatif deformiteler gibi komplikasyonların dışında daha seyrek görülen ve hayatı tehdit eden kafa tabanı ve intrakraniyel hasar, serebrospinal sıvı rinoresi, menenjit, pünömosefalus, subaraknoid kanama, intrakraniyel apse ve kavernoöz sinüs trombozu durumlarına da hazırlıklı ol-

malıdır. Konvansiyonel septoplasti sonrasında pünömosefalus yapan sfenoid sinüs posterior duvar hasarı oluşan bir hastamız ve obliterasyon ve fasya lata greft fasya lata ile endoskopik yolla onarımı sunulacaktır.

Anahtar Kelimeler: Serebrospinal sıvı, sfenoid sinüs, nazal septum, pünömosefalus

Introduction

Septoplasty is one of the most commonly performed operations in otorhinolaryngology practice. Complications, with a rate of 5-60% in different series, are not observed frequently when surgery is performed meticulously with good anatomical knowledge (1).

Septoplasty complications may be divided into two groups, i.e. functional and aesthetic (2). Aesthetic complications are post-septoplasty deformities related to cartilage weakness due to over-resection (saddle nose, widened nasal base, loss of tip projection) or dislocations. Frequent functional operative complications such as hemorrhage, septal hematoma, septal abscess, septal perforations, saddle nose, infection and anosmia have been briefly reported (3). Rare but life-threatening complications include skull base and intracranial injury including traumatic cerebrospinal fluid (CSF) rhinorrhea, meningitis, pneumoencephalus, subarachnoid hemorrhage, subdural abscess, brain abscess, and cavernous sinus thrombosis (4).

known that nasal surgery is one of the most common causes of CSF leakage other than trauma, tumor ablation and paranasal sinus diseases (5). Herein, we report a case of CSF rhinorrhea and pneumocephalus early after conventional septoplasty due to sphenoid sinus posterior wall injury.

Case Presentation

A 28-year-old male patient was referred to our clinic with a blunt headache and vertigo symptoms originated after the removal of nasal packing that was applied after conventional septoplasty surgery. His operation was performed under general anesthesia by one of our junior surgeons two days before the onset of symptoms. It was learned from his records that, during the surgery, bilateral septal mucoperichondrial and mucoperiosteal flaps were elevated and cartilage and bone deviations were corrected by excision. At the end of the surgery, nasal packing was performed formed from two fingers of sterile gloves that were filled with gauze. The operation lasted for about 90 minutes and approximately 300 mL of bleeding was observed.

Although skull base injury and CSF rhinorrhea are uncommon complications of septoplasty, it is

His Glasgow coma score was 15 upon admission. He had no lateralizing sign and had a totally



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normal neurological examination. Blood pressure was 120/80 mmHg, pulse was 60/min and respiration was normal. Complete blood count revealed 13 g/dL hemoglobin, 37.6% hematocrit and 12900/ μ L leucocytes. Nasal endoscopic examination revealed crusting. Pink serous nasal drainage was observed after removal of the crusts. Cranial computed tomography (CT) revealed diffuse pneumocephalus localized at both the supra- and the infra-tentorial levels that was intensely localized at the subdural space of the frontal lobes without any sign of intracranial bleeding (Figure 1a, b). Paranasal CT revealed loss of aeration and air-fluid levels were in the paranasal sinuses. Also, a small bone fragment in the right compartment of the sphenoid sinus and a defect localized at the posterior wall the sinus were observed (Figure 1c). The patient was taken to the operating room immediately to perform an endoscopic examination and CSF fistula repair. In the endoscopy, a bone defect was observed at the sphenoid sinus ostium after blood and mucus drainage was cleared. The fractured bone fragment that was situated in the sinus was removed. A clear bone defect at the posterior wall of

the sphenoid sinus from where pulsatile CSF was draining was observed (Figure 2a-c). It was thought to occur due to chisel trauma during septoplasty. It was sealed off with a fascia graft taken from the temporalis muscle and the sinus was packed with fibrillar surgicel and spongostan. The cessation of the drainage was observed and glove finger nasal packing was applied. An 18F Foley catheter was placed in the nasal passage and filled with 8 mL of H₂O to support the packing. The control cranial CT taken on the fourth postoperative day revealed significant recovery of the pneumocephalus, which was 3 mm thick at the right frontal lobe and 9 mm thick at the left frontal lobe. However, serous nasal drainage was observed after the Foley catheter was removed on the fourth postoperative day and the patient was reoperated to explore the defect. Endoscopic nasal examination revealed CSF leakage from the edge of the temporalis muscle fascia. A graft from the fascia lata was taken, which was placed firmly in the defect; this stopped the leakage (Figure 3a). The middle turbinate was excised and the mucosal flap designed from the turbinate was applied over the fascia lata. The sinus was filled with surgicel and spongostan and glove finger nasal packing was applied with an 18F Foley catheter situated in the nasal passage again. A lumbar drainage catheter was inserted at the end of the operation from which 50 mL of CSF drainage

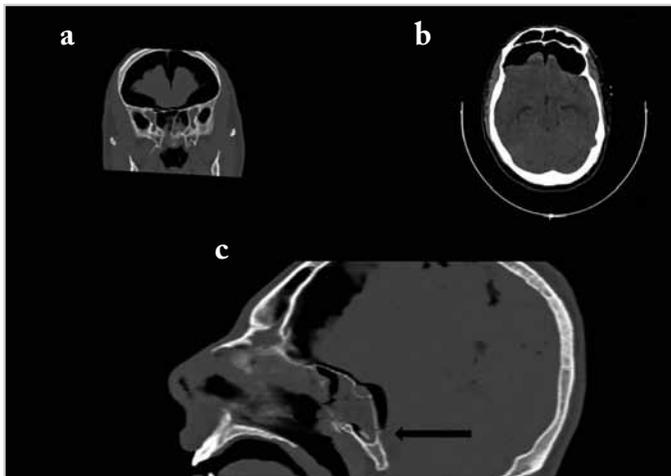


Figure 1.a-c. Coronal and transverse sections from the cranial CT with diffuse pneumocephalus localized at both the supra- and the infra-tentorial levels (a, b), Sagittal section of the paranasal CT revealed a bone defect at the posterior wall of the sphenoid sinus and a bone fragment in the sinus that was localized anterior to the defect (arrow) (c)

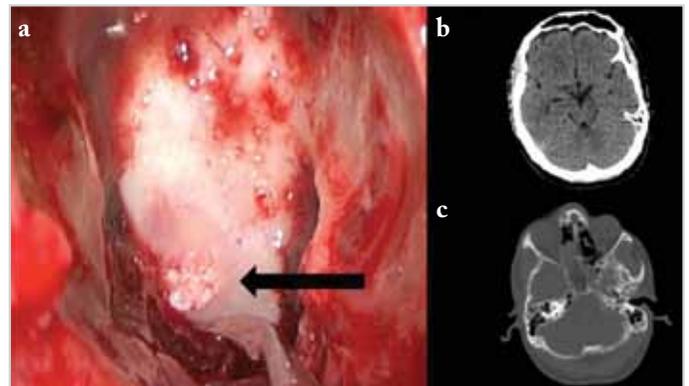


Figure 3. a-c. The defect is obliterated with a fascia lata graft (arrow) (a). Pneumocephalus was totally resorbed after surgery (b). Fascia lata and the turbinate mucosa grafts are observed in the right sphenoid sinus (c)

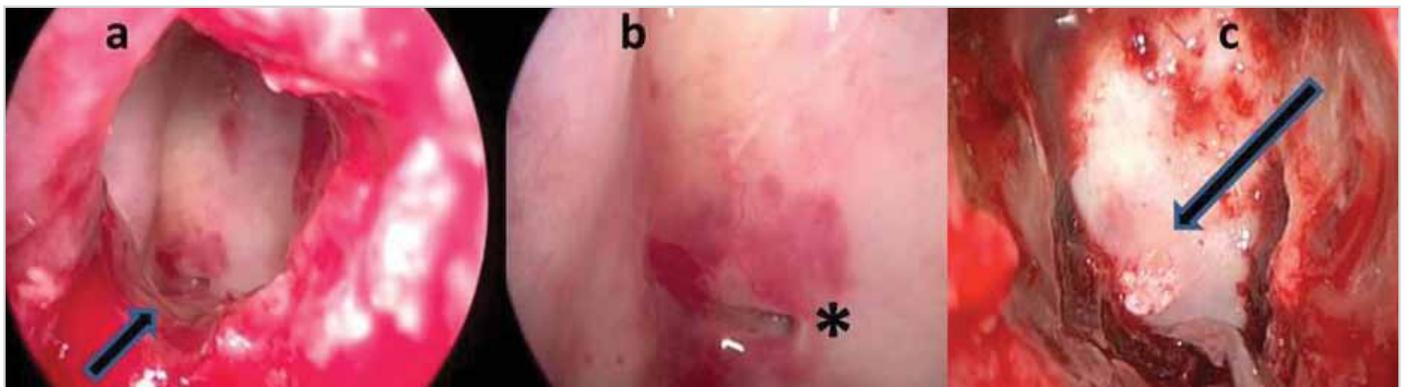


Figure 2. a-c. The defect at the inferolateral part of the posterior wall of the right sphenoid sinus (short arrow) (a). A closer view demonstrating that the defect is located approximately 5 mm medial to the right internal carotid artery (*) (b). Obliterated view with a fascia lata graft (long arrow) (c)

was started three times a day. It was decreased to 30 mL three times a day due to headache and stopped on the fifth postoperative day. After total resorption of the pneumocephalus was observed in his control cranial CT, the nasal Foley catheter was removed (Figure 3b, c). The patient was discharged after no nasal discharge and no headache were observed with total recovery.

Discussion

Septoplasty is a surgery generally performed for the correction of functional and sometimes cosmetic problems. Surgeons should be aware of the symptoms, diagnosis and management of complications of the operation. More common complications of septoplasty are those which cause functional and sometimes cosmetic problems and lead to a decrease in the quality of life of the patient. However, some rare life-threatening complications may be seen after conventional septoplasty, such as rhinorrhea, hemiplegia, tension pneumocephalus, blindness and endocarditis (6-10).

Rhinorrhea is one of the rare but life-threatening complications of septoplasty. Skull base injury due to nasal surgery generally occurs at the lateral lamella, i.e. the junction between the cribriform plate and the ethmoid labyrinth, where the bone is quite thin and the dura is tightly adherent (11). CSF leakage after septoplasty might occur when septal mucoperichondrial elevation is performed beyond the ethmoid roof or perpendicular lamina is fractured, which may cause fracture of the cribriform plate (12). Iatrogenic trauma to the frontal and sphenoid sinuses is more likely to occur due to endoscopic sinus surgery rather than septoplasty (13). This is the first case reported as a sphenoid injury due to septoplasty. A high bony deviation is the reason for manipulation of the bony septum at the inferior part of the skull base. The sphenoid sinus anterior wall is related to the posterior ends of the perpendicular plate of the ethmoid and vomer and may be damaged during the excision of a deviation. The posterior wall of the sphenoid sinus is both thicker and further from the surgical field than the anterior wall, but may be damaged by uncontrolled force.

Avoidance is more important than treatment in traumatic complications of the frontal and sphenoid sinuses. Resections of deviations at these sites should be performed after good exposure is established. Blood or secretions should be cleared appropriately and flaps should be elevated enough for a good view. The instruments must be sharp so as not to break but to cut the bones, and excisions with elevators or chisels should be performed preferably after cutting with scissors.

Early diagnosis of CSF rhinorrhea and immediate management is also important to avoid further problems. Leakage detected during septoplasty should be repaired intraoperatively. The surgeon should be aware of pink serous drainage after nasal packing is removed or a diffuse blunt headache if any risk of skull base trauma exists following surgery such as any traumatic forceful application, excessive bleeding or high septal deviation. Coro-

nal and axial paranasal CT scans or MRI should be performed immediately and samples from the drainage should be tested for β -2 transferrin as soon as possible (1, 14). Meningitis due to ascending infection or encephaloseal formation due to pulsation of the brain will be seen in a later period in the case of a misdiagnosis (15). Also, CSF leakage may be a late symptom of a skull base injury after septoplasty. Pneumocephalus may be the early result of a high output fistula and may lead to rapid deterioration, herniation and death if not managed urgently (8). An otolaryngologist who performs septum or sinus surgery should be wise enough to diagnose and manage CSF leakage. After diagnosis, the patient should be hospitalized and may be given intravenous antibiotics for prophylaxis. If there is only a low output fistula, lumbar drainage may be enough to stop the leakage and regeneration of the defect, but the defect should be obliterated tightly if there is pneumocephalus or persistent CSF leakage, preferably by endoscopically or by the intracranial approach. The patient should be monitored until no drainage is observed when the nasal packing is extracted and all crusts and secretions are appropriately cleared.

Informed consent is also a very important issue for the patient and the surgeon so as to face such frustrating and devastating problems. The patient should not only provide signed informed consent but should also be verbally informed by the surgeon in a language understood by the patient so as not to cause legal or ethical problems. In addition, surgeons should report their experiences on complications to enhance the knowledge of the risks of septoplasty.

Conclusion

Intracranial complications of septoplasty are uncommon but life-threatening. Avoidance can be achieved by a meticulous surgical technique and fine anatomical knowledge. The sphenoid sinus is a potential region for CSF leakage. An acute low output CSF fistula may be controlled with lumbar drainage, but pneumocephalus or high output CSF leakage should be monitored closely and repaired endoscopically as soon as possible. Patients should be properly advised with detailed informed consent.

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