

OLGU BİLDİRİSİ / CASE REPORT

An unusual complication of functional endoscopic sinus surgery: subarachnoid hemorrhage

B. Uslu Coşkun, H. Seven, S. Alkan, M. Çıfci, B. Dadaş

Endoskopik sinüs cerrahisinde ender rastlanan bir komplikasyon: subaraknoid kanama

Son on yıldır, endoskopik sinüs cerrahisi, otolaringolojide en sık uygulanan cerrahilerden biri olmuştur. Bazı intrakraniyal, orbital ve intranasal komplikasyonlar tanımlanmıştır. Majör komplikasyonlar, serebrospinal rinore, kribriform plate ve frontal lob yaralanmaları ve körlüğü kapsamaktadır. Bunlar oldukça ender görülmekte ve tüm komplikasyonların çok küçük bir bölümünü oluşturmaktadır. Biz başka bir klinikte fonksiyonel endoskopik sinüs cerrahisi geçirmiş 33 yaşındaki erkek hastada saptadığımız ender görülen başka bir komplikasyonu sunmaktayız. Endoskopik sinüs cerrahisi sırasında durası zedelenen ve tamir edilen, ancak erken postoperatif dönemde alt ekstremitelerinde parezi oluşunca acil bilgisayarlı tomografi çekilerek subaraknoid kanama geçirdiği anlaşılan hasta bu bulgularla kliniğimize refere edildi. Subaraknoid kanama, serebrospinal sıvı fistülü ve takiben menenjit geçiren hasta genel durumu düzelince serebrospinal sıvı fistülünün tamiri için ameliyata alındı. Fistülü tamir edilen hasta postoperatif 6. günde taburcu edildi. Hastanın 8 aylık takibinde alt ekstremitelerinde tam düzelme saptandı.

Anahtar Sözcükler: FESS komplikasyonu, anterior serebral arter kanaması, subaraknoid kanama, serebrospinal fistül, menenjit.

Abstract

Over the past decade, endoscopic sinus surgery has become one of the most frequently performed operations in otolaryngology. Several intracranial, orbital and intranasal complications have been described. Major complications include cerebrospinal rhinorrhea, cribriform plate injuries, frontal lobe injuries and blindness. These are extremely rare and represent a very small percentage of total complications. We present an unusual case of a 33-year-old white man who underwent functional sinus surgery in another clinic. During the endoscopic sinus surgery dura trauma occurred but was repaired. In the early postoperative period urgent computed tomography was undertaken as the paresis took place at the lower extremities. It was observed that he had subarachnoid hemorrhage due to the injury to anterior cerebral artery, and cerebrospinal fluid fistula with subsequent meningitis. The patient was given general anesthesia for the repair of cerebrospinal fluid fistula when he recovered. The patient was discharged at the 6th postoperative day. His 8th month follow-up revealed full recovery in his lower extremities.

Key Words: FESS complication, anterior cerebral artery hemorrhage, subarachnoid hemorrhage, cerebrospinal fistula, meningitis.

Türk Otolarengoloji Arşivi, 2007; 45(1): 52-57

Turk Arch Otolaryngol, 2007; 45(1): 52-57

Introduction

The dangers of intranasal surgery have been well known since the beginning of this century. In 1912, Mosher stated that "intranasal ethmoidectomy is one of the most dangerous and blindest of all surgical operations".¹ Technological developments and surgical experience in functional endoscopic sinus surgery (FESS) have reduced the risks of surgical procedures, but

Berna Uslu Coşkun, MD; Hüseyin Seven, MD; Seyhan Alkan, MD;
Memet Çıfci, MD; Burhan Dadaş, MD
Department of Otorhinolaryngology, Şişli Etfal Teaching and Research Hospital, Istanbul

some complications secondary to sinus and nasal surgery still occur. Unpleasant events can occur because of anatomic variations, extensive disease and the narrow borders of the sinuses placed between the skull base and orbits. Many of these complications are minor, but there is always a potential for significant morbidity, including blindness, diplopia, cerebrospinal fluid (CSF) fistula with / without meningitis, intracranial brain injury, and hemorrhage from internal carotid artery injury. Most of the disastrous complications are related to ethmoidectomy and frontal sinus surgery.² Intracranial complications can be the worst expectation with the highest morbidity and mortality.

We present a case of subarachnoid hemorrhage due to anterior cerebral artery injury that occurred during endoscopic sinus surgery (ESS), to our knowledge, such a complication has been only reported in a few cases in the literature.^{3,5}

Case Report

A thirty-three year old man with refractory chronic sinusitis and septum deviation had a bilateral functional endoscopic sinus surgery and endoscopic septal surgery six days before application, in an another center

(Figure 1). He subsequently developed left sided focal seizures and the paresis in lower extremities postoperatively. An emergency cranial computed tomography (CT) scan, revealed the presence of a subarachnoid hemorrhage. Afterwards he was referred to our department. The dura trauma is believed to have occurred along with hemorrhage during the surgery. The hemorrhage was stopped with packing and then the dura was immediately repaired. No information available is the method employed to dural repair. The patient was referred to our clinic due to paresis at lower extremities and behavioral changes. When the patient was admitted to our clinic he was sleepy, semi-cooperative, and had paresis at lower extremities. The pupils were both isochoric, had positive bilateral light reflexes and the eye movements were normal. The patient had no facial asymmetry. Our endoscopic study and/or CT examination showed the findings below.

1. Dural dehiscence at the right frontobasal parenchyma of cerebrum was seen
2. Both nasal cavity mucosa were too edematous and fragile. The nasal discharge was colorless and with no smell in his right nasal cavity, and no similar discharge in his left nasal cavity.

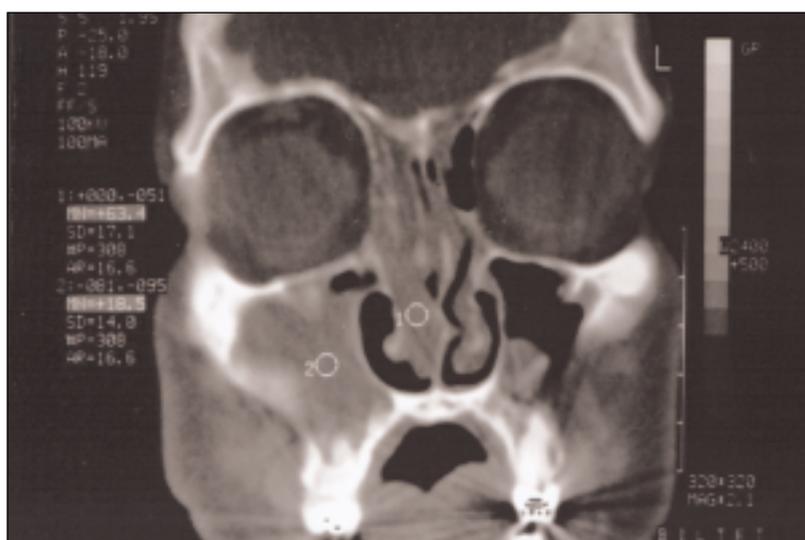


Figure 1. The coronal section of the paranasal sinus CT revealed chronic right maxillary and bilateral ethmoid sinusitis, septal deviation and left maxillary retention cyst.

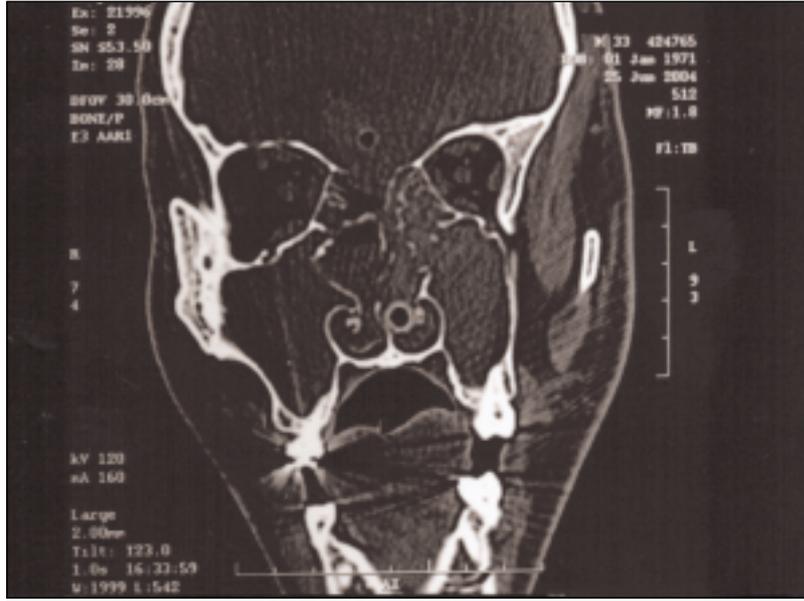


Figure 2. The coronal section of paranasal sinus CT revealed a bone defect in right fovea ethmoidalis and an air image in neural parenchyma.

3. Paranasal sinus CT and cranial magnetic resonance imaging (MRI) were obtained. Paranasal sinus CT revealed a bone defect in right fovea ethmoidalis area

and an image of an air collection in neural parenchyma (Figure 2) A coronal T1 weighted cranial MRI scan revealed, heterogeneous signal areas

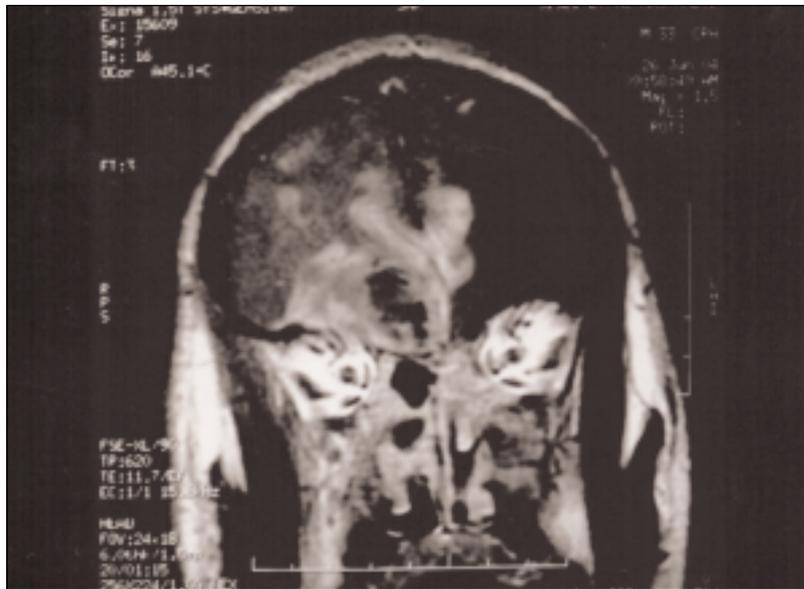


Figure 3. The coronal T1 weighted cranial MRI scan revealed, heterogeneous signal areas containing hypointensive foci due to air-blood changes with round configurations at the right frontobasal parenchyma. There was also a contrast uptake in cortical and subcortical areas at bifrontal sagittal section.

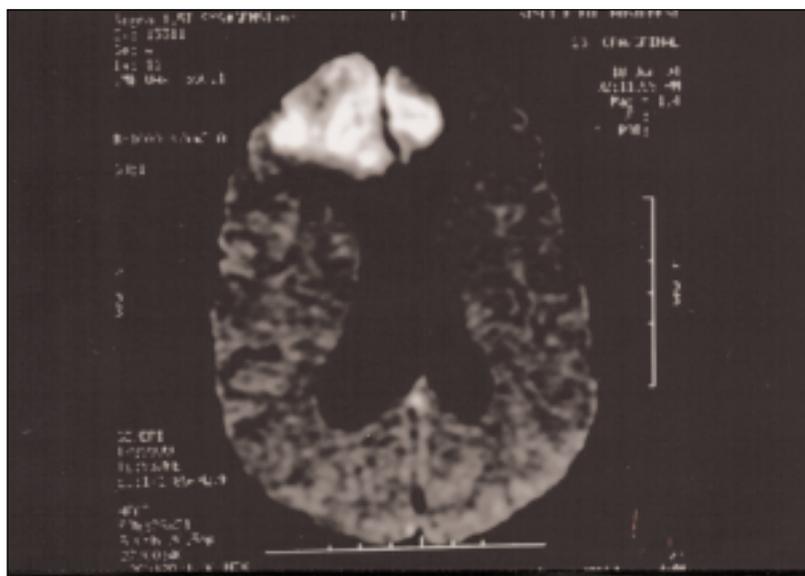


Figure 4. Axial T1 weighted cranial MRI revealed a signal increase with water restriction at both neural parenchyma's prominently at the right area.

containing hypointensive focuses due to air-blood changes with round configurations at the right frontobasal parenchyma. There was a contrast uptake in cortical and subcortical areas at bifrontal sagittal section (Figure 3). Axial T1 weighted cranial MRI revealed a signal increase with water restriction at both neural parenchymas prominently at the right area (Figure 4).

Antiepileptic drugs were given to the patient because of focal seizures. A lumbar subarachnoid drain was inserted for decompression. Two days later patient had a fever and neck stiffness. CSF and blood culture were obtained. The results indicating meningitis. Vancomycin HCl 4x500 mg, meropenem 3x2 g were administered at least two weeks. During the treatment for meningitis, epistaxis from the left nasal cavity was seen. In order to control the epistaxis, epistaxis catheter was inserted to both nasal cavities. CSF leakage appeared to be the cause of meningitis. After controlling epistaxis, and meningitis symptoms regressed, surgery for the CSF leakage repair was planned to be done an endoscopic approach under general anesthesia. Nasal cavity mucosa were too edematous and fragile, the destruction of fovea ethmoidalis, and CSF leak was

seen at the right area intraoperatively. Uncinate process, bulla ethmoidale was excised, and maxillary anrostomy was done in previous operation. Middle turbinate flap was rotated for the closure of the bone defect. Tissucol fibrin glue (Immuno, Vienna, Austria) was used for fixation of the flap. The closure was performed with three layers of conchal bone, mucosa, and gel foam with antibiotic. Lumbar drain was kept in for 7 days. The patient recovered from meningitis and at the 6th postoperative day he was discharged and referred to a rehabilitation center for physical therapy. At the 8th month follow-up visit, it was observed that the patient fully recovered from lower extremities paresis.

Discussion

Complications of ESS have been classified as major and minor. Major complications are being less than 1% in most studies.^{3,4,5} Major complications have been divided as orbital and intracranial. The most common intracranial complication is CSF rhinorrhea (0.5%).^{4,5,6} Meningitis, brain abscess and intracranial hemorrhage are even more rare.^{3,4,5}

Maniglia,⁷ described 3 patients with major intracranial complications; two with cribriform plate damage, one with damage to the anterior cerebral artery. The roof of ethmoid is particularly thin and vulnerable at the attachment point of the vertical bony shelf of the middle turbinate. Similarly, in the medial ethmoid sinus, the bony roof is thin and the dura may be adherent. Minimal trauma in this area may cause bleeding of the intradural meningeal branches or bleeding of subarachnoid branches of the anterior cerebral artery.⁸ In our case the patient who underwent FESS in another center referred to us, the further diagnosis was anterior cerebral artery hemorrhage as a complication of operation.

Iatrogenic trauma causing communication between the intracranial content and the nasal cavity, remains to be the most common cause of CSF rhinorrhea. Failure to appreciate the anatomic landmarks, the presence of space occupying lesions, previous surgery and anatomic variations may increase the risk of a CSF fistula during endoscopic sinus surgery. If the CSF leak is noted intraoperatively, repair should be undertaken at once. When it is repaired intraoperatively, there is more reduced morbidity associated with it.⁹ But when the CSF leak and the major vessels injury happen at the same time, it is difficult to repair it because of loss of the vision due to the hemorrhage. In our case it is thought that at previous operation the repair was not effective because of hemorrhage.

Intracranial bleeding noticed intraoperatively caused by damage to the internal carotid artery or to the anterior cerebral artery requires surgical packing and neurosurgical consultation with likely immediate anterior craniotomy. A neuroradiologist may help limit blood loss and prolong the patient's life by passing a balloon for intravascular tamponade. Entrance through the cribriform plate into the brain may cause frontal lobe syndrome involving loss of memory, forgetfulness and behavioral changes. In this patient, surgical packing stopped bleeding without the need of craniotomy. If couldn't, an intravascular tamponade, or anterior craniotomy should be performed.

Frontal lobe syndrome and paresis at the lower extremities were seen in the patient due to the injury to anterior cerebral artery by the entrance through the cribriform plate into the brain. It was postulated that the extensive disease distorted the anatomy and also facilitated the penetration as the medial skull base roof is thin. Berenholz et al⁸ presented a case of CSF fistula and subarachnoid hemorrhage using powered instrumentation for FESS.

CSF fistula may be more likely to occur when sinus surgery is performed under general anesthesia. General anesthesia prevents the patient from experiencing pain when the ethmoid, cribriform or skull base were encountered or compromised.¹⁰

Subarachnoid hemorrhage was the result of bleeding from subarachnoid branches of the anterior cerebral artery. Surgical repair may be accomplished through a frontal craniotomy, an external ethmoidectomy or transnasally. We performed CSF repair transnasally with endoscopic route one week after the initial FESS. We used middle turbinate mucosa and bone to patch the fistula. There are other types of tissues like fascia, muscle, septal mucosa, fat and fascia lata that can be used to patch the fistula. We used lumbar spinal drain to reduce the CSF pressure and preserve the position of the graft. The patient was discharged on his 15th postoperative day from the hospital.

In conclusion, we have seen 3 major complications; subarachnoid hemorrhage, meningitis and CSF fistula in a single patient who underwent FESS for chronic sinusitis. Fortunately he was fully recovered without any sequelae. Comprehensive investigations should be applied to evaluate the extensive diseases, anatomic variations, and powered instrumentations should be used. The surgeon must be well trained to fully understand to the shape and location of ethmoidal sinuses and surrounding structure, before he or she starts practicing surgery on patients

References

1. Ramadan HH, Allen GC. Complications of endoscopic sinus surgery in a residency training program. *Laryngoscope* 1995; 105: 376-9.
2. Schnipper D, Spiegel JH. Management of intracranial complications of sinus surgery. *Otolaryngol Clin North Am* 2004; 37: 453-72.

3. **Vleming M, Middleweerd RJ, de Vries N.** Complications of endoscopic sinus surgery. *Arch Otolaryngol Head Neck Surg* 1992; 118: 617-23.
4. **May M, Levine HL, Mester SJ, Schaitkin B.** Complications of endoscopic sinus surgery: analysis of 2108 patients- incidence and prevention. *Laryngoscope* 1994; 104: 1080-3.
5. **Maniglia AJ.** Fatal and major complications secondary to nasal and sinus surgery. *Laryngoscope* 1989; 99: 276-83.
6. **Kennedy DW, Shaman P, Han W, Selman H, Deems DA, Lanza DC.** Complications of ethmoidectomy: a survey of fellows of the American Academy of Otolaryngology - Head and Neck Surgery. *Otolaryngol Head Neck Surg* 1994; 111: 589-99.
7. **Maniglia AJ.** Fatal and other major complications of endoscopic sinus surgery. *Laryngoscope* 1991; 101: 349-54.
8. **Berenholz L, Kessler A, Sarfaty S, Segal S.** Subarachnoid hemorrhage: a complication of endoscopic sinus surgery using powered instrumentation. *Otolaryngol Head Neck Surg* 1999; 121: 665-7.
9. **Hegazy HM, Carrau RL, Snyderman CH, Kassam A, Zweig J.** Transnasal endoscopic repair of cerebrospinal rhinorrhea: a meta-analysis. *Laryngoscope* 2000; 110: 1166-72.
10. **Stankiewicz JA.** Cerebrospinal fluid fistula and endoscopic sinus surgery. *Laryngoscope* 1991; 101: 250-6.

Conflict of interest statement:

No conflicts declared.

Correspondence: Berna Uslu Coşkun, MD

Adnan Saygun Cad. Kelaynak Sok.
Kibele Sit 10/1 Ulus 34340 Istanbul-TURKEY
Phone: + 90 212 282 98 89
Fax: +90 212 278 66 48
e-mail: bernauslu@gmail.com