# Large Decompressive Craniotomy for Acute Subdural Empyema in Elderly: Case Report

## Yaşlılarda Görülen Akut Subdural Ampiyem İçin Büyük Dekompresif Kraniyotomi

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**ABSTRACT** Subdural empyema is an uncommon but serious complication of sinusitis with rare occurrence in the elderly. The use of advanced imaging modalities, aggressive neurosurgical interventions and modern antibiotic regimens are still not very effective in controlling the disease and this severe condition is still responsible for significant morbidity and mortality among the patients suffering from sinusitis. We report an elderly case of frontal sinusitis-associated acute subdural empyema with brain edema, associated mass effect. Emergency large decompressive frontoparietal craniotomy was performed and subdural empyema was evacuated. Meropenem intravenous and vancomycin intravenous had been given to patient for 21 days. The patient eventually was discharged from hospital. Immediate attention and high degree of suspicion is critical. Early diagnosis with aggressive medical and surgical management can lead to reduce subsequent morbidity and mortality.

**Key Words:** Empyema, subdural; paranasal sinuses; therapy

**ÖZET** Subdural ampiyem yaşlılarda görülen, sinüzitin oldukça nadir, fakat ciddi bir komplikasyonudur. İleri görüntüleme modaliteleri, agresif beyin cerrahi girişimleri ve modern antibiyotik rejimlerinin kullanılması hastalığın kontrolünde etkin değildir ve bu ciddi durum sinüzit yakınması olan kişiler arasında önemli morbidite ve mortalite nedenidir. Bu çalışmada, sinüzitle ilişkili subdural ampiyemin neden olduğu beyin ödemi ve kitle gözlenen yaşlı bir erkek olgu sunulmaktadır. Acil, oldukça geniş frontopariyetal kraniyotomi yapılarak subdural ampiyem boşaltıldı. Hastaya 21 gün süreyle vankomisin ve intravenöz meropenem tedavisi verildi. Olgumuz sonuçta hastaneden taburcu edildi. Dikkatli davranmak ve yüksek oranda şüpheci olmak oldukça kritiktir. Erken tanı, agresif medikal ve cerrahi yaklaşım olgumuzda olduğu gibi morbidite ve mortalite oranını düşürecektir.

**Anahtar Kelimeler:** Ampiyem, subdural; paranasal sinüsler; tedavi

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Subdural empyema (SDE) is an uncommon complication of paranasal sinusitis and accounts for 15% to 25% of pyogenic intracranial infections.[1-4] Infection of the frontal sinuses is most commonly associated with devolopment of sinogenic intracranial complications, particularly subdural empyema.[5] Despite improvements in broad-spectrum antibiotics regimens, paranasal sinusitis lead to serious and potentially life-threatening complications. Immediate attention and high degree of suspicions are critical for the effective treatment of subdural empyema and controlling its detrimental complications. Altough suppurative intracranial infection of si-

nusitis in elderly is rare, the mortality and morbidity remain high. This is one of the most imperative neurosurgical emergencies.[3] Therefore, a high index of suspicion is necessary to identfy and treat these serious complication appropriately. The management of SDE involves aggressive neurosurgical and otolaryngological intervention and also high-dose intravenous antibiotics. Otherwise, the clinical course of SDE can rapidly become fatal. Here we presented a case of subdural empyema complicating sinusitis otherwise a healthy adult.

## CASE REPORT

A 70-year-old right handed man admitted to the emergency department because of fever, seizure and lethargy. The patient was well until 5 days before admission when he complained of headache, fever and feeling poorly. He had been diagnosed on the first day of his illness with headache secondary to a viral upper respiratory infection and sent home with medication. His headache didn't recover with medication and he applied again our clinic for out-patient with more severe headache. Magnetic resonance imaging (MRI) scan was obtained and revealed that right sided frontal lesion including air with contrast-enhanced capsule (Figure 1 a-b). The patient's past medical history was significant for rhinosinusitis but was otherwise unnotable. On physical examination, the vital signs were: temperature 39.0°C, pulse 130 beats/min, respiration 30 breaths/min and blood pressure 90/60 mmHg. The ears were clear but the examination of throat showed postnasal suppurative flow (exudation). There was neck stiffness. In the emergency department his Glaskow Coma Scale (GCS) score was 8/15. Right pupil was dilated and unreactived to light. He could just locate to pain stimulus with his left arm and leg. Because of the deteriorating patient's course, he was intubated and transferred to the neurosurgical intensive care unit for further management. Ceftriacson sodium and metronidazol were started as empiric therapy for sinusitis with possible meningitis. The patient's seizures were treated with phenytoin.

Computerized tomographic (CT) scan of the brain showed 1.2 cm right sided frontoparietal subdural fluid collection with brain edema, associated mass effect (Figure 2). He was taken to operating room for large decompressive frontoparietal craniotomy and a large subdural empyema was evacuated. The patient also underwent endoscopic bilateral frontal sinusotomies and bilateral anterior ethmoidectomy. The postoperative course was uneventful but after five days of surgery, control CT

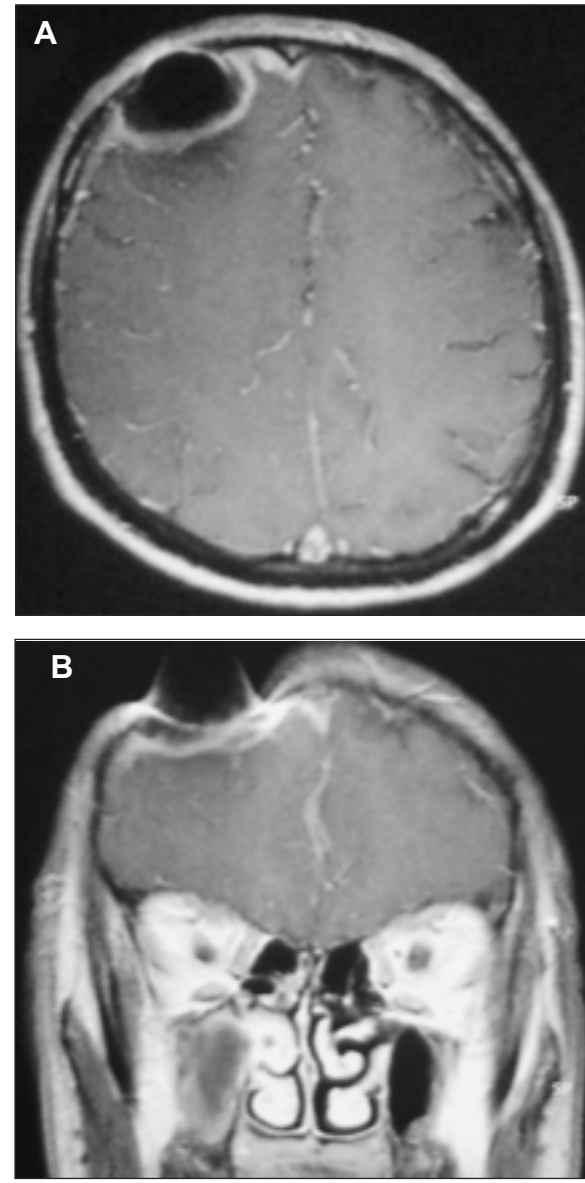


**FIGURE 1: (A)** T1-weighted axial MRI scan demonstrated right sided frontal capsular lesion. The capsule is enhancing with gadolinium and involving air intensity leading anaerobic enfection, **(B)** T1-weighted coronal MRI scan with contrast demonstrated as if this abscess formation is destructive and destroying right frontal bone. On the other hand, there is no such like finding either CT scan or operation.

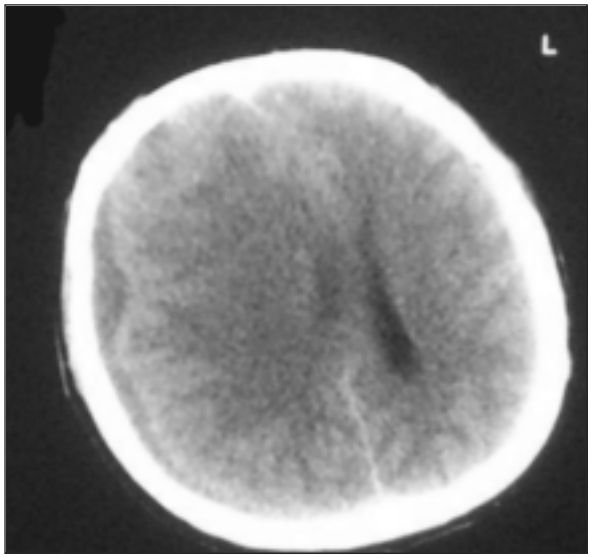

**FIGURE 2:** An axial head CT without contrast showing right sided frontoparietal fluid collection consistent with subdural empyema.

scan showed new right sided occipital collection consistent with subdural puss with mass effect. The patient again operated and new subdural empyema was evacuated. Later microbiology tests on the empyema fluid revealed anaerobic gram-possitive cocci. The antibiotic regimen was changed to meropenem and vancomycin.

The patient eventually was discharged from hospital 90 days after admission. Six months later, he was able to walk and was independent in his activites of daily living. There was no subdural collection on control MRI scan obtained six months later (Figure 3).

## DISCUSSION

Bacterial rhinosinusitis are common and resolves without sequeale in the majority of cases. Suppurative complications such as meningitis, epidural abscess, subdural empyema, intracerebral abscess, cavernous sinus or thrombosis of other sinuses can occur.[2,6] SDE is still a severe pathology and is also very uncommon sinus-associated intracranial infection particularly in the aged.[7,8] In the patient hospitalised with sinusitis, reported rate of intracranial complications varies from 3.7%-47.6%.[7,9] Infection of the frontal sinuses is most commonly associated with development of sinogenic intracranial complication followed by the ethmoid, sphenoid and maxillary sinuses, particularly subdural empyema.[6,10] The pathogenesis of sinogenic intracranial complications include two major mechanism: direct extension of infection and retrograd thoromboflebitis via the valveless diploe veins.[2] The close proximity of the sinuses to the intracranial cavity allows direct dissemination of infection to bone and subsequent erosion in to the epidural space. Immediately after, there is further penetration of pus through the dura to subdural space. Tromhophlebitis that begins in the veins draining the sinuses can pass retrograde in to cavernous sinus and other dural venous sinus. These veins are valveless. Retrograde thromboflebitis is facilitated by shared venous draniage of the sinuses and intracranial structures. If infection reaches to subdural space, pus can spread rapidly and widely over the convexities of the brain because of the absence of septations.

Most complicated sinusitis occurs in young men in the second or third decade of life, often with no underlying medical problems[9,11] because of high vascularity of diploic system in this age group.[7] For this older man in the eight decade of his life pathogenesis of SDE is probably direct extension of enfection to the subdural space. An epidural

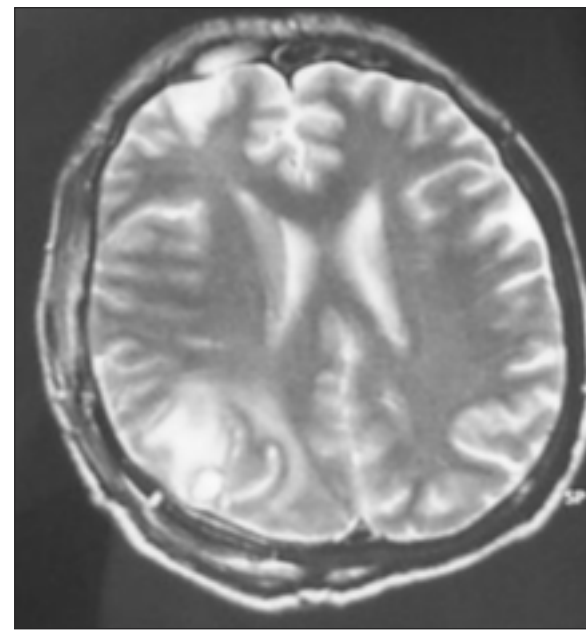

**FIGURE 3:** T2-weighted MRI scan obtained six months later after the operation showing postoperative changes without subdural collection or abscess.

empyema may occur in association with osteomyelitis of the posterior paranasal sinus wall and subdural empyema could develop simultaneously or subsequently as a second event.

Surgical management of subdural empyema is an absolute requirement of therapy and should be done as much as urgently. The aims of surgical intervention are decompression of brain, diminished intracranial pressure and prompt evacuation of pus. Consequently, cortical damage and subsequent neurologic deficit could be avoided. Large decompressive craniectomies are more beneficial than burrholes.[12,13] In addition to drainage of intracranial purulence, definitive management of the infected sinuses should be done, preferably at the same time as empyema drainage. The choice of surgical approach depends on the involved sinus. The development of endoscopic sinus surgery had made this the most popular otolaryngologic intervention in rhinosinusitis associated infection in recent years. Management of frontal sinus disease consisted of frontal trephination, cranilization of frontal sinuses or endoscopic frontal sinusotomy.[1,3,6]

In conclusion, despite improvements in broad-spectrum antibiotics regimens, paranasal sinusitis lead to serious and potentially life-threatening complications. Immediate attention and high degree of suspicion is critical. Early diagnosis with aggressive medical and surgical management can lead to reduce subsequent morbidity and mortality. A multidisciplinary team approach involving the neurosurgeon, otolaryngologist, anesthetist, and infectious disease physician offer a favourable outcome with no mortality.

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