Odontogenic Pansinusitis Complicated by Orbital Cellulitis, Epidural Empyema and Intracerebral Abscess of Fronto-basal Region: Case Report

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Abstract

Sinusitis is a relatively common problem, which still can be complicated by intracranial and orbital involvement. Intracranial abscesses are uncommon, serious, neurological condition associated with significant morbidity and mortality. A case report of sinusitis, complicated by orbital cellulitis, epidural empyema and intracerebral abscess is presented. The patient was successfully treated by emergency surgical intervention including Caldwell-Luke sinusotomy with perforation of the roof of maxillary sinus, ethmoidotomy, left sided lateral supraorbital craniotomy with perforation of the orbital roof, accompanied by parenteral antibiotic administration and tight postoperative observations by CT monitoring.

Keywords: Complicated sinusitis; Orbital cellulitis; Epidural empyema; Intracerebral abscess

Introduction

Sinusitis is a relatively common problem, which still can be complicated by intracranial and orbital involvement. Intracranial abscesses are uncommon, serious, neurological conditions associated with significant morbidity and mortality [1]. These include brain abscess and subdural or epidural emyepemas and are classified according to the anatomical location or the etiologic agent [2]. Subdural and epidural empyemas accounting for approximately 20-33% of all intracranial infections [3]. The majority occur in the setting of sinusitis, have a fulminant clinical course, and require prompt diagnosis and emergent neurosurgical intervention [4-6]. Dental infection as a cause of epidural abscess is rare compared to other forms of intracranial suppurations [7]. Morbidity and mortality are minimized by early diagnosis, which is best made using computed tomography scanning, and proper therapy, which consists of surgical drainage and administration of appropriate antimicrobials [8].

Case Report

A 22-year-old female was referred to the department of ENT and Maxillofacial Surgery of “Heratsy” №1 University Hospital on December 2013 with severe edema of the left eyelid, inability to open the left eye, headache and high grade fever within the last three days. She gave a history of recurrent episodes of headaches with left-sided foul smelling anterior nasal discharge of yellowish color for 2 years duration following the left upper second molar endodontic treatment. 3 months prior to admission she had a toothache from the same tooth. On clinical examination there was a left- sided exofthalm with severe upper eyelid edema, conjuctival congestion and chemosis (Figure 1). Movements of left eyelid were restricted in all directions, but visual acuity was within normal limits. Diffuse swelling of left fronto-temporal and buccal region was present and left frontal, ethmoid and maxillary sinuses were tender on palpation. There were no signs of meningeal irritation or any neurological deficits. Initial blood analyses showed no pathological changes. CT scan of PNS showed left-sided pansinusitis (Figure 2).

Emergent the Caldwell -Luc sinusotomy with ethmoidotomy was performed. There were significant number of polyps and very foul smelling pus in maxillary and ethmoidal sinuses. After cleaning of sinuses a small perforation approximately 6-7 mm in diameter was performed in upper wall of the maxillary sinus in projection of retrobulbar area for evacuation of the pus. The causative tooth was extracted. Active irrigation with anti-septics (Betadine, Dioxide) was performed and wide drainage tube was placed in maxillary sinus without suturing. Empirical antibacterial treatment was initiated with Ceftriaxone and Metronidazol.

Figure 1: Appearance of the patient before treatment.
In second POD a follow-up CT scan was performed (Figure 3a-c). A ring enhancing extra-axial mass of the left frontal lobe with the dimensions of 3.4 x 2.5 cm with central necrosis and surrounding edema was observed on axial cut (Figure 3a). Retrobulbar and suprabulbar hypodense lesion with density of 15-20HU was seen on axial and coronal planes, which was causing significant massive exophthalmos and destruction of the upper border of orbital roof (Figure 3b and c). Destruction of the orbital roof was also noted (Figure 3b).

At the same day the left sided lateral supraorbital craniotomy was performed by neurosurgeons to reach the left orbital roof, frontal sinus and frontobasal region of the brain. The patient was positioned supine. The head was turned 30° to the right with minimal flexion, and was fixed with a three- pins Mayfield head frame. A curvilinear incision was made behind the hairline. The skin was opened in one layer fashion (skin-galea-pericranium-muscle) and was retracted with 3 spring hooks. The bone flap was measured 4-5 cm x 3 cm. The epidural empyema was washed, and the supraorbital abscess was removed through a bur hole placed on the roof of the left orbit. The left frontal sinus was opened widely, cleaned with curettes, and closed with bone wax to prevent a possible liquorrhea. The dura of the left frontobasal region was opened, and the brain abscess was removed and drained (Figure 4).
Figure 3: CT of the head (coronal and axial planes) left frontal lobe ring-enhancing extraxial lesion of the left frontal lobe (3.4 x 2.5 cm) with central necrosis and surrounding edema (a), retrobulbar and suprabulbar hypodense mass with density of 15-20HU is seen in axial and coronal cuts (b), which causes massive exophthalmos and destruction of the upper border of the roof of the orbit (c).
Cultures of the fluid collected from maxillary sinus and epidural empyema fluid revealed the growth of Streptococcus spp. The medication was changed to intra-venous Moxitec 400 mg q.d., Metronidazole 500 mg t.i.d., Fraxiparin 0.3 q.d subcutaneously and enhanced detoxication therapy (0.9% NaCl, 4% KCL, Iono-tech etc.).

Irrigation of maxillary sinus t.i.d. was performed through the drainage tube of placed inside maxillary sinus. 3% Hydrogen peroxide, Dioxidine, 0.12 % Chlorhexidine gluconate were used for irrigation purposes. Moxicin eye drops was used 5 times per day and Solcoseril eye gel 3 t.i.d.. This regimen was maintained for 1 week. Beginning from the second week Moxitec and Metronidazole were discontinued and Sulfperazone was prescribed b.i.d. with Mannitol q.d. intravenously for 3 weeks. Periodically blood analysis were performed with monitoring of the sodium and potassium. Gradual clinical and radiological improvement was observed. On 15-th POD oro-maxillary communication was closed by suturing.

Lesion dynamics and postoperative brain edema, which was strongly pronounced within first two postoperative weeks due to encephalitis were monitored weekly using CT (Figure 5a and b). Follow up examinations revealed a gradual reduction of edema’s size until its resolution in 8 weeks following the admission (Figure 6a-c).

At the end of 8 weeks the patient was discharged. External examination was showing a slight asymmetry because of the left upper eyelid residual edema (Figure 7). The patient has no complains, neurological deficits or visual problems.

Discussion

Sinusitis is a relatively common problem encountered by an otorhinolaryngologist. Despite the advent of newer antibiotics, diagnostic procedures and recent advances in management, it still precipitates with life-threatening intracranial complications [4,9]. The suppurative complications of sinusitis can be divided into intracranial and orbital. Orbital complications include preseptal cellulitis, orbital cellulitis with/without abscess formation and cavernous sinus thrombosis [10]. They present with periorbital oedema, chemosis, visual loss, restricted eye movements, and proptosis. Therefore, urgent surgical debridement and drainage is a critical step in the management of these cases.
movement, and proptosis. The latter three findings help to differentiate orbital infections from preseptal cellulitis, which is confined to structures anterior to the orbit [11]. Orbital complications of sinusitis and intracranial infection coexist in up to 45% of cases. Therefore, patients exhibiting orbital signs should undergo cranial imaging [12]. Intracranial complications of paranasal sinusitis constitute true surgical and medical emergencies [13]. Morbidity and mortality are minimized by early diagnosis, which is best made with computed tomography scanning, and proper therapy, which consists of surgical drainage and administration of appropriate antimicrobials [8]. The

Figure 6: CT of the head (coronal and axial planes): decreased in size of encephalomalatia (a, b), absence of exophthalmos signs (c).
brain abscess. Up to 40% of patients have a normal peripheral white 
choice in diagnosis and monitoring of treatment [19].

radiologic tests: computed tomography or magnetic resonance are tests of 
multiple abscesses develop. Headache is the most common symptom. The 
from local sites or blood-borne from distal sites. In 10-15% of cases 
three times, and morbidity rate is highest in fourth decade of the life. The 
nervous system. This condition is more common among men—twice to 

Subdural empyema, however, is much more strongly associated 
with underlying sinusitis and is also the most common sinusitis-
associated intracranial infection [13].

Epidural empyemas tends to remain localized within the extradural 
space. It can be recognized on noncontrast CT scans as a lens-shaped 
lesion of low density adjacent to the inner plane of the skull. The skull 
may show evidence of prior trauma or surgery, focal osteomyelitis, or 
permeation by infection. Contrast-enhanced CT shows enhancement 
of the inner dural layer of the collection. Mass effect with effacement 
of sulci, ventricular compression, and ventricular displacement may be 
present [16].

Most symptoms are a result of the size and location of the space-
occupying lesion or lesions.

The triad of fever, headache (often severe with lateralization towards 
the side of the abscess), and focal neurological deficit occurs in less than 
half of patients. It is important to note that fever is absent in over 50% of 
patients with brain abscess at the time of the initial presentation [17,18].

Brain abscess is one of the most serious diseases of the central 
nervous system. This condition is more common among men—twice to 
three times, and morbidity rate is highest in fourth decade of the life. The 
development of the brain abscess can result from the spread of infection 
from local sites or blood-borne from distal sites. In 10-15% of cases 
multiple abscesses develop. Headache is the most common symptom. The 
radiologic tests: computed tomography or magnetic resonance are tests of 
choice in diagnosis and monitoring of treatment [19].

Routine laboratory studies are not helpful for the diagnosis of 
brain abscess. Up to 40% of patients have a normal peripheral white 
blood cell count. Acute-phase reactants are moderately helpful but 
nonspecific [20].

Decision about therapeutic methods depends on number, size 
and localization of lesions and patient’s condition. In conservative 
treatment empirical antibiotic therapy and supportive treatment 
are used. Currently two methods of surgical treatment are used: CT-
guided stereotactic aspiration and evacuation of the brain abscess by 
craniotomy [19,21-23].

Once an abscess has formed, Surgical excision or drainage combined 
with prolonged antibacterial therapy (usually 4-8 weeks) remains the 
treatment of choice. Some neurosurgeons advocate complete evacuation 
of the abscess, while others advocate repeated aspirations as indicated 
[22]. Small abscesses and lesions in the stage of cerebritis respond well 
to medical therapy alone [24]. However, emergency surgical drainage of 
the epidural abscess or subdural empyema and any underlying sinusitis 
should be done [9]. Weekly or biweekly CT scans to monitor the size of 
the abscess are, however, mandatory following aspiration, and repeated 
aspirations may be required [25] Craniotomy is also recommended 
for multiloculated abscesses and larger lesions with significant mass 
effect that are superficial and located in noneloquent regions of the brain 
[21,26]. The goals of surgical intervention are decompression of 
brain and complete evacuation of pus. Vision impairment, as well as 
worsening of periorbital erythema or edema, propptosis and restriction 
of eye movement and lack of response to an initial trial of appropriate 
antibiotics is absolute indications for surgical drainage. The route of 
surgical drainage is determinate by localization of the orbital 
abscess. Endoscopic orbital decompression or external approach can 
be employed. In addition, definitive management of infected sinuses 
should be done preferably at the same time [11,27].

When the predisposing condition is a contiguous focus of infection, 
such as paranasal sinusitis, otitis media, or dental abscess infection, it 
is usually polymicrobial (>50%-60% of cases), particularly if culture 
specimens from the brain abscess are cultured optimally on anaerobic 
media. Aerobic streptococci, staphylococci, gram-negative organisms, 
and anaerobic organisms, including anaerobics and microaerophilic streptococci have been reported as the causative agents [28].

Initial empiric antimicrobial therapy should be based on the 
expected etiologic agents according to the likely predisposing 
conditions, the primary infection source, and the presumed 
pathogenesis of abscess formation. When abscess specimens are 
available, staining of the material can help guide in selection of medical 
therapy. Whenever proper cultures are taken and organisms are isolated 
and their susceptibility is determined, the initial empiric therapy can be 
adjusted to specifically treat the isolated bacteria [26].

Third generation cephalosporins and metronidazole offers broad 
coverage and good brain-blood barrier and abscess penetration [9]. If 
adjacent osteomyelitis is present, prolonged intravenous therapy for a 
mimum duration of 6 to 8 weeks should be considered [13].

If not recognized early, both epidural empyema and brain abscess 
can be fatal. A delay in surgical drainage and decompression can be 
associated with high morbidity and mortality.

Conclusion

Paranasal sinusitis can on rare occasions lead to serious, potentially 
life-threatening orbital and intracranial complications. Early diagnosis 
with aggressive medical and surgical management can lead to improved 
outcome. We present a case of odontogenic pansinusitis, complicated 
with orbital cellulitis, epidural empyema and brain abscess, which 
was successfully treated by emergency surgical intervention including 
sinusotomy and craniotomy accompanied by parenteral antibiotic 
administration and careful postoperative CT monitoring.
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