

CASE REPORT

Late diagnosis of odontogenic sinusitis with near-fatal outcome – a case report

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Key Clinical Message

Subdural empyema is a rare but potentially life-threatening complication to sinusitis. Awareness of infection and early diagnosis is of the essence when dealing with a putatively immunosuppressed patient. Furthermore, patients at increased risk of infections due to immunosuppression need to be fully informed of risks associated with their treatment.

Keywords

Early diagnosis, immunosuppression, sinusitis, subdural empyema.

Introduction

Subdural empyema is a rare but potentially life-threatening complication to sinusitis. Therefore, action must be taken immediately to diagnose and treat such intracranial complications before irreversible tissue damage has occurred, and both physicians and patients at putative risk should be aware.

Here, a case of sinusitis originating from an odontogenic focus leading to severe subdural empyema with subsequent neurological sequelae is presented.

Case Report

A 45-year-old man was admitted to the ophthalmological department with a periorbital swelling so severe it disabled him to open his left eye. The swelling and a headache had been building up for 4 days upon admission. The patient had no previous history of sinus problems. He was overweight (BMI = 28), without any known diabetes, was a smoker, and was undergoing treatment for rheumatoid arthritis (RA); methotrexate tablets (25 mg/week).

At the time of admission the patient was febrile (38.7°C) and his state of consciousness was moderately affected.

On inspection the oral cavity showed a normal mucosa and no dental abnormalities were noted. The left periorbital region showed massive swelling; the skin was warm, red, and sore; and the left pupil was vaguely responsive equaling a small relative afferent pupillary defect. The vital signs were as follows: pulse, 103 beats/min; respiration, 16 breaths/min; blood pressure, 118/71 mmHg; hemoglobin, 7.3 gm/dL; white blood cell count, $18.5 \times 10^9/L$; neutrophils, $15.6 \times 10^9/L$; C-reactive protein (CRP), 298 mEq/L; procalcitonin, 12.1 mEq/L; potassium, 3.3 mEq/L; and sodium, 133 mEq/L.

After ophthalmic examination a computed tomography (CT) scan of the orbit was performed and showed left orbital inflammation interpreted as postseptal cellulitis, exophthalmos, and “dirty fat” retroorbitally (Fig. 1). The intraocular pressure was elevated to 21/42 mmHg. These findings led to the performance of an acute canthotomy in an effort to save the patient’s vision on the left eye.



Figure 1. Computed tomography scan in the axial plane showing exophthalmos and dirty fat (arrow) on the left eye.

On the same day he was transferred to our department where left functional endoscopic sinus surgery was performed. Large amounts of pus were evacuated from the left ethmoidal, frontal, and maxillary sinuses, and only a limited volume was present in and removed from the periorbita. Simultaneously two teeth (10, 14) were extracted due to apical periodontitis with pus under pressure. The patient was given a dose of antibiotics, cefuroxime (1500 mg) and metronidazole (500 mg), following surgery and 6 h postoperatively.

On hospital day 2, the patient experienced a growing headache and shivering. His Glasgow Coma Scale (GCS) score was 11–12. An acute CT scan of the cerebrum was performed and a subdural accumulation visualized on the left side along with midline shift (Fig. 2).



Figure 2. Computed tomography scan with contrast in the axial plane showing midline shift and a subdural accumulation (arrow) on the left side.

Under general anesthesia a burr hole surgery (BHS) was performed, and large amounts of pus were emptied under high pressure, and an external ventricular drain (EVD) was placed in the anterior horn of the right lateral ventricle by neurosurgeons.

Postoperatively the patient was aphasic and could only answer questions with one-syllable words.

On hospital day 3, a control CT still showed subdural empyema along with swelling of the left hemisphere, bleeding in the left frontal lobe, and perifocal edema (Fig. 3).

By hospital day 4, the patient's GCS was 9, and a new CT showed extensive swelling of the left hemisphere and still some empyema. The ventricles had collapsed and therefore the EVD did not produce any pus or cerebrospinal fluid.

The CRP had not changed much despite the antibiotics and antifungal medication; voriconazole (400 × 2 mg the first day, then 200 × 2 mg the following) now was initiated. The patient underwent BHS again to remove the subdural empyema. In addition to the BHS, 5–10 mL pus was drained from the extracranial abscess in relation to the left eye. Subsequently a sinuscopy was performed revealing an edematous mucosa and large amounts of coagulated blood, which were removed.

Upon ophthalmic examination on hospital day 5 the patient's left pupil was found nonresponsive and the vision of this eye was declared lost. There were still clear signs of inflammation and *Staphylococcus aureus*, *Fusobacterium nucleatum*, *Propionibacterium* species, and group C *Streptococcus* were found in the pus; only group C *Streptococcus* was found in the blood. The antifungal medication was discontinued, while metronidazole (500 × 3 mg), meropenem



Figure 3. Computed tomography scan in the axial plane showing swelling of the left hemisphere, empyema, bleeding in the left frontal lobe (arrow), and perifocal edema. The external ventricular drain is visible in the right ventricle.

nem (2×3 g), and linezolid (600×2 mg) treatment was initiated.

By hospital day 6, the CT scan (Fig. 4) of the brain showed improvement; decreasing midline shift, increasing depth of sulci, and visible basal cisterns. The EVD was still not effective despite the correct location and was therefore removed. The patient's GCS was 7.

During the next 2 days there was further improvement in the patient's condition. Over the course of 3 weeks he regained the ability to walk and his ability to construct more advanced sentences improved.

Forty-four days after admission the patient was discharged from the hospital. He still had neurological sequelae from the infection, such as loss of vision on the left eye and speech impairment as well as loss of short-term memory. A control MRI showed loss of frontal cortical substance (Fig. 5). The patient is currently followed in the outpatient clinic, receiving antiepileptic treatment.



Figure 4. Computed tomography scan in the axial plane showing decreased midline shift.

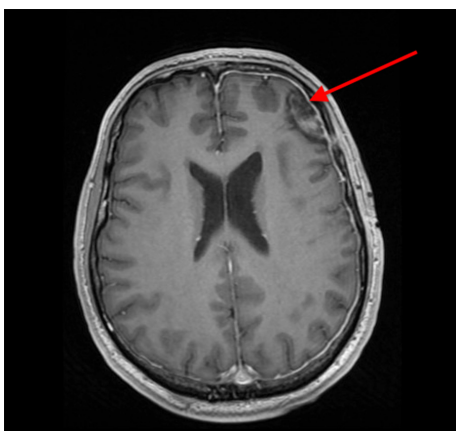


Figure 5. MRI in the axial plane showing loss of frontal cortical substance (arrow).

Discussion

Generally, most cases of sinusitis, including suppurative infections, are uncomplicated. However, in some instances like this case the suppurative infection can spread and affect the orbita as well as intracranial structures, causing subdural empyema. Subdural empyema is a neurosurgical emergency associated with a high mortality [1]. The sinusitis is believed to infect the subdural space either through osteomyelitis of the skull or by retrograde movement of septic thrombi via the small veins of the involved sinus [2–4].

Since subdural empyema is such a rare complication to sinusitis and in this case odontogenic, it can be difficult to diagnose because of a low index of suspicion. When the patient was initially admitted to the hospital no dental complaints were mentioned and the symptoms from the eye were the predominant focus of the examination. In addition, the initial examination did not reveal any dental abnormalities nor raise any suspicion to the fact that the patient was immunosuppressed. This may explain why the dental infectious focus was not detected until during the first surgery.

The rapid progression of the infection in this case is probably due to immunosuppression as a result of methotrexate treatment. It is important that action is taken early on to provide effective treatment and avoid a fatal outcome [5]. Noticeably, odontogenic sinusitis may show a predisposition for intracranial spread [6].

Infections originating from sinusitis can be divided into orbital and intracranial components [5]. Coexistence of orbital and intracranial infections is common [7]. Therefore, it is important that patients experiencing orbital symptoms undergo cranial imaging at the slightest suspicion of suppurative complications. In this case the patient underwent acute canthotomy as a result of the CT scan performed on the date of admission. Despite this early intervention, the patient's vision was lost, which may be contributed to the fact that he waited for several days before consulting a physician, while the swelling was building up. A contributing factor to the rapid progression of the infection in this particular patient may be the suppression of the patient's immune system due to RA and methotrexate intake, allowing the infection to persist despite the first BHS. Acute severe infection is a known risk of methotrexate treatment [8]; however, the dose in this case was within the low-dose interval (25 mg/week). Despite the low dose, the patient might have benefitted from being instructed by the prescribing doctor to see a physician at the representation of infectious symptoms. The patient was at increased risk of severe infections due to this immunosuppressive treatment.

Generally the management of a subdural empyema has three components: early localization and treatment of the

primary infectious focus, drainage of the empyema itself, and administration of antibiotics [1]. In this case the infection originated from an odontological focus and the two affected teeth were extracted early on. Later the patient underwent BHS to drain the subdural empyema. No consensus exists on the surgical intervention of choice as either BHS or craniotomy can be used. Because of limited exposure when using BHS there is a higher incidence of recurring pus formation [3]. This might explain why the first BHS in this case was not sufficient to eliminate the subdural empyema.

As shown in this case of an aggressive purulent odontogenic and sinogenic infection with severe orbital and neurologic sequelae, early awareness, diagnosis, and treatment are essential, especially in immunosuppressed patients. It is important to recognize that purulent spread to the orbit and intracranial requires immediate medical and surgical intervention.

Conflict of Interest

None declared.

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