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Odontogen frontoparietal epidural and
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Case report

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ABSTRACT

Introduction: Cerebral infections (frontoparietal extradural and subdural empyema) following a dental abscess and multiple sinusitis is a rare and potentially devastating entity even in the era of modern diagnosis and treatment.

Case presentation: We present a patient with parietal epidural and subdural empyema and intracerebral frontal abscess, sinusitis and dental abscess, chronic consumer of alcohol and with neglected diabetes mellitus. He was initially diagnosed with encapsulated hematoma and sinusitis. The pus obtained at the intervention was certified by our laboratory as sterile with the consequent difficulty in antibiotic treatment and who induced a longer antibiotic treatment, a second surgical intervention for an encapsulated frontal abscess, a longer hospitalisation and favoured contamination with Covid 19. Despite these, the patient had a finally good evolution.

Conclusions: A frontoparietal extradural and subdural empyema and an intracerebral frontal abscess produced by a dental abscess and sinusitis is a rare and potentially lethal complication. The multidisciplinary approach between radiologist, neurosurgeon, otolaryngologist, dentist, microbiologists is mandatory for a proper diagnosis and treatment of these pathologies.

INTRODUCTION

Sinusitis is an important and underrated source of intracranial infection (41% to 67%) . Even with modern improvements of diagnosis and treatment mortality from intracranial sinusitis-associated infection in the pre-CT era was 66%⁹but have decreased in the post-CT scan era to 5-40%.

CASE REPORT

A 42 years old patient was admitted in our hospital for diffuse headache, vertigo, nausea, vomiting, ethanolic halene, amnesia. No signs of head trauma. Anamnesis: chronic ethanolic consumer, glicemia 270 mg/dl in 2018 uncontrolled from diabetologist. Emergent CT Scan of the head revealed right parietal encapsulated subdural hematoma

Keywords
subdural empyema,
intracerebral abscess,
sinusitis



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(7 mm initially), right frontal contusion, right maxilar, right frontal, sfenoidal sinusitis, superior right premolar abscess. The patient was initially treated conservative with analgetics, neurotrophics, B vitamines, antibiotics for sinusitis.

The ENT specialist and the dentist apreciated that they will treat the sinusitis and the dental abscess after the neurosurgical colection will be healed. Despite the medical treatment the neurological status worsened within a few days with grand mal seizures, left hemiparesis, meningismus, photophobia . A new CT Scan was performed and revealed the increasing of subdural colection with a maximum diameter of 14 mm in parietal area.

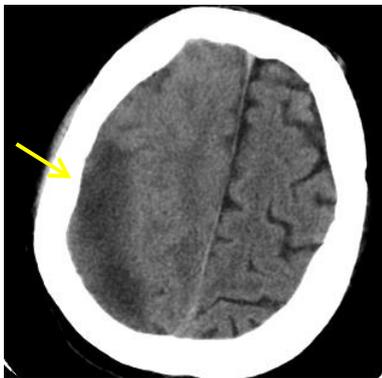


Figure 1. Hypodense subdural right parietal collection (yellow arrow)

He underwent evacuation of an epidural and subdural parietal empyema (mainly subdural) by right parietal craniectomy because of osteomyelitis of cranial bone . Frank pus (sterile-because of initial antibiotic treatment for acute sinusitis) was drained and cortical suface was proper washed with diluted betadine. Post-operative, he was treated with intravenous antibiotics (Meropenem, Vancomycin and Metronidazol.) Despite of a favorable imediate postoperative evolution, the patient had multiple left motor jacksonian epilepsias.

The CT Scan with and without contrast revealed Right dental abscess with lysis of right maxilar floor and medial maxilar wall, maxilar sinusitis, right frontal sinus and right frontal bone osteolysis, right frontal sinusitis, right frontal cerebral abscess.

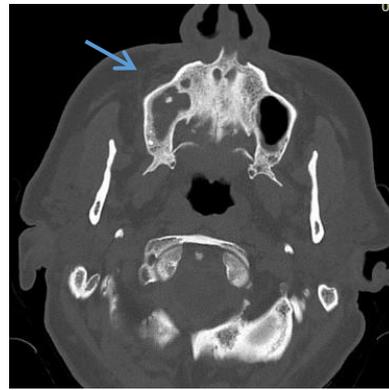
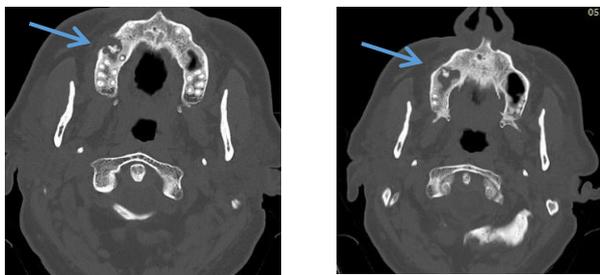


Figure 2. Axial CT Scan. Bone window. 1 5 right dental abscesses with lysis of the right maxilar floor and acute maxilar sinusitis (blue arrow).

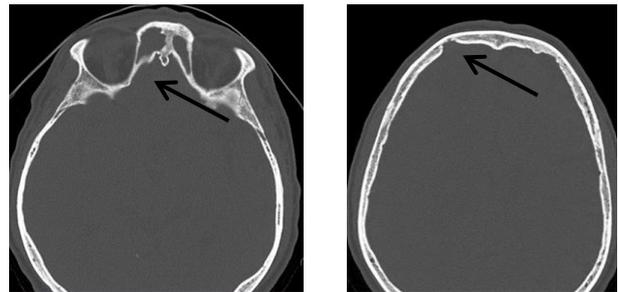


Figure 3. Axial CT Scan. Bone window. Right frontal sinus and right frontal bone osteolysis (black arrow).

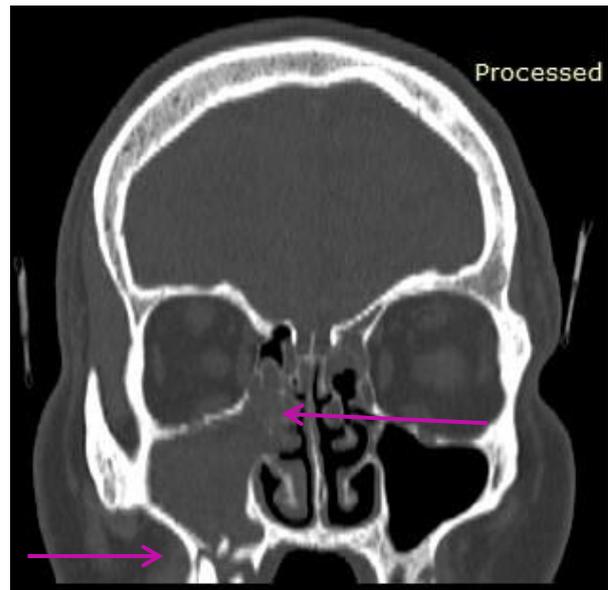


Figure 4. Coronal CT Scan. Bone window Osteolysis of the floor and medial wall of the right maxilar sinus, acute maxilar sinusitis (pink arrow).

The MRI Scan of the head revealed encapsulated right cerebral frontal abscess compressive on the ventricular median structures.

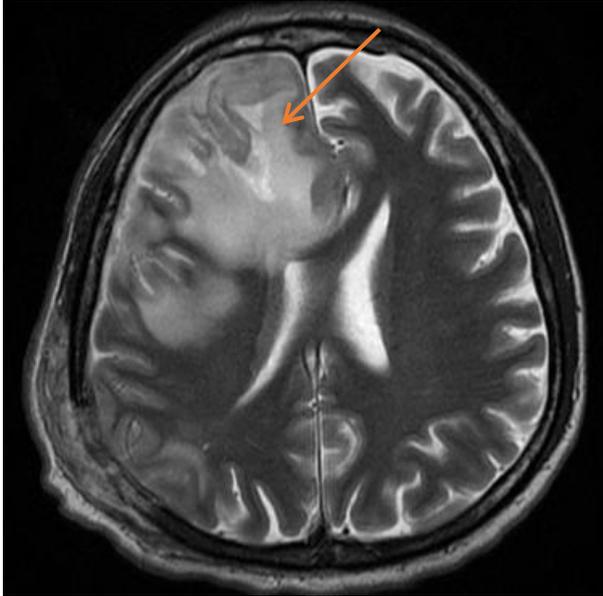


Figure 5. MRI Axial T2. Encapsulated right frontal abscess (red arrow) compressive on the frontal ventricular horns.

A new surgical intervention was performed with cerebral frontal abscess microsurgical exeresis and frontoparietal craniectomy. His neurological condition improved gradually and the follow up CT showed improvement of mass effect and cerebral edema.

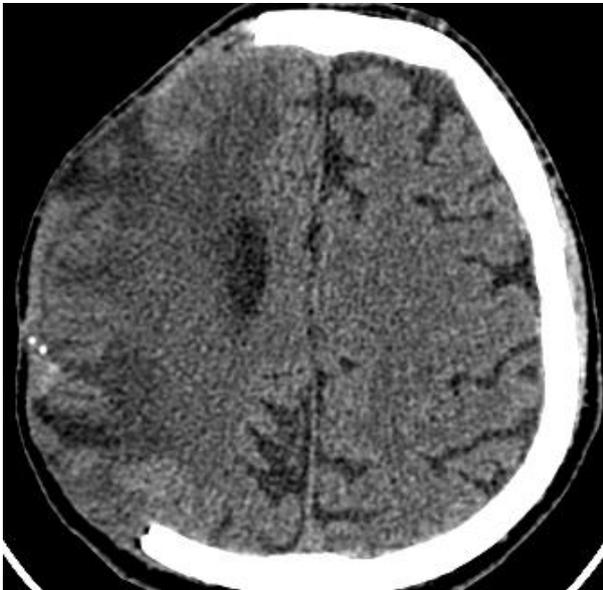


Figure 6. Postoperative Axial CT Scan -exeresis of empiema and frontal abscess. There is some residual edema. Acute fronto-ethmoidal sinusitis and dental abscess are not cured yet.

After 8 weeks of treatment the patient developed cough, expectoration and hypoventilation (SPO₂

93%). CT Scan of the chest revealed veiling areas “in matte glass” in the left upper lobe, subpleural with infectious substrate. The Covid Test was positive. The patient was transferred and treated 21 days in a Covid hospital. The neurological status at the transfer moment was: residual left pyramidal syndrome, left brachial paresis (ASIA 4/5) in progressive recovery. After 21 days of treatment the patient was healed of COVID and the brachial paresis disappeared.

Follow up: 3 months period

We hope good result of ENT and dental treatment to finally eradicate the infection and we scheduled a cranioplasty with titan mesh after one-year period.

DISCUSSION

ENT brain abscess has a 3.2-to-1 male predominance¹. Although there are many causes of infections of the head and neck, odontogenic are the most common type, with over 53% being found as the main source of deep neck infections².

Sinusitis is an important and underrated source of intracranial infection (41% to 67%)³. Even with modern improvements of diagnosys and treatment mortality from intracranial sinusitis-associated infection in the pre-CT era was 66%⁴ but have decreased in the post-CT scan era to 5-40%⁵.

In our case the patient has had amnesia, so we (neurosurgeons and radiologists) didn't excluded a traumatic etiology, despite the absence of signs of cranial trauma and the presence of sinusitis.

The rarely encountered complications of bacterial sinusitis are subdivided into local manifestations (like mucocele, pyocele and recurrence) and extension of sepsis to the adjacent orbital or intracranial structures. Orbital complications include orbital cellulitis, subperiosteal abscess, intra-orbital abscess and osteomyelitis^{6,7}. The intracranial complications comprise of meningitis, encephalitis, epidural or subdural empyema, cerebral abscess and cavernous or other dural venous sinuses thrombosis⁴. Subdural empyema, however, is much strongly associated with underlying sinusitis and is also the most common sinusitis-associated intracranial infection^{6,7}.

From the sinonasal region the infection can spread through direct or indirect routes. The direct spread occurs following the erosion of sinus wall or through preformed pathways like congenital or acquired skull defects (as seen in ISE associated with

trauma and neurosurgical procedures⁸) and the natural skull foramina⁹. The more commonly implicated mechanism however is the indirect spread via retrograde septic thrombophlebitis of valveless emissary veins or endolymphatic channels¹⁰. Compared with other causes of intracranial suppuration, a greater proportion of subdural empyemas (41% to 67%) result from sinusitis.³ Brain abscesses and epidural abscesses typically have a more indolent presentation⁹. The anatomical considerations mentioned above are important determinants of the clinical course. For example, purulence in the epidural space is constrained by the dura, which is adherent to the calvarium. Therefore, clinical presentation of epidural abscess is insidious with fever and headache evolving over weeks. By contrast, seeding of the subdural space leads to rapid spread of purulence because of lack of anatomical constraints⁴. The most common symptoms in patients presenting with intracranial complications are fever and headache⁴. Altered mental status and focal neurological deficits are frequent. Seizures occur in 8–20% of cases¹¹. Other symptoms include meningismus, decreased visual acuity or other ocular complaints including photophobia⁴. Most intracranial complications result from frontal, ethmoid, or sphenoid³ sinusitis; sinusitis is often bilateral¹¹.

Long term sequelae of SDE include hydrocephalus, residual hemiparesis and epilepsy. CT is the imaging modality of choice⁹. Initial CT may be negative or nonspecific¹⁰.

Medical management of subdural empyema includes early initiation of antibiotic therapy, anti-oedema measures and treatment of associated seizures. In most cases the medical management alone is insufficient and associated with high mortality^{8,14}.

Early surgical intervention by burr hole or craniotomy evacuation is the key to early recovery and salvage of maximal neurological function.⁴ In addition to drainage of intracranial purulence, definitive management of the infected sinuses should be done, preferably at the same time as empyema drainage⁴. Odontogen abscess must be prevented by a rapid diagnosis and combined treatment surgical and medical of dental abscess and sinusitis¹¹

In our patient, the ENT experts and dentists

decided to treat (surgically) the sinusitis and dental infection after the healing of cerebral infection.

The combination of improvement of investigations and management strategies have decreased mortality of intracranial infection to 4–9%^{12,13}.

The intracerebral frontal abscess formation was determined by the result of pus culture: sterile and in consequence the difficulty of finding an adequate antibiotic^{9,5} and the lack surgical treatment of synodontal infections. Prolonged spitalisation of this patient increased the risc of Covid contamination.

CONCLUSIONS

If the cranial CT Scan reveals a sinusitis and a subdural/extradural hipodensity don't forget the probability of empiema

Odontogen cerebral epidural and subdural empiema and cerebral abscess must be prevented by a rapid diagnosis and treated by combined concomitent treatment medical and surgical of empiema, dental abscess and sinusitis as a gold standard. This should be realised by a mutidisciplinary approach between radiologist, neurosurgeon, otolaryngologist, dentist, microbiologist.

CONSENT

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

ABBREVIATIONS

CT Scan - Computed tomography
MRI - Magnetic resonance imaging
SDE - Subdural Empiema

AUTHOR'S CONTRIBUTIONS

BD was the major contributor to writing the manuscript;TAH: manuscript preparation, analysis, SAV contributor of the manuscript preparation. All authors read and approved the final manuscript.

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CONFLICTS OF INTEREST

The authors declare no potential conflict of interest.

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