

From a Simple Sinusitis to Cavernous Sinus Thrombosis

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Abstract

Cavernous sinus thrombosis (CST) is a serious complication of a facial infection or sinusitis. Through this clinical case we will discuss the clinical and radiological manifestations of CST, as well as the therapeutic modalities.

Keywords: *Cavernous Sinus Thrombosis; Sinus; Venous Thrombosis*

Introduction

Cavernous sinus thrombosis (CST) is a very rare, life-threatening condition that can more likely affect young adults and children and complicating often the infectious process of the face. Moreover, the evolution can be dramatic because of the intracranial extension of the thrombotic and infectious process, local vascular complications, or septicaemia.

Case Report

A 16-year-old female patient, with no relevant past medical history, was admitted to the Emergency Department with a disorder of consciousness and fever. On examination she was unconscious GCS 9 and febrile (39,5°C), she had bilateral swollen eyelids, exophthalmos and chemosis (Figure 1). The neurological exam found hemiplegia on the right side. A Head CT scan and Head MRI had shown thrombosis of both cavernous sinuses, the right ophthalmic vein extending to sigmoid and transverse sinuses, in addition to both internal jugular veins with a left inter ischemic injury hypodensity and pansinusitis (Figure 2).

Moreover, the cerebrospinal fluid analysis revealed a bacterial meningitis, nasal endoscopy shown pus in middle meatus region, the HIV Serology was negative, and no abnormalities were found on the basic metabolic panel. Consequently, the diagnosis of cavernous sinus thrombosis from a septic origin was retained, with a bacterial meningo-encephalitis and migration of the septic thrombi towards the intracranial venous sinuses and the internal jugular veins.

The patient was placed on a broad spectrum antibiotic, and was also put on therapeutic anticoagulation, nasopharyngeal disinfection, and motor rehabilitation.

Under this treatment, the evolution was favorable, the exophthalmos regressed, and oculomotor dysfunctions improved, but she kept a light right hemiparesis as sequelae (Figure 3).



Figure 1: The patient had bilateral swollen eyelids, exophthalmos and chemosis.

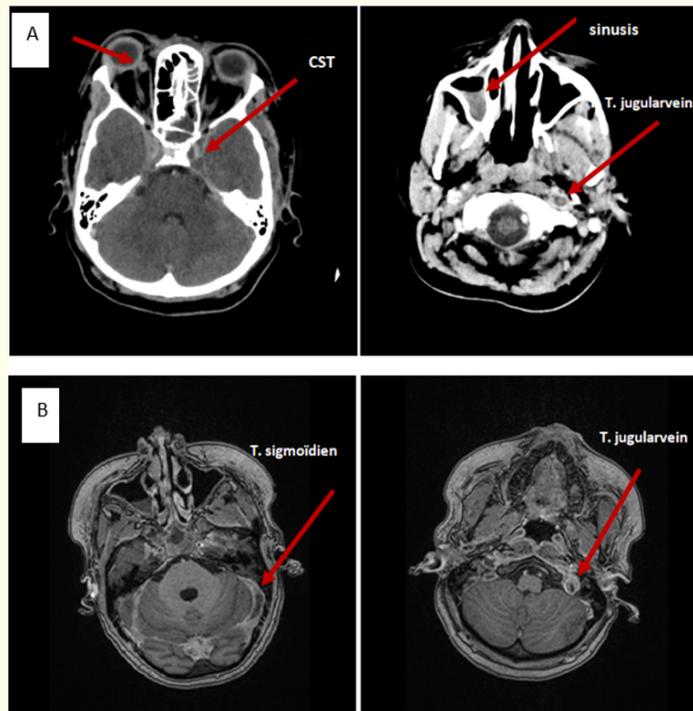


Figure 2: CT scan (A) and MRI T-weighted (B): Thrombosis of both cavernous sinuses and the right ophthalmic vein extending to sigmoid and transverse sinuses, and both internal jugular veins.

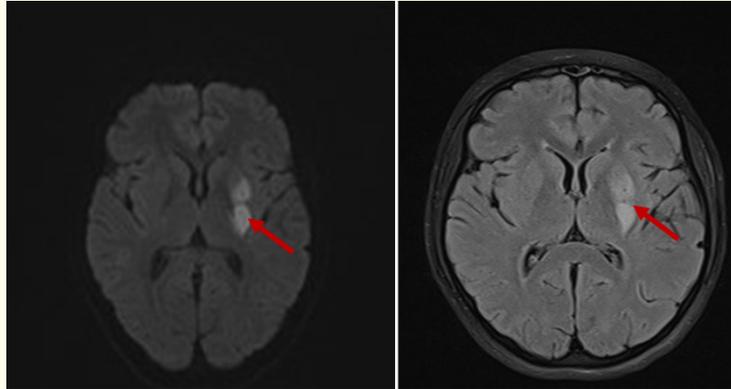


Figure 3: Diffusion and FLAIR: Left ischemic injury.

Discussion

The cavernous sinus situated in the central skull base, one on each side of the sella turcica and superior to the sphenoid bone. It extends from the top of the orbit to the top of the petrous part of temporal bone. Many fibrous septa split the cavernous sinus into small caves, hence the name. Inside the cerebral venous system, since there are no valves, the blood in the cranial sinuses and the cerebral and emissary veins can move in both directions and that's because of the pressure gradients. This feature makes the cavernous sinuses vulnerable and exposed to septic thrombosis from several infections: Sinusitis, Otitis, Dental infection.

There are many bacteria and viruses that can cause the CST, the most frequently found in patients is the staphylococcus aureus. Others, such as streptococcal species, tuberculosis or aspergillus are less common. Also, multiple factors such as uncontrolled diabetes, cancer, chemotherapy, and steroid use can risk developing cavernous sinus thrombosis as well as developing its complications.

Patients suffering from CST most commonly present fever, swollen eyelids, headache and vision changes as symptoms at the very beginning or progress subacutely over the days. Other symptoms like facial numbness, stiff neck, seizures, confusion, or coma may be present in some cases. Lethargy, altered mentation, or obtundation are frequent Neurologic findings in the CST, on the other hand, seizures or hemiparesis are very rare. Adding to the neurologic findings, there are universal eye disorders that can be found in patients with CST which include eyelids swelling, eyelids erythema, exophthalmos, ptosis, chemosis and limited eye movements. Papilledema, decreased visual acuity, retinal haemorrhages, and photophobia are not so often found. Without forgetting Blindness that can result in few cases. The oculomotor nerve (CN III), the trochlear nerve (CN IV), and the abducens nerve (CN VI) can all be affected in the CST, but the most common neuropathy is the sixth cranial neuropathy, developing a partial ophthalmoplegia with limited eye abduction. The face sensation can be affected by the fifth cranial neuropathy resulting in hemiparesis due to compression of its branches with an abolished corneal reflex.

In present practice, the most radiological exams used to confirm the diagnosis of CST are Computed Tomography (CT) scan and magnetic resonance imaging (MRI), not only that, but to eliminate all other differential diagnosis that may have comparable clinical features (e.g. orbital cellulitis, migraine headache, thyroid exophthalmos, Meningitis...).

The radiographic features that confirm the CST are:

- MRI with MR venography (preferred imaging choice): Absent flow void in the damaged cavernous sinus.
- Non contrast CT scan: the cavernous sinus thrombus is featured as increased density.
- Contrast-enhanced CT: reveals filling defects and a distended cavernous sinus.
- However, a normal CT scan doesn't exclude a CST in the presence of a high clinical suspicion.
- Carotid angiography can show a reduced calibre or a complete obstruction of the intracavernous segment of the carotid artery, which also could be seen on MRI and CT scan.
- Imaging can also be useful in revealing the site of infection or portal of entry (e.g. Sinusitis, otitis, dental infection).

In addition, lumbar puncture is a procedure that can be useful in terms of the diagnosis which may rule out a meningitis or in some cases be totally normal.

Due to the seriousness of CST, broad spectrum intravenous antibiotics should be administered immediately until a definite pathogen is found, covering gram positive, gram negative, anaerobic germs and capable of achieving high levels in the cerebrospinal fluid.

Moreover, all patients with CST should be kept on IV antibiotics for at least 3 to 4 weeks.

The most used Antibiotics are third generation cephalosporin and vancomycin.

Along with the antibiotherapy, it is important to drain the source of infection if present and treat it correctly. Using Anticoagulants for CST is still controversial, since some medical teams prescribe antibiotics only, and others who insist on the association of both antibiotics + anticoagulants, in order to reduce and stop the migration of the thrombus, plus, some studies have shown a decrease in mortality rate thanks to anticoagulants, however, lack of studies and trials couldn't settle on whether formally indicate the anticoagulants or not. To be more precise, low molecular weight heparin (LMWH) is superior to unfractionated heparin (UFH) unless contraindication.

In addition, steroid therapy is highly recommended, aiming to reduce inflammation and oedema, and in some cases such as the pituitary insufficiency that can occur along CST, corticosteroids are absolutely indicated to prevent the adrenal crisis.

Although there is no place for surgery in the CST, some patients might need abscess drainage, orbital decompression, mastoidectomy, sphenoidectomy. Speaking of antibiotics, before they were available, the mortality was 80 - 100% and morbidity rates dropped due to earlier diagnosis and treatment [1-14].

Conclusion

Cavernous sinus thrombosis is a rare disease with tragic complications that needs an early clinical and radiological diagnosis. Whereas some studies have shown a decrease in mortality rate thanks to anticoagulants, their use among the treatment protocol of CST associated to antibiotics is still controversial. Otherwise, recognizing the primary source of infection and treating it correctly is the best way to prevent cavernous sinus thrombosis.

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