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Cavernous Sinus Thrombosis in a Patient with aspirin-exacerbated respiratory disease: a case report

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ABSTRACT

Cavernous sinus thrombosis (CST) is a rare but life-threatening condition most commonly arising from trauma and paranasal sinus infections. The diagnosis of CST remains a formidable challenge despite advancements in medicine. Early identification and therapeutic intervention require an increased level of clinical awareness and a profound understanding of the pathophysiology of the disorder. This report presents a case of CST in a 58-year-old female with a long history of nasal and paranasal sinus polyposis and aspirin-induced asthma.

KEYWORDS: Cavernous sinus thrombosis, aspirin-exacerbated respiratory disease, nasal polyposis, aspirin-induced asthma, FESS

LEARNING POINTS / HIGHLIGHTS

1. Sudden severe headache, visual disturbances, and vomiting in patients with a history of sinusitis or nasal polyposis should raise suspicion for cavernous sinus thrombosis (CST) and prompt immediate evaluation.
2. Prompt use of imaging techniques such as contrast-enhanced CT and MRI is crucial for the timely diagnosis of CST, especially in patients with known sinus infections or underlying sinus conditions.
3. Effective treatment of CST requires a coordinated approach, including the use of anticoagulation therapy, antibiotics, and potentially surgical intervention to address the underlying source of infection or inflammation.
4. Postoperative complications, such as nasal bleeding, need to be closely monitored and managed, especially when anticoagulants are part of the treatment plan. Adjusting anticoagulant doses and ensuring adequate hemostasis are critical for patient safety.
5. After acute treatment, long-term management, including the use of biological therapy, may be necessary for patients with chronic conditions like nasal polyposis to prevent recurrence and improve quality of life.

INTRODUCTION

Cavernous sinus thrombosis (CST) is a rare condition involving the formation of a blood clot within the cavernous sinus, a large vein located at the base of the brain. CST can be categorized as either septic or aseptic, with septic cases being more common. Septic CST typically arises from infections in the "danger triangle" of the face, which includes areas like the nose, eyes, and upper lip. These infections, such as abscesses, sinusitis, dental infections, or ear infections, can spread to the cavernous sinus, leading to thrombosis. *Staphylococcus aureus* is the most frequent bacterial cause, although other bacteria, fungi, and, rarely, viruses or parasites may also be involved. Aseptic CST, which is less common, may result from factors such as trauma, surgery, or pregnancy. [1,2] The clinical presentation of CST often includes fever, headache, periorbital edema, ophthalmoplegia and cranial nerve palsies. Early diagnosis and treatment are critical to prevent severe complications, including stroke, diplopia, vision loss and death.

The diagnosis of CST is determined through clinical evaluation, with confirmation provided by suitable radiological imaging, such as MRI and CT scans. [3,4] Treatment typically involves a combination of antibiotics, anticoagulation, and, in some cases, surgical intervention. The management of patients with CST should also address the treatment of underlying infections, such as sinusitis, dental abscesses, and facial cellulitis, as well as potential complications, including brain abscesses, meningitis, and extension to other venous sinuses. [5]

CASE PRESENTATION

A 58-year-old female patient was admitted to the Neurology Department as an emergency due to severe right-sided headache and pain around the right eye socket, accompanied by nausea, vomiting, and double vision. The patient has been suffering from nasal and paranasal sinus polyposis associated with aspirin-induced asthma for about 25 years. In the past, during exacerbations, she was treated with oral antibiotics and chronic inhaled steroids. Additionally, she has undergone multiple endoscopic surgeries using the FESS method.

The patient has no history of collagenosis, thrombophilia, or other internal medical conditions. In her family history, her father was treated for paranasal sinus polyposis.

Upon admission to the Neurology Department, the patient was in moderate general condition, in pain, conscious, and able to communicate logically. She was afebrile. On physical examination: vesicular breath sounds were symmetrical over the lungs, heart rate was regular at 84/min, blood pressure was 130/80 mmHg, the abdomen was soft and non-tender, there were no peritoneal signs, and no meningeal signs. In the neurological examination, anisocoria was observed (right pupil larger than left), the right eyeball had impaired mobility and was slightly medially positioned. Neurologically, no other significant changes were noted.

Laboratory tests and cerebrospinal fluid analysis were within normal limits.

CT scan of the head and paranasal sinuses with contrast: Normal appearance of brain structures, with no signs of intracranial hemorrhage or ischemic changes. Post multiple endoscopic sinus surgeries (FESS type) with wide openings of the maxillary sinuses and removal of the middle nasal turbinates. Extensive mucosal changes in the paranasal sinuses; ethmoid cells, frontal sinuses, and the right sphenoid sinus were airless, filled with dense material – indicative of severe inflammatory changes. The right sphenoid sinus was filled with content of increased density – possible fungal colonization.

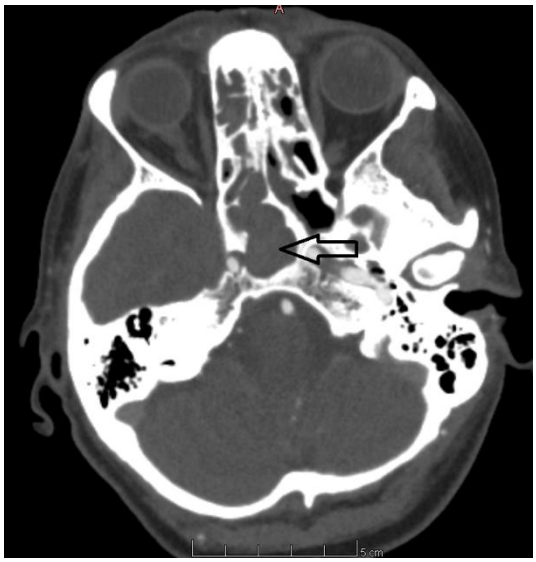

Figure 1. Inflammation of the right sphenoid sinus and right ethmoid cells.

Angio-CT of the head arteries: The internal carotid and vertebral arteries within the examined range and the basilar artery were patent, not dilated, without segmental narrowing. The posterior communicating arteries did not enhance – aplastic/hypoplastic. The anterior cerebral arteries, anterior communicating artery, and middle cerebral arteries were patent without visible segmental narrowing. No malformations or aneurysms of the intracranial arteries were detected.
Venography-CT of the head: The venous sinuses of the dura mater and intracranial veins within the assessable range showed no contrast filling defects. The brain showed no enhancing focal lesions. No intracranial vascular malformations.
In the hospital, the patient was treated with analgesics, antiemetics, anti-edematous drugs, antibiotics, and intravenous fluids. Due to the lack of clinical improvement after two days of treatment, an MRI of the head with contrast was performed, which revealed cavernous sinus thrombosis, more pronounced on the right side.
MRI of the brain, performed both with and without contrast enhancement, shows artifacts from orthodontic material. Features of cavernous sinus thrombosis, more pronounced on the right side, with bulging of the contour; a narrower contrast filling defect in continuity towards the right internal jugular vein. Massive inflammatory changes in the paranasal sinuses, including the sphenoid sinus, which directly borders the cavernous sinus – possibly a septic secondary cause of the cavernous sinus thrombosis. Medial wall defects of the maxillary sinuses – most likely postoperative. In T2 FLAIR sequence, after 10 minutes, enhancement of the dura mater in the cavernous sinus area was observed, mainly due to the aforementioned changes; additionally, post-contrast enhancement in the arachnoid/pia mater in the right occipital lobe and the tentorium cerebelli – nonspecific, to be differentiated from inflammatory changes. In the same sequence, enhancement of the retroseptal orbital fat tissue on the right was visible – primarily reactive/inflammatory changes; the signal may be elevated due to artifacts from dental elements. Enlarged perivascular spaces in the deep structures bilaterally. No signs of diffusion restriction (repeated also on the day of adding contrast agent). In gradient studies, no signs of microbleeds. The ventricular system was not enlarged or displaced. CSF spaces were preserved.

Cranio-cervical junction structures were normal. At the edge of the examination field, degenerative-disk changes in the cervical spine.

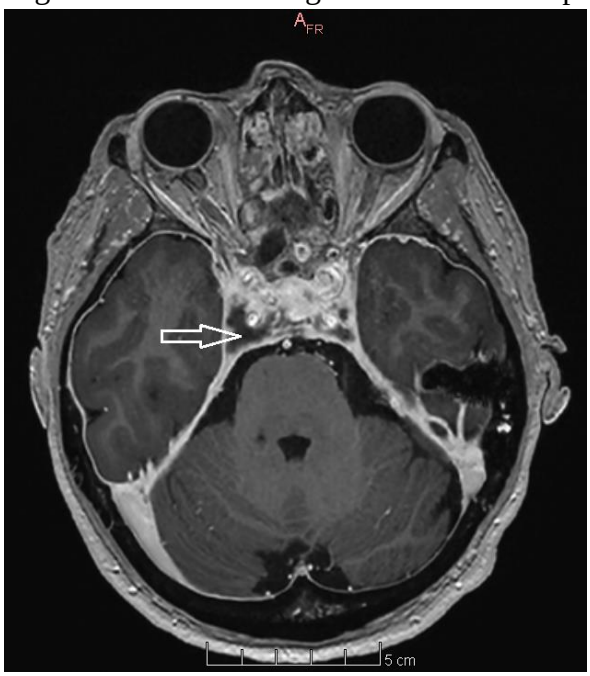

Figure 2. Contrast filling defects in the cavernous sinus more pronounced on the right side – features of thrombosis.

After receiving the MRI results, low molecular weight heparin (Enoxaparin 2x1mg/kg body weight) was added to the treatment in the Neurology Department. The patient was then transferred to the ENT Department, where an endoscopic sinus surgery was performed using the FESS method. During the procedure, neuronavigation was used to locate the right sphenoid sinus ostium (which was occluded). The right sphenoid sinus was opened, revealing two mucous cysts filled with thick yellow material (likely inflammatory), which were removed. The ostia of the other paranasal sinuses were patent. The postoperative material was sent for histopathological and microbiological examination. The patient experienced several days of nasal bleeding after the surgery, which required nasal packing and a partial reduction of the heparin dose to 70% of the required dose. After the FESS surgery, the patient's general condition improved, with the resolution of headaches and visual disturbances. After the nasal bleeding ceased, the patient was discharged home with the recommendation to continue using the appropriate dose of low molecular weight heparin and to remain under the care of the neurology and ENT outpatient clinics. A follow-up MRI of the head performed one month after treatment with low molecular weight heparin showed complete regression of the thrombi in the cavernous sinuses.

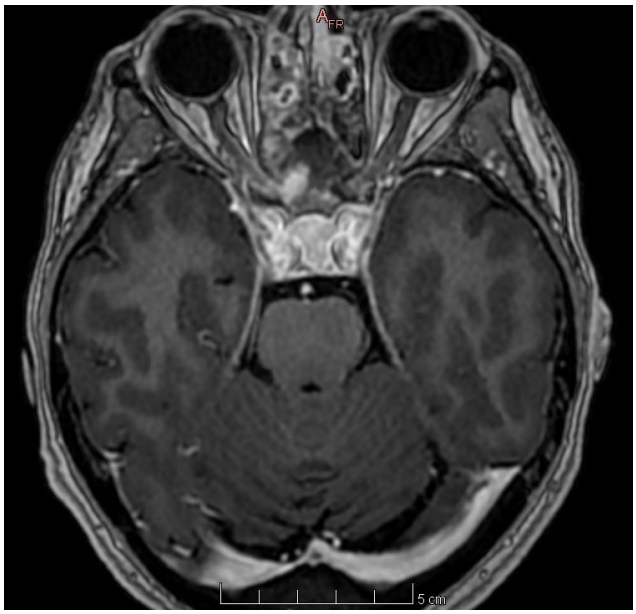

Figure 3. The cavernous sinus fills correctly with contrast – no signs of thrombosis.

During a follow-up visit to the Neurology Clinic, low molecular weight heparin was discontinued, and oral anticoagulant Rivaroxaban was introduced. During the ENT Clinic visit, the patient received the histopathological examination result – mucous cysts/mucoceles. No neoplastic growth was found. The patient is currently in good general condition without pain or signs of infection.

DISCUSSION

This case of cavernous sinus thrombosis (CST) in a 58-year-old woman with chronic nasal polyposis and aspirin-exacerbated respiratory disease (AERD) highlights the challenges of diagnosing and managing this rare but serious condition. The patient's symptoms, including severe headaches, vomiting, and visual disturbances, were initially nonspecific, complicating early diagnosis. Despite these challenges, the use of MRI ultimately confirmed CST

CONCLUSION

The patient presented with severe right-sided headache, double vision, and a history of nasal polyposis with aspirin-induced asthma, which led to the diagnosis of cavernous sinus thrombosis secondary to severe sinus inflammation. Initial imaging (CT and MRI) revealed extensive sinusitis and cavernous sinus thrombosis, necessitating the addition of anticoagulation therapy with low molecular weight heparin. Endoscopic sinus surgery (FESS) successfully removed obstructive mucous cysts, leading to significant clinical improvement and resolution of symptoms. Follow-up imaging confirmed the complete resolution of the thrombosis, allowing for a transition to oral anticoagulation therapy, with the patient recovering well and free from further complications.

DISCLOSURE

This case report describes the diagnosis and treatment of a 58-year-old female patient with cavernous sinus thrombosis secondary to severe paranasal sinusitis. The information provided is based on clinical findings, imaging results, and treatment outcomes observed during the patient's hospitalization and follow-up care. All medical procedures, including the administration of medications and surgical interventions, were conducted following standard medical protocols. The patient's identity has been anonymized to protect privacy, and all details are presented in accordance with ethical guidelines. The patient provided informed consent for the use of her medical data for educational and research purposes. No conflicts of interest or financial ties relevant to this case were reported by the healthcare providers involved in the patient's care. This case highlights the importance of timely diagnosis and multidisciplinary treatment in managing complex cases of sinusitis with complications.

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