Cavernous Sinus Thrombosis Secondary to Sphenoid Mycetoma following COVID-19 infection

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Learning Point for Clinician

The sphenoid sinuses have an intimate anatomical relationship with each cavernous sinus. Sphenoid sinusitis can induce inflammation and lead to thrombosis within the cavernous sinus. Clinicians should consider sinusitis as a key differential diagnosis when assessing the cause of any patient presenting with orbital symptoms and/or cavernous sinus thrombosis.

Introduction

Cavernous Sinus thrombosis (CST), is a rare and potentially life-threatening disorder. Cranial nerves involved in eye movement and facial sensation (III-VI) travel through or in the lateral wall of the Cavernous Sinus (CS). CST may disrupt these structures, and can result in patients presenting with severe headaches, retro-orbital pain, visual disturbances and ophthalmoplegia.[1]

CS drains venous blood from the facial vein, superior and inferior ophthalmic vein into the basilar plexus. Anatomically, it lies in close proximity to the sphenoid sinus. Bacterial or acute invasive fungal sinusitis (IFS) are therefore commonly implicated in CST formation, either through spread via emissary vessels or by direct extension through the lateral sinus wall, inducing thrombosis.[2,3]

IFS is one form of fungal sinusitis which most commonly affects immunocompromised individuals, often with an aggressive and invasive clinical course. In contrast, non-invasive fungal sinusitis (NIFS), occurs in immunocompetent individuals, taking a far more indolent course, rarely affecting surrounding structures. The most common NIFS is a mycetoma or fungal sinus ball, with patients either asymptomatic or presenting with mild chronic pressure symptoms.[4]

We present a unique case of an immunocompetent 64 year old female who presented with bilateral CST secondary to a histopathologically confirmed mycetoma, following recent recovery from COVID-19 infection.

Case Report

A 64 year old female, who recently suffered from COVID-19 infection, with no other significant past medical history, presented to the emergency department with sudden onset, maximal severity frontal headache with associated emesis. She had a normal neurological examination, but was found to have chemosis and proptosis of her left eye with no other ophthalmic involvement.

Computed Tomography (CT) demonstrated opacification of the left posterior ethmoid sinus and sphenoid sinus, with local dehiscence of its superolateral wall, in close proximity to the optic canal (Figure1a,b). Left sided proptosis was seen, with evidence of pre-septal oedema. CT venogram confirmed bilateral CST, more prominent on the left.

On admission, she was apyrexial and haemodynamically stable. Her bloods demonstrated elevated inflammatory markers. She was initiated on intravenous anti-microbial therapy for presumed bacterial sinusitis alongside anti-coagulation therapy.

She underwent urgent left FESS, sphenoidotomy and left medial orbital wall decompression. Intraoperatively, a mass suggestive of a left sphenoid mycetoma was seen (Figure 1c,d). A defect in the posterolateral sinus wall was noted. On histopathology, the mass was confirmed as a mycetoma. Samples of sinus wall demonstrated non-specific inflammation, the presence of gram-positive cocci, and no evidence of fungal invasion.

She had an uneventful post-operative recovery and was discharged 4 days later with anti-coagulation, anti-microbial therapy and nasal decongestants.

Discussion

High morbidity due to intracranial complications is well characterised in IFS[2], often requiring urgent surgical debridement in conjunction with high dose anti-fungal therapy. In contrast, treatment for NIFS often requires surgery alone, with few cases reported of intracranial complications[2,3,4].

One theory suggests that extra-sinonasal sequelae and CST formation in NIFS may be related to a hypercoaguable state secondary to mycetoma-induced local inflammation and bacterial supra-added infection[2,4]. Our case is in keeping with this. Other rare cases have been reported of mycetoma transforming to IFS which may result in a similar clinical picture.[2,5] Our patient's recent COVID-19 infection may have played a role in exacerbating her mycetoma, and promoting a hypercoaguable state.[6]

CST carries a high morbidity and potential mortality. Early recognition and treatment is essential. We have demonstrated a rare case of mycetoma inducing local inflammation and resultant sinusitis, bony erosion and thereby, CST. Suspicion of CST first arose from orbital signs on clinical examination. Given their intimate anatomical relationship, all clinicians assessing patients with possible CST and orbital symptoms should be cognisant of a possible sinogenic aetiology.

Sources

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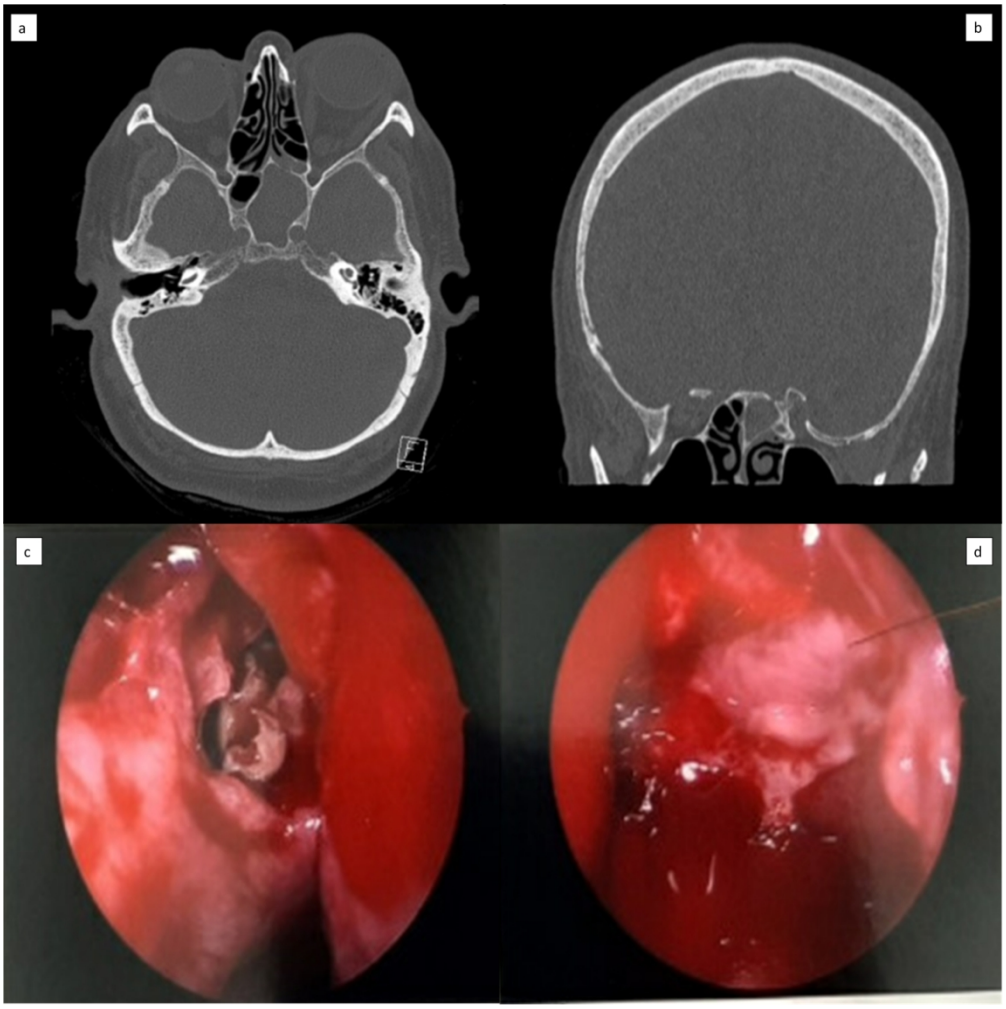

Figure 1
a- Axial CT head scan showing opacification of left sphenoid and posterior ethmoid sinus. Note close proximity of internal carotid artery and optic nerve to sphenoid sinus.
b- Coronal CT head scan demonstrating opacification of left sphenoid sinus with bony erosion and defect seen in its superolateral wall.
c- Intra-operative image of mycetoma during Functional Endoscopic Sinus Surgery
d- Intra-operative image of granulation tissue and pus extruding from defect in the sinus wall

112x112mm (300 x 300 DPI)

Acronyms Used

CST- Cavernous Sinus Thrombosis

CS- Cavernous Sinus

IFS- Invasive Fungal Sinusitis

NIFS- Non-invasive Fungal Sinusitis

CT- Computer Tomography

FESS- Functional Endoscopic Sinus Surgery