



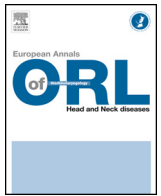
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What is your diagnosis?

SARS-CoV-2 infection may mask another infection

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1. Description

A 20-year-old man was admitted to the intensive care unit with delirium and disorders of consciousness (Glasgow score: 10) associated with fever. He had no notable history apart from chronic sinusitis for which he had never sought medical attention. During the week before admission to hospital, he had experienced asthenia, myalgia, cough, headache, rhinorrhoea and persistent fever of 40 °C.

Clinically, this young man presented neck stiffness, a negative Babinski sign, left unilateral purulent rhinorrhoea in a context of bilateral nasal polyposis, bilateral superior and inferior palpebral oedema and bilateral chemosis, particularly marked on the right.

The laboratory work-up demonstrated leukocytosis (leukocytes: $19.7 \times 10^9/L$), lymphopenia (lymphocytes: $0.57 \times 10^9/L$, laboratory signs of inflammation with procalcitonin: 56.7 µg/L and

CRP: 318.2 mg/L. Cerebrospinal fluid (CSF) was straw coloured with elevated CSF protein (4.2 g/L), elevated lactate (9.17 mmol/L), and negative bacteriological examination. The SARS-CoV-2 virus was present on Reverse Transcription Polymerase Chain Reaction (RT-PCR) analysis of the nasopharyngeal swab, but absent from CSF.

The assessment was completed by MRI of the head and facial bones.

Question

What is your diagnosis?

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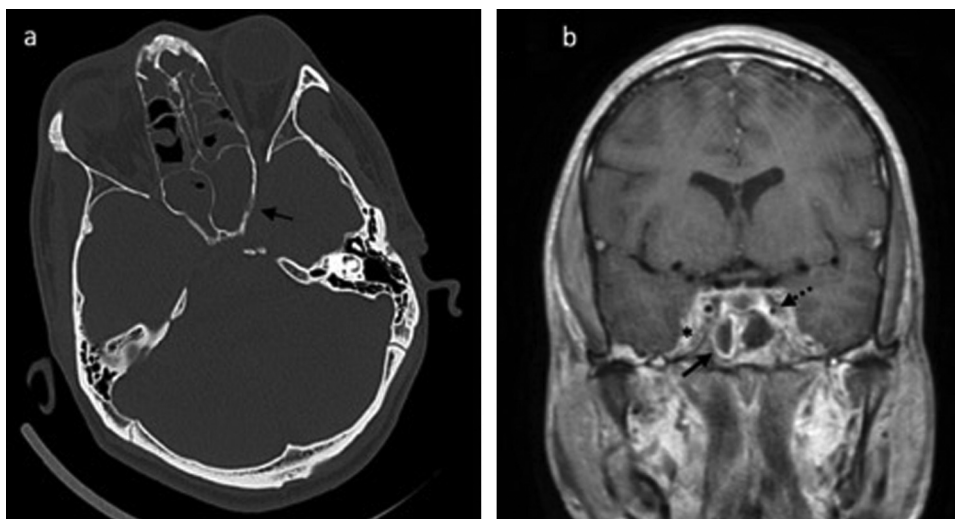


Fig. 1. a: brain CT, axial scan with bone window setting. Presence of a bone defect of the lateral wall of the left sphenoid sinus (arrow); b: MRI, gadolinium-enhanced T1-weighted sequence, coronal section through the cavernous sinus. Intense enhancement of the fluid-filled sphenoid sinus (solid arrow) and the walls of the lateral sellar compartment (*) with inflammatory stenosis of the intracavernous segment of the internal carotid arteries (dotted arrow).

Answer

MRI confirmed the diagnosis of meningoencephalitis with secondarily infected nasal polyposis concomitant with SARS-CoV-2 infection by demonstrating bilateral nasal polyposis complicated by secondary infection of the left sphenoid and maxillary sinuses. Osteomyelitis of the lateral wall of the left sphenoid sinus (Fig. 1a) was also visualized, explaining contiguous spread of infection to the brain with, in particular, the presence of pachymeningitis, septic ventriculitis, pre-suppurative frontal encephalitis, bilateral inflammatory stenosis of the intracavernous segment of the internal carotid arteries with left intrapetrous extension, bilateral cavernous sinus thrombosis (Fig. 1b) and left and right ophthalmic vein thrombosis with an ophthalmic complication of the right eye.

The estimated incidence of neurological and intracranial complications secondary to bacterial sinusitis is 3.7% in patients hospitalised for management of sinusitis [1]. Two mechanisms can explain intracranial spread of infection: retrograde spread of a thrombus or septic embolus and direct spread via erosion of a bone wall. The most common complications of bacterial sinusitis are orbital complications, ranging from preseptal cellulitis to intra-orbital abscess and cavernous sinus thrombosis [1].

The complications observed in this patient can mainly be explained by secondarily infected sinusitis, but also by the presence of SARS-CoV-2 infection, diagnosed on the basis of his clinical symptoms prior to admission and RT-PCR of the nasopharyngeal swab. Neurological complications have been reported in 14% of intensive care patients with serious forms of SARS-CoV-2 infection. MRI demonstrated signs of meningoencephalitis in 62% of cases, while SARS-CoV-2 RT-PCR of CSF was negative in 100% of cases [2], as in the young patient presented here. SARS-CoV-2 is also responsible for significant elevation of the blood levels of proinflammatory cytokines, which play a prothrombotic role, which could also explain the cavernous sinus thrombosis [3].

The treatment of secondarily infected and complicated nasal polyposis is both medical and surgical [4]. Empirical antibiotic therapy with oral amoxicillin-clavulanic acid, in the absence of allergy,

is recommended in all cases of acute bacterial ethmoid, frontal and sphenoid sinusitis. In complicated forms, empirical antibiotic therapy is initiated by intravenous injection and is subsequently adapted to the results of bacteriological examinations. The bacterial species usually identified during surgery for nasal polyposis is *Staphylococcus aureus* [5], while the microorganism isolated in this patient was *Streptococcus constellatus*, a bacterial species known to be responsible for complicated sinusitis. Bacterial colonisation of nasal polyposis is commonly observed, in about 74% of cases.

The standard surgical treatment is bilateral endoscopic ethmoidectomy with sphenoidotomy. Complications are rare, but potentially serious due to the intimate anatomical relations between the paranasal sinuses and the meninges, orbit, and internal carotid arteries. The most common complications are haemorrhage, dural tear with a risk of cerebrospinal fluid leak and meningitis and orbital lesion with a risk of orbital haematoma [4].

Disclosure of interest

The authors declare that they have no competing interest.

References

- [1] Ziegler A, Patadia M, Stankiewicz J. Neurological Complications of Acute and Chronic Sinusitis. *Curr Neurol Neurosci Rep* 2018;18:5. <http://dx.doi.org/10.1007/s11910-018-0816-8>.
- [2] Helms J, Kremer S, Merdji H, Clere-Jehl R, Schenck M, Kummerlen C, et al. Neurologic Features in Severe SARS-CoV-2 Infection. *N Engl J Med* 2020. <http://dx.doi.org/10.1056/NEJMc2008597>.
- [3] Klok FA, Kruip MJHA, van der Meer NJM, Arbous MS, Gommers DAMPJ, Kant KM, et al. Incidence of thrombotic complications in critically ill ICU patients with COVID-19. *Thromb Res* 2020. <http://dx.doi.org/10.1016/j.thromres.2020.04.013>.
- [4] Fokkens WJ, Lund VJ, Mullol J, Bachert C, Alobid I, Baroody F, et al. *European Position Paper on Rhinosinusitis and Nasal Polyps 2012*. *Rhinol Suppl* 2012;23:3 [preceding table of contents; 1–298].
- [5] Gendre A, Rives P, Michel G, Boutoille D, Espitalier F, Malard O. Intra-operative bacterial analysis in nasal polyposis: Clinical and functional impact. *Eur Ann Otorhinolaryngol Head Neck Dis* 2019;136:155–60. <http://dx.doi.org/10.1016/j.anori.2019.02.013>.