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## Anti-GQ1b Negative Miller Fisher Syndrome Mimicking Acute Sphenoid Sinusitis

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### ABSTRACT

**Background:** Miller Fisher Syndrome is a variant of Guillain-Barre Syndrome, classically characterized by the triad of ataxia, areflexia and ophthalmoplegia. However, many conditions can mask the presentation of Miller Fisher Syndrome, potentially leading to grave consequences due to delayed diagnosis or even misdiagnosis.

**Case Report:** We describe a case of Miller Fisher Syndrome mimicking acute sphenoid sinusitis with intracranial complications in an otherwise healthy 19-year-old man. Accurate diagnosis with prompt treatment led to full clinical recovery of our patient.

**Conclusion:** Sphenoid sinusitis warrants great vigilance and thorough neurological examination due to its proximity to structures such as the cavernous sinus and its associated cranial nerves. This case highlights its potential to mask more devastating conditions like Miller Fisher Syndrome and the successful role of medical management without the need for sphenoidotomy.

**Keywords:** Miller Fisher syndrome, Guillain-Barre Syndrome, ophthalmoplegia, sinusitis, sphenoid sinusitis

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### INTRODUCTION

Miller Fisher Syndrome (MFS) is a known variant of Guillain-Barre Syndrome (GBS), classically characterized by the triad of ataxia, areflexia, and ophthalmoplegia (1). It is typically associated with antecedent upper respiratory or gastrointestinal symptoms. Despite the widely known and established core clinical symptoms, MFS may mimic various pathologies, posing diagnostic difficulties. As reported in our case, MFS can masquerade as sphenoid sinusitis with apparent cavernous sinus involvement. To the best of our knowledge, only one such case has been reported in the literature to date (2).

### CASE REPORT

A previously healthy 19-year-old man presented with a fever, unstable gait, blurred vision, headache, dizziness, and vomiting for past two days. The patient had an upper respiratory tract infection (URTI) ten days prior. Otherwise, he denied complaints of foul-smelling nasal discharge or facial pain. There was no history of head trauma or recent travel reported.

Physical examination revealed bilateral ptosis, complex ophthalmoplegia, ataxia, and areflexia. Neck stiffness and meningism signs such as Brudzinski's and Kernig's signs were absent. Nasal endoscopy revealed minimal thick secretions at the nasopharynx while bilateral osteomeatal complexes were patent. Routine laboratory, autoimmune, and lumbar puncture examinations performed were unremarkable. Initial computed tomography (CT) of the brain was suggestive of bilateral cavernous sinus thrombosis with concurrent left sphenoid and right maxillary sinusitis. Subsequently, Magnetic Resonance Imaging (MRI) of the brain was performed, which showed regional inflammation of the left cavernous region involving dural and orbital apex without any sinus thrombosis (Fig. 1). The inflammation was likely an ascending infection from the adjacent sphenoid sinusitis. Interestingly, there was also a small bony defect at the roof of the left sphenoid sinus, measuring about 2 mm, close to the left cavernous sinus.

The clinical triad of areflexia, ataxia, and ophthalmoplegia led to the diagnosis of MFS. The patient was started on intravenous immunoglobulin (IVIg) 2g once daily for five days and recovered remarkably. Anti-Ganglioside GQ1b Antibody Immunoglobulin G (anti-GQ1b IgG) was negative, and nerve conduction studies were normal. The sphenoid sinusitis was managed with intranasal oxymetazoline spray for one week, followed by intranasal corticosteroid spray without any surgical intervention. Upon discharge, he was well except for residual diplopia due to left lateral rectus palsy. Follow-up at two months revealed complete recovery, with repeat CT of the paranasal sinuses demonstrating resolved sphenoid sinusitis (Fig. 2).

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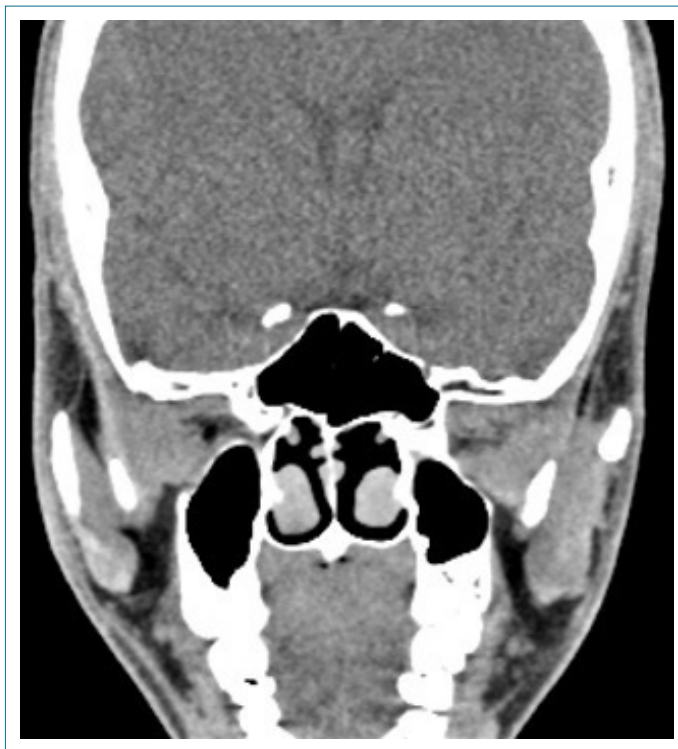


**Figure 1. Inflamed left cavernous sinus region with adjacent sphenoid sinusitis**

## DISCUSSION

MFS is a principal variant of GBS, typically characterized by the triad of ataxia, areflexia, and ophthalmoplegia. As a variant, MFS can still form a continuum with GBS, as approximately five percent of patients with MFS tend to develop weakness during their disease course (1). The incidence of GBS is 1 to 2 per 100,000 per year, and MFS accounts for 5 to 10% of those cases in the Western world, with a higher proportion in Eastern Asia, reportedly 25% in Japan (3). Due to the autoimmune background of the disease pathogenesis, an antecedent infection is often present, commonly either a URTI or gastrointestinal illness. *Campylobacter jejuni* is the most frequently identified antecedent infection, occurring in about 30% of patients, while other reported pathogens include *Haemophilus influenzae*, *Mycoplasma pneumoniae* and *cytomegalovirus* (4). The pathogenesis of the immune response against the host nerve gangliosides is due to molecular mimicry that occurs between these and lipo-oligosaccharides on the surface of the infectious agent. Our patient also reported an antecedent URTI ten days prior to admission.

Meanwhile, sphenoid sinusitis can present with various neurological symptoms due to its anatomical location and proximity to crucial neurovascular structures. Rare cases of septic cavernous sinus thrombosis, isolated abducens nerve palsy, and even Horner's syndrome have been reported in the literature (5). However, MFS masquerading as sphenoid sinusitis is exceptionally scarce, with only a single case reported to date (2). Chaudhary et al. (2) reported a case of a 45-year-old woman who presented with diplopia, ataxia, and left-sided headache, with imaging findings of left sphenoid sinus opacification. Emergent left sphenoid sinusotomy drained turbid serous fluid. However, the patient further



**Figure 2. Resolved sphenoid sinusitis at two months follow-up**

deteriorated, and subsequently, a revised diagnosis of MFS was made. Anti-GQ1b antibody was positive, and the patient staged a successful recovery with IVIG.

Our patient had a few salient differences compared to the previously mentioned case. He had bilateral ptosis and complex ophthalmoplegia. These brainstem findings pose a diagnostic conundrum with various possible differentials, such as myasthenia gravis and brainstem stroke (6). Nevertheless, the initial CT findings were suggestive of left sphenoid sinusitis with bilateral cavernous sinus thrombosis (CST), which could, in theory, explain the presenting symptoms. Although the sphenoid sinusitis is lateralized, bilateral cavernous sinus involvement following unilateral sphenoid sinusitis can occur (7). In fact, unilateral cavernous sinus thrombosis ensuing sphenoid sinusitis on the contralateral side has been reported before (8). This is feasible due to the midline anatomical location of the sphenoid sinus, whereby a particular side of the sphenoid sinus could extend posterior to the contralateral side, thus being in contact with both cavernous sinuses. In the modern era of antibiotics, sphenoid and ethmoid sinusitis have become the commonest etiology of CST, either via direct extension or retrograde thrombophlebitis along ophthalmic veins (8).

Following the CT findings, an MRI was performed, which revealed the absence of CST. It also found a small defect at the left sphenoid sinus roof, which predisposed to the regional inflammation of the left cavernous region. The MRI proved that the ongoing unilateral sphenoid sinusitis is unlikely to be the primary etiology. The characteristic triad of ataxia, areflexia, and ophthalmoplegia was duly recognized and led to the diagnosis of MFS. The preliminary investigations, such as lumbar puncture and infectious panel screen, were negative, which possibly argued against MFS. However, the classic albuminocytological dissociation seen in the cerebrospinal fluid of GBS patients may not always be present, especially in the

first week of presentation, and tends to be more prominent in later weeks. This could explain the absence in our patient, who was subjected to lumbar puncture in the first week itself (9).

Meanwhile, anti-GQ1b antibodies, which are often found in MFS patients with ophthalmoplegia, were also absent in our patient. Contrastingly, this antibody tends to peak in the first week of illness itself compared to the albuminocytological dissociation of CSF fluid (9). Anti-GQ1b is highly expressed in the oculomotor, trochlear, and abducens nerves, as well as muscle spindles, thereby explaining the occurrence of ophthalmoplegia and cerebellar-like ataxia. Notwithstanding the possible factor of the lack of standardization of anti-ganglioside serology among laboratories, the negative antibody serology in our patient should not hinder the diagnosis of MFS. Wakerley (2014) from the GBS classification group did not stipulate the antiganglioside antibody testing in their proposed diagnostic system of GBS and its variants. Nevertheless, it was mentioned as a supportive feature (10). In line with that, the characteristic clinical triad, monophasic course of illness, antecedent infection of URTI, and remarkable recovery of our patient following the administration of IVIG cemented the diagnosis of MFS.

## CONCLUSION

MFS can present in many ways, causing a diagnostic conundrum. One such rare presentation is MFS mimicking sphenoid sinusitis with cavernous sinus involvement. Nevertheless, sphenoid sinusitis always warrants a thorough neurological examination due to its proximity to crucial neurovascular structures. This case highlights the potential of sphenoid sinusitis to mask a more devastating condition like MFS. Otorhinolaryngologists should always maintain a high index of suspicion in patients presenting with neuro-ophthalmic signs and symptoms in the setting of sphenoid sinusitis as this may mask a more sinister condition.

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Peer-review:** Externally peer-reviewed.

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