

Sphenoid Sinus Mucocele Affects Optic and Oculomotor Nerves

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An 83-year-old man was referred from urgent care to the ophthalmology clinic for evaluation of new-onset binocular diplopia, vision loss in his left eye, and a progressive drooping of his left upper eyelid. Both the patient and his wife noted that these symptoms had been present and had progressed in severity over the previous 2 weeks. He reported no changes in his constitution or mentation over the same period, and he appeared to be in good health overall.

History. The patient had a prior diagnosis of moderate-stage primary open-angle glaucoma with scattered visual field defects in his right eye. His right eye had been treated 5 years earlier with endoscopic cyclophotocoagulation glaucoma laser to lower his intraocular pressure. Following the laser treatment, he no longer needed glaucoma medications to maintain his target intraocular pressure.

The patient reported no history of past or recent head trauma. He had a remote history of nasal surgery in the 1980s for an obstruction but was uncertain of the surgical details. He had stopped smoking more than 50 years ago and rarely consumes alcohol. He reported no unexplained weight loss, fever, lymphadenopathy, chills or other constitutional symptoms. He had worked as a salesperson for a corrugated cardboard company and had spent a fair amount of time in cardboard plants, but he had been retired for more than 10 years. At the time of his initial evaluation, he was taking simvastatin and loratadine.

Physical and ocular examination. The patient presented with left upper eyelid ptosis, ipsilateral superior-temporal extra-

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ocular muscle restriction, ocular misalignment, pupil asymmetry with increased pupil diameter in the left eye, and an edematous left optic nerve head (**Figures 1 and 2**). The diameter of his left pupil was larger than the diameter of the right pupil. A 0.9-log-unit afferent pupillary defect was present in his left eye, as well. The patient was unable to elevate his left upper eye lid without recruitment of the frontalis muscle. The appearances of the right upper eyelid and right eye were unremarkable. Visual acuity was 20/25 in the right eye and 20/30 in the left eye.

Diagnostic tests. Computerized Humphrey visual field analysis confirmed the presence of a dense, extensive visual field depression of the left eye that had not been present in his historical visual field tests (**Figures 3 and 4**). Fundus photography showed disc edema of the left optic nerve head (**Figure 5**). Optical coherence tomography (OCT) of the left optic disc demonstrated elevation of the retinal nerve fiber layer in the superior, inferior, and nasal quadrants (**Figure 6**). The right eye showed inferior quadrant retinal nerve fiber layer depression consistent with previous OCT measurement and his previous diagnosis of glaucoma.

A computed tomography (CT) scan with and without contrast and CT angiography (CTA) of the head were obtained. The CT images showed a nonenhancing, soft-tissue mass in the left sphenoid sinus extending into the sella turcica and temporal fossa causing bone erosion of the sphenoid sinus and lateral

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Left upper eyelid ptosis and slightly increased left pupil diameter.



Ocular misalignment and extraocular muscle restriction in superior-temporal gaze of the left eye.

displacement the left internal carotid artery and carotid syphon (**Figure 7**). The CTA results were unremarkable.

A magnetic resonance imaging (MRI) scan was also obtained, which showed a cystlike lesion of the sphenoid sinus (**Figures 8 and 9**). Magnetic resonance angiography (MRA) results were unremarkable. Nasal endoscopy examination confirmed the presence of an extensive left sphenoid sinus mucocele with mild septum deviation to the left (**Figure 10**). There was no purulence or polyps bilaterally.

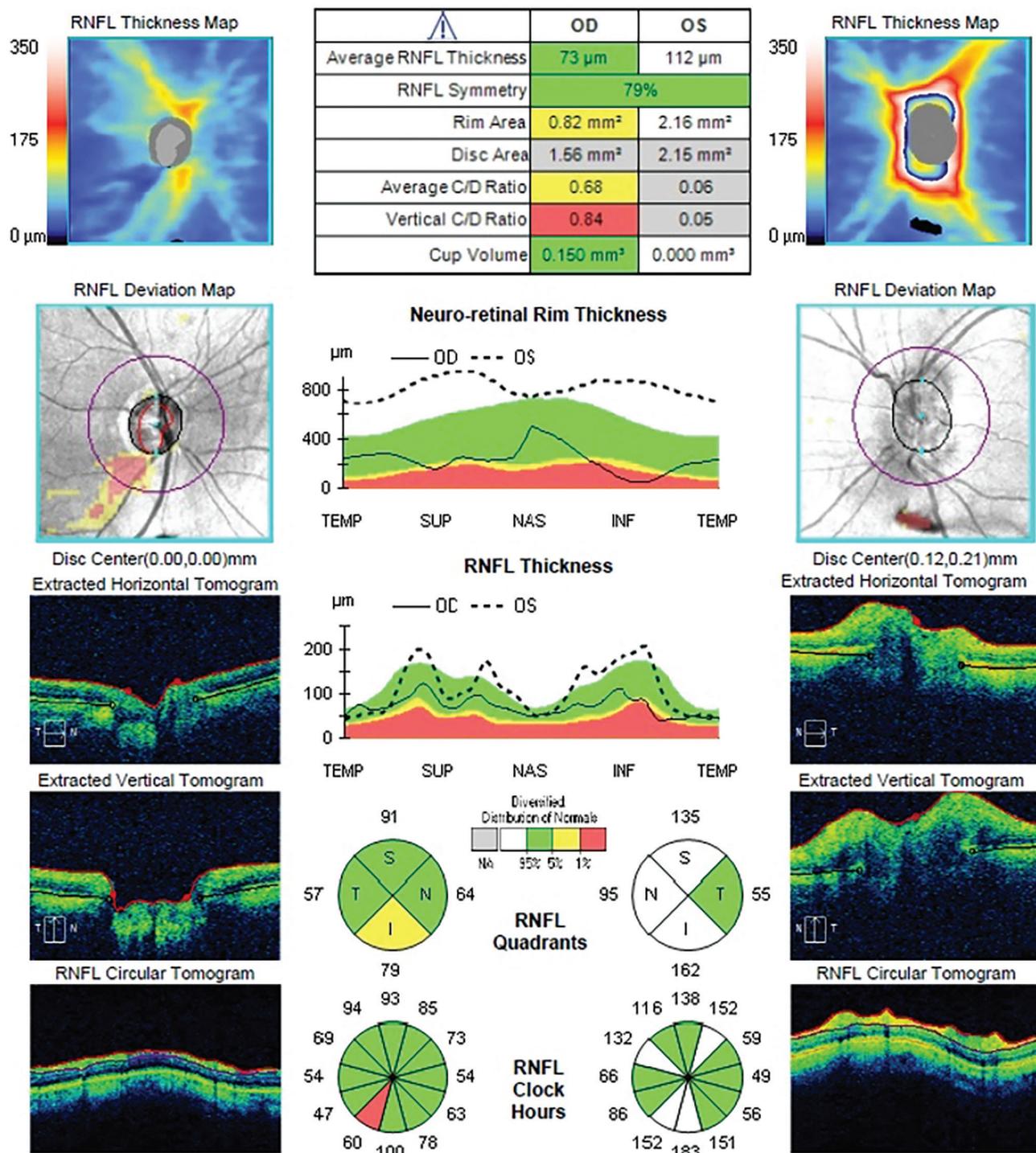
Diagnosis. After examination and diagnostic testing was completed, the patient received a diagnosis of pupil-involving,

left oculomotor nerve palsy and compression of the left optic nerve secondary to an expansive sphenoid sinus mucocele. The proximity of the mucocele to the midbrain and cranial nerves caused mechanical compression and functional depression of the left optic and oculomotor nerves.

Outcome of the case. The patient was taken to surgery by the otolaryngology team, where a large amount of inspissated mucoid secretion and mucocele itself were evacuated (**Figure 11**). The sinus was sequentially irrigated revealing the exposed pulsatile carotid, as well as the dura. There was no cerebral spinal fluid leakage and no damage to the carotid artery. The

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OCT results of the optic nerve head showing increased thickness of the left retinal nerve fiber layer.



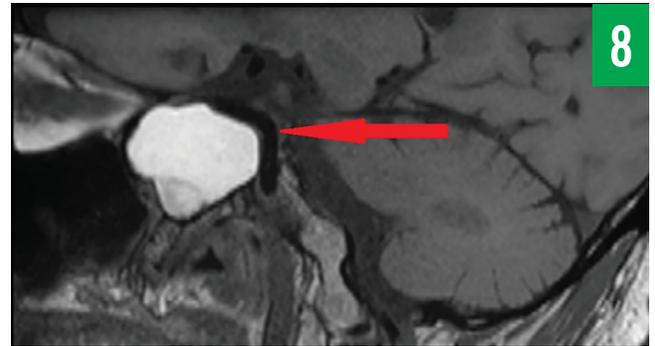
Axial CT scan showing a soft-tissue mass causing bone erosion within the left sphenoid sinus extending beyond the midline (arrow).

chronic lacrimation, diplopia, and decreased visual acuity. Headaches and nasal symptoms are also commonly associated with paranasal sinus mucoceles.⁵

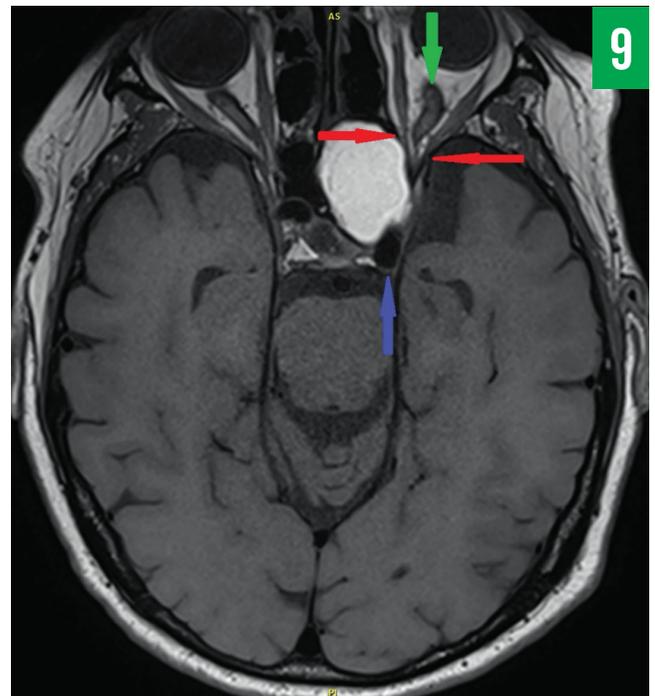
The combination of our patient's age and the mucocele location were a very unlikely pairing for paranasal sinus mucocele presentation. The diagnosis was a welcome surprise given the patient's ominous clinical presentation. We suggest that the patient's sphenoid sinus mucocele was a possible sequela of his previous nasal surgery.

Presentation. Space-occupying lesions of the sphenoid sinus may impact the function of several cranial nerves, causing ophthalmic complications. The second, third, fourth, fifth, and sixth nerves may all be impacted by mechanical compression from an expanding mucocele, which may cause ipsilateral muscle palsy to any or all of the 6 extraocular muscles. Symptoms of new-onset vision loss with or without new onset diplopia always warrant further examination to determine the etiology.

Diagnosis. A CT scan of a paranasal sinus mucocele will display a homogenous, well circumscribed mass located within

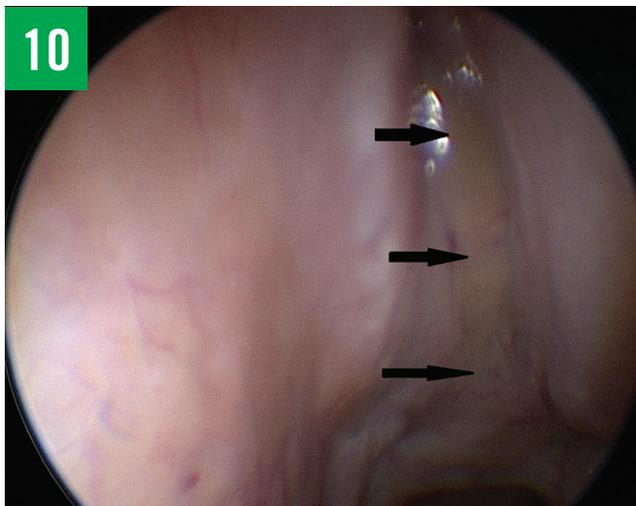


Sagittal MRI scan showing hyperreflective sphenoid sinus mucocele and displaced carotid artery (arrow).

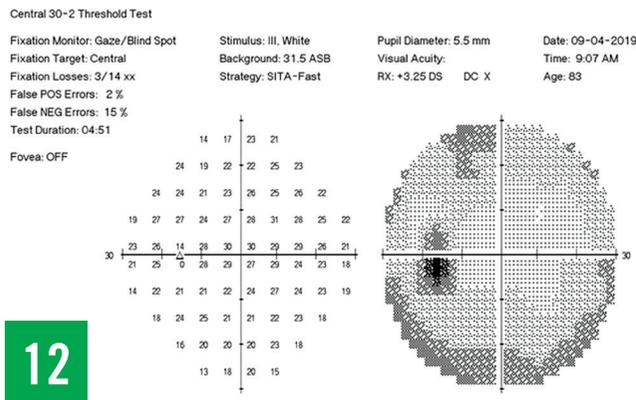


Axial MRI scan showing compression and contortion of the optic nerve (green arrow), compression of medial and lateral rectus muscles of the left eye (red arrows), and displacement of the carotid artery (blue arrow).

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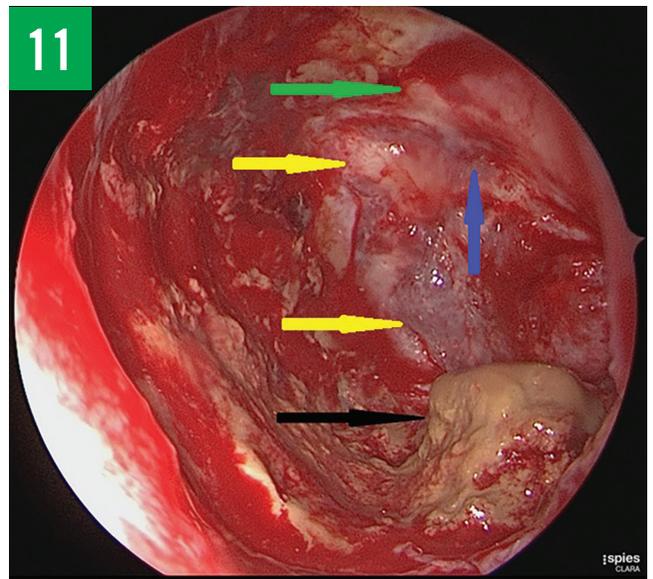
Endoscopic image showing the base of the sphenoid sinus mucocoele (arrows).



Results of a computerized Humphrey visual field test showing the patient's improved visual field 1 month following the procedure (see **Figure 4** for the presurgical visual field test results).

the sinuses, which may affect and displace the bony walls of the sinus and neighboring structures. Paranasal sinus mucocoeles may image as hypodense, isodense, or hyperdense compared with the surrounding tissues. MRI scans also may reveal variable intensity of T1-weighted images and a hyperintense mass on T2-weighted images, depending on the composition, contents, and hydration of the mucocoele.^{4,5}

Treatment. Historically, paranasal sinus mucocoeles had been excised by opening the involved sinus cavity externally. Surgical removal of mucocoeles through endoscopic nasal sinus surgery is less invasive and better tolerated than the open sinus approach. The endoscopic surgical procedure has high success rates and recurrence rates close to zero. Endonasal evacuation and mar-



Endoscopic image of partially evacuated sphenoid sinus with residual inspissated mucoid material (black arrow), the optico-carotid recess (blue arrow), the carotid artery (yellow arrows), and the optic nerve (green arrow).

supialization of paranasal sinus mucocoeles has also been shown to reverse vision loss resulting from the presence of a mucocoele. In cases where the mucocoele was removed within 6 days of initial presentation, even severe vision loss was reversed.⁶

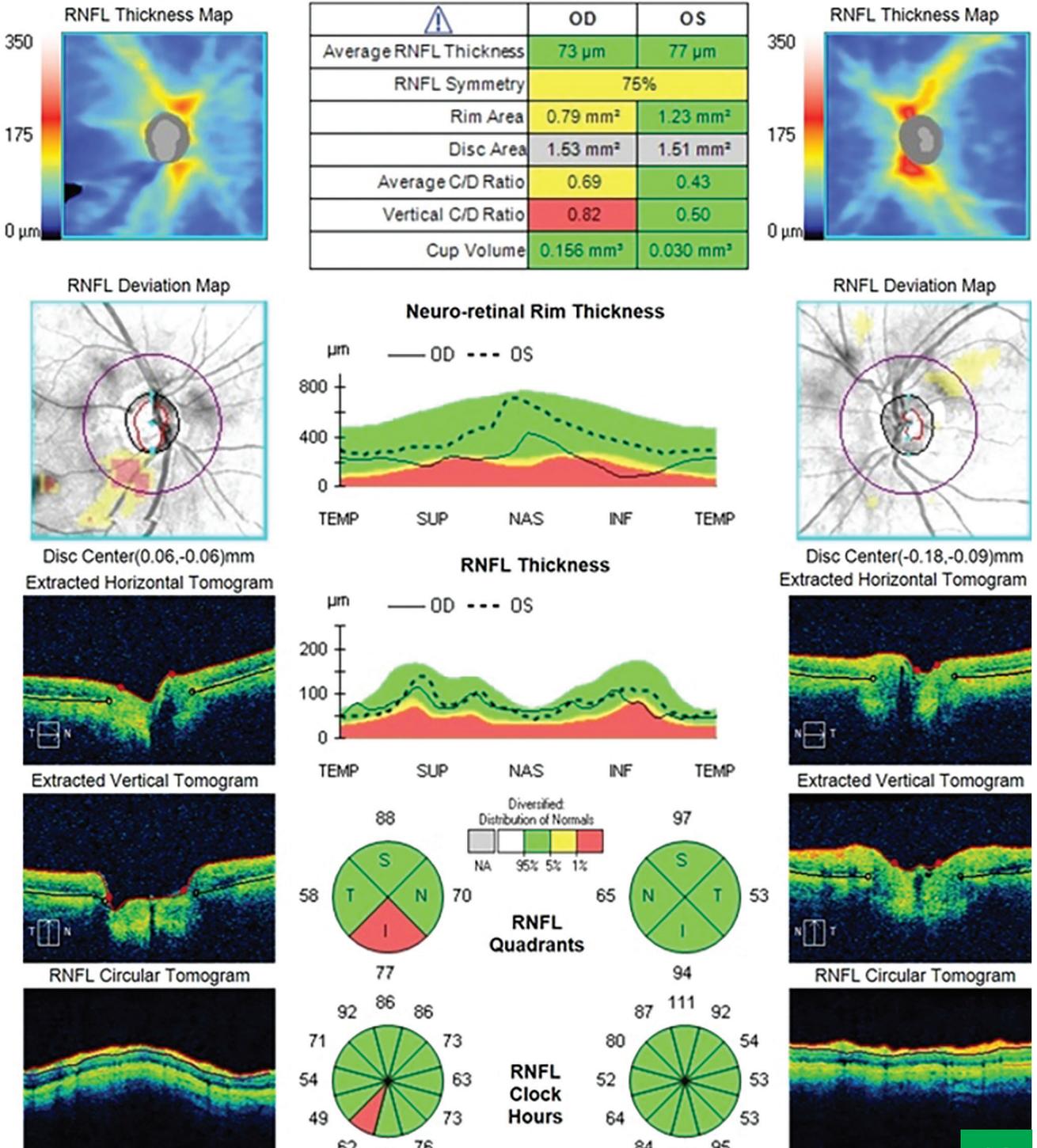
Take-home message. Patients presenting with new-onset diplopia, vision loss, and extraocular muscle restriction always warrant thorough investigation to determine the etiology. In cases where paranasal sinus mucocoeles are the cause, long-term visual and ophthalmic outcomes are often favorable when appropriate surgical intervention is taken in a timely manner. ■

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OCT results showing resolution of retinal nerve fiber layer swelling in the left eye (see Figure 6 for presurgical OCT results).