

[MIGRAINE](#)

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Sinus Migraine: An Emerging Diagnosis

The intricate and changeable pathophysiology of migraine can create clinical presentations similar to rhinosinusitis. The authors propose a new way to think about migraine and a new classification for the disorder.

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A complex disorder of sensory processing, migraine is thought to be triggered deep in the brain but attacks can come from other pathways. [iStock/Graficaprint](#)

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Rhinosinusitis affects 11.6%, or approximately 30 million people in the US each year.¹ It is one of the leading reasons for antibiotic prescriptions, with about \$150 million spent on them per year. Yet, for 70% to 80% of people with sinus complaints, symptoms resolve *without* the use of antibiotics in 2 weeks.²⁻⁴

Perhaps, a diagnosis other than rhinosinusitis is warranted when [a patient presents with facial pressure](#) and pain, nasal stuffiness, and runny nose. Although rarely considered, it is possible that the nervous system is fooling us into believing that there is a sinus infection where none exists. In this article, we make the case that certain presentations of migraine may, in fact, be misdiagnosed as rhinosinusitis and instead should have their own classification.

SENSORY PROCESSING

Migraine and Sensory Processing

Background

Migraine disorder is not exactly synonymous with simply having a bunch of bad headaches. Most people, clinicians included, think of migraine as a headache disorder characterized by associated nausea, vomiting, photophobia, and phonophobia. However, migraine can affect other parts of the sensory system as well, causing temporary, reversible visual changes, vertigo, hearing loss, ear pressure or ringing in the ear, and changes in smell.

A complex disorder of sensory processing, migraine is thought to start with a triggered activation of pain pathways deep in the brain that causes headache and inflammation. Over time, these attacks can evolve from episodic head pain to a more persistent sensitization of the nervous system. Think about how ocular migraine causes temporary visual effects that mimic a stroke or how vestibular migraine disrupts normal balance without necessarily being accompanied by a headache. This intricate and changeable pathophysiology of migraine disorder can create clinical presentations that confuse both patients and clinicians.

Enter the Sinus Migraine

Until recently, migraine symptoms involving the nose and sinuses have been largely overlooked, but a steady flow of studies has been building an argument to change our thinking about rhinosinusitis. It appears, for example, that migraine can affect the trigeminal nerves that create sensations of pain and pressure in the sinus cavities over the forehead, around the eyes, and beneath the cheeks.⁵ Migraine can also send signals to the autonomic nerves and produce abnormal amounts of nasal secretions, a stuffy nose and red, teary or dry eyes.⁵

Until this potential new migraine entity is given a proper name, we should consider calling it a neurogenic form of sinusitis, or “sinus migraine.”

RHINOSINUSITIS

Diagnostic Criteria for Rhinosinusitis

To compare, the American Academy of Otolaryngology–Head and Neck Surgery focuses a diagnosis of rhinosinusitis on infectious etiology. The [criteria require a person to have the symptoms](#) of facial pain-pressure-fullness, combined with nasal obstruction. The common problem with this criteria is that clinicians do not focus on the critical distinguishing feature of purulent discharge. Therefore, clinicians often diagnose people with facial pain and pressure as having rhinosinusitis, overlooking the criteria of nasal congestion and purulent discharge. Others mistake excessive nasal secretions for purulent discharge.

The lack of rigor in documenting rhinosinusitis criteria leads to misdiagnosis because migraine can create facial pain and pressure, nasal congestion, and rhinorrhea. Such

presentations were supported by a study of 2,991 patients with self-described or physician-diagnosed sinus headache, with the majority of symptoms reported being sinus pressure (84%), sinus pain (82%), and nasal congestion (63%). Researchers found 88% of patients met the International Headache Society criteria for migraine or probable migraine.⁶ In another study of 47 patients with IHS defined migraine, 74% reported nasal stuffiness and 60% reported rhinorrhea with their headaches.⁷

Why Migraine is Not Considered in Rhinosinusitis Symptoms

Neurogenic sinus symptoms are sometimes unrecognized because there is no reliable diagnostic test. A nasal endoscopy can rarely identify a purulent infection and sinus CT scans have proved to correlate poorly with patient symptoms. A study by Barham et al found that more than 95% of individuals presenting with acute sinus symptoms did not have any objective findings on a CT scan.⁸

Finally, a delay in diagnosis or misdiagnosis can be perpetuated by the relief of symptoms with a course of antibiotics, steroids, or surgery because several antibiotics decrease inflammation, as do corticosteroids, and secondarily calm the hypersensitive nerves of migraine (but only temporarily). The effectiveness of surgery can also be temporary as sinus and nasal surgery involves the removal of mucosa and results in disruption of sensory and autonomic nerves. Over the following 6 to 12 months, nerve fibers can re-establish their function and neurogenic symptoms may slowly return.

SINUS MIGRAINE HYPOTHESIS

Clinical Perspective: The Sinus Migraine Hypothesis

To establish a diagnosis for midfacial pressure and pain, headache specialists rely on the International Classification of Headache Disorders (ICHD-3). Currently the only secondary headaches related to the paranasal sinuses are headaches attributed (triggered) by acute, chronic, or recurring (inflammatory or infectious) rhinosinusitis.⁹

In the authors' view, this classification system is missing the option of a neurogenic etiology.

Sinus Migraine Pathophysiology

Although the [pathophysiology of sinus migraine is unknown](#), one theory proposes the pathophysiology begins with the activation of the trigeminal and autonomic nervous systems. The pain-sensing trigeminal nerve originates from the trigeminal nucleus caudalis of the brainstem, which is the nerve center for pain signals coming in and out of the central nervous system. Its first division, known as V1 or the ophthalmic branch, innervates the blood vessels in the brain and is responsible for the headache of migraine.

Its second division, V2 or the maxillary branch, innervates primarily the sinus and nasal mucosa. The sinuses contain sensors that relay pain and pressure signals to the trigeminal

nucleus. The mucosa also contains parasympathetic nerves that control the blood flow to nasal tissues and are responsible for a stuffy nose. They also control the secretory glands, and when activated result in a runny nose. In the brainstem, the trigeminal nucleus also has many secondary connections throughout the brain. One of these connections is to the superior salivatory nucleus, which is the control center for the parasympathetic nerves to the nose.

These nerve centers in the brainstem can become hyperactive by two known mechanisms. The first is a cortical spreading depression, the biological underpinning of a migraine headache attack. Second, it is believed that the inflammation within the brain that occurs with each attack slowly corrupts the nervous system and leads to a second form of migraine disease known as central sensitization, which is often associated with chronic migraine. A familiar example of this phenomenon of spontaneous hyperactivity is allodynia.

The sinus migraine hypothesis is that, if this process of central sensitization involves the trigeminal nucleus and superior salivatory nucleus, it is possible that a person could experience sinus pain and pressure, a stuffy nose, and a runny nose without having an infection within the sinuses.

Perhaps the strongest evidence headache specialists have to date for sinus migraine as its own condition is the response of individuals with migraine history and suspected rhinosinusitis to both rescue and preventive migraine medications. A study of 54 patients with sinus headache and absence of sinusitis on imaging found 82% had a significant reduction of head pain with triptans.¹⁰

On the other hand, another study used low dose amitriptyline for 240 patients with chronic mid-facial pain. The researchers reported, "After 3 years, nearly half of the patients were symptom free, and in a third the pain changed from being chronic to being episodic."¹¹ Reversing chronification is extremely challenging in people with migraine and this treatment demonstrated promising results.

In addition, using an interdisciplinary approach between otolaryngology and neurology resulted in a positive outcome for 92.4% of people with sinus symptoms.¹²

Consulting with an otolaryngologist and a neurologist can therefore be helpful when a person has unresolved symptoms or symptoms with an unknown etiology.

Why Sinus Migraine Matters for Treatment

Without a better understanding of how migraine might be mimicking rhinosinusitis, we are all paying a price. Not having a distinct name for this condition with effective diagnostic criteria and clinical guidelines for managing it leads to delays and inappropriate patient care. In regard to public health, upper airway infection is one of the leading uses of oral antibiotics, and yet the effectiveness of antibiotics for rhinosinusitis has been documented as poor.¹³

While little attention has been given to this fact at a time when antibiotic stewardship has emerged as a national health priority, the concern is that the inappropriate use of antibiotics has accelerated antibiotic resistance, changed the gastrointestinal microbiome, and caused serious gastrointestinal complications, such as *Clostridium difficile* infection.

In addition, recent studies have raised doubts about the efficacy of expensive sinus balloon surgery for relieving sinus pressure and pain.¹⁴ Finally, misdiagnosis and inappropriate medical and surgical treatments are contributing to the avoidably huge sinusitis-related healthcare costs, estimated up to \$12.5 billion per year, and the socioeconomic cost of 11.5 million missed work days related to “rhinosinusitis.”¹⁵

CLINICAL RECOMMENDATIONS

Clinical Recommendations for Future Rhinosinusitis Assessment

Until new clinical guidelines are established, we recommend more routine screening of patients with rhinosinusitis symptoms for active or past symptoms of migraine, for common migraine comorbidities, and family history of migraine. A cone CT scan (low radiation dose imaging) should be considered early in the diagnostic work-up because it can often identify patients who do not have sinus abnormalities that correlate to symptoms. And a trial of migraine rescue or preventive medicine may be more economical and less risky than a trial of antibiotics.

*We recommend screening with the ID-Migraine questions:*¹⁶

- During the past 3 months, have you ever had any of the following symptoms concerning your headache pain?
- Has a headache limited your activities for a day or more in the last three months?
- Are you nauseated or sick to your stomach when you have a headache?
- Does light bother you when you have a headache?

Answering “yes” to at least 2 of these questions has been shown to mean that there is more than 90% chance that a person has migraine disease.

For people with chronic or recurring sinusitis, be skeptical and consider sinus migraine.

- Screen for migraine and be persistent in asking questions about other subtle migraine-related symptoms, such as ear pressure, a fluid sensation in the ears, loss of balance, facial pain or pressure, dizziness, temporary visual changes, and sensitivity to noise, smell, or light.
- Ask about a history of migraine, at any age.
- Ask about a family history of migraine.

- Ask about common migraine comorbidities, such as irritable bowel syndrome, anxiety, depression, or fibromyalgia and learn more about the 75 or more migraine comorbidities.¹⁷
- Even though the findings of sinus CT scans have proved to correlate poorly with patient symptoms, it is still diagnostically useful to obtain a sinus CT scan to better establish if a patient has any findings that accurately correlate with an active infection.
- Consider a trial of a rescue medicine, such as sumatriptan, or preventive medicine, such as low-dose amitriptyline or a CGRP blocker.

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