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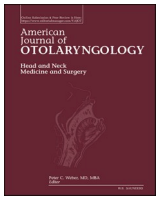

Rhinogenic and sinus headache – Literature review

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ABSTRACT

Background: Headache is a common, yet challenging symptom to evaluate given its wide range of clinical presentations and different etiologies. For centuries, conceptual understanding of headache causation has been attributed to anatomic abnormalities of the nose and paranasal sinuses.
Methods: Structured literature review.
Results: The number of cases, categorized as migraines or other primary headaches, misdiagnosed as a "sinus headache" is high in the literature, ranging from 50 to 80%. The potential mechanisms for rhinogenic headaches were classically described as pain secondary to prolonged mucosal contact points, hypoxia in the paranasal sinuses secondary to poor ventilation, or pressure caused by the growth of nasal polyps. Additionally, other mechanisms were described and are still being studied. Corrective surgery for mucosal contact points in the nasal cavity is deemed necessary for relieving the headache, although patient outcomes are variable.
Conclusion: Delay in proper diagnosis and treatment negatively impact patient quality of life. Most cases of "sinus headache" or "rhinogenic headache" seen in clinical practice are in fact misdiagnosed as either primary headaches or migraines. Because of increased misdiagnoses, Otolaryngologists should establish a direct and precise diagnosis congruent with a chief complaint being a headache. Vital information such as a good clinical history, well-performed nasal endoscopy, and occasional CT scan may decrease misdiagnosis probability.

1. Introduction

Headache is considered a common symptom, although it is difficult to evaluate as it is due to its wide range of clinical presentations and etiologies [1]. Many studies in the literature have found that many migraine cases either go undiagnosed or are misdiagnosed as chronic rhinosinusitis [2]. Other types of tension, vascular and tumor-related headaches, and facial pain can confound and delay correct diagnosis, negatively impacting patient quality of life.

For centuries, conceptual understanding of headache causation has been attributed to anatomic abnormalities of the nose and paranasal sinuses [3]. In 1920, Sluder described neuralgia of the sphenopalatine ganglion as a possible cause of chronic headaches. In the 1940s, Wolf described the study of referred nasal pain after application of stimuli to internal structures of the nose [4]. However, interest in so-called rhinogenic headaches increased with the advent of the endoscope; further spurring advancements for more precise endonasal surgical techniques in recent decades [5].

On the other hand, the presence of gross nasal deformities in asymptomatic patients [1,5] indicates there are multiple mechanisms and multifactorial etiology implications in such cases of headaches, hindering diagnosis and correlation of symptoms with anatomical findings. With this in mind, the selection of patients for surgical treatment is a crucial challenge due to a small percentage of patients who meet migraine criteria for migraine and tension headaches [7,8]. Thus, the diagnosis of pathological conditions that manifest as a headache is still confounded, as many authors use the term *sinus headache* to refer to clinical pictures that meet criteria for migraine and tension headache [9,10]. Conversely, a small percentage of patients who meet criteria for migraine may present concomitant sinus pathology [11,12].

Within this context, the objective of the present study was to conduct a review of the literature on rhinogenic headache to elucidate the etiology differences, advance current understanding of this disease entity, and facilitate its diagnosis.

2. Methods

The authors performed a search on PubMed database in December

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2020 using the mesh terms "Headache"[Mesh] OR "Pain"[Mesh] AND non-mesh terms, frequently used in literature: "sinonasal OR middle turbinate OR rhinopathic OR rhinogenic OR sinus OR contact point OR Sluder OR nasal". The search results were then initially refined by including only articles in English, Portuguese, and Spanish.

From 6035 articles, all titles and abstracts were screened by two independent researchers. All articles addressing rhinogenic or sinonasal headaches related to differential diagnoses proceeded in the screening process with case reports being excluded. There were no duplicates.

Following the first screening, 121 remaining articles were assessed in their full text version.

33 articles ultimately matched the objectives of this review due to their clinical relevance regarding diagnosis and management of rhinogenic headaches. An additional 19 articles were added after reviewing reference lists for retrieved publications, mostly regarding differential diagnosis correlated to migraines. Therefore, a total of 52 studies ultimately were included in this review (Fig. 1).

3. Definition, history, and pathophysiology

A correlation between rhinogenic headache diagnosis and mucosal contact points is not novel. John Roe was the first to describe the condition in 1888 [13]. In the 1920s, Sluder postulated that such headaches could occur even in the absence of inflammation or infection through rarefaction of the sinus cavity [12,14]. Further, in 1943, McAuliffe et al. [15] challenged the mechanisms underlying sinus pain and theorized that it did not originate in the mucosal lining of the paranasal sinuses, but in the structures of the nasal cavity, paranasal sinuses, and sinus ostia [15]. Similarly, Colley et al. [16] performed research to update the differential diagnosis between sinus and rhinogenic headaches. Conclusively, it is surmised that the most accurate way to differentiate these two entities lies with the location of pain in relation to the resulting inflammatory response. Rhinogenic headaches are classified when the pain has no relation to inflammatory sinus diseases. On the other hand, sinus headaches should be understood as pain arising from inflammatory sinus conditions, such as acute bacterial rhinosinusitis.

Although referred pain was reported as early as 1946 [16], Greenfield, better explained its mechanisms in the sinonasal region [17]. Pain resulting from injury or mucosal contact in the sinonasal cavity is not felt locally, but often referred to the dermatomes of the fifth cranial (trigeminal) nerve branches. As a result, afferent pain fibers, sinonasal receptors, and sensory fibers originating in cutaneous receptors, correspond to the sensory neurons in the trigeminal nerve nucleus. These two pathways (nasal cavity and cutaneous receptors) synapse with common cortical neurons, posing complications for cortical neuron distinguishability correlated to stimulus origination. Thus, when the mucosa is stimulated, pain impulses are falsely localized upon reaching the sensory cortex [1,17–19].

In 1988, Stammberger and Wolf hypothesized that headaches of rhinogenic origin were caused by (1) referred pain due to intense and constant mucous contact, (2) hypoxia of the paranasal sinuses due to poor or absent ventilation, and (3) pressure caused by proliferation of nasal polyps [20]. In addition, a potential mechanism for mucosal contact point headaches postulates that axonal reflex arcs are generated upon stimulation between the two mucosal surfaces within the nose or paranasal sinuses. This reflex triggers the release of substance P, a vasodilating neuropeptide found in unmyelinated group C nerve fibers.

Substance P causes vasodilation, plasma leak (neurogenic edema), and histamine release, among other inflammatory events. This vascular phenomenon may be responsible for migraine-like headache secondary to referred pain, as the dura mater, nasal cavity, and paranasal sinuses are innervated by the trigeminal branches. Additionally, constant mucosal contact would lead to localized or referred pain following the distribution of the first and second trigeminal branch dermatomes [10,11]. Next, Substance P can be transported and released in both central and peripheral sensory neurons, mediating not only central (orthodromic) reflexes in group C fibers but also peripheral (antidromic) reflexes [19–21]. The peripheral stimulus responsible for triggering the axonal reflex may be infectious (secondary to chemical irritants), caloric, or mechanical (e.g., pressure). This model of axonal reflex-

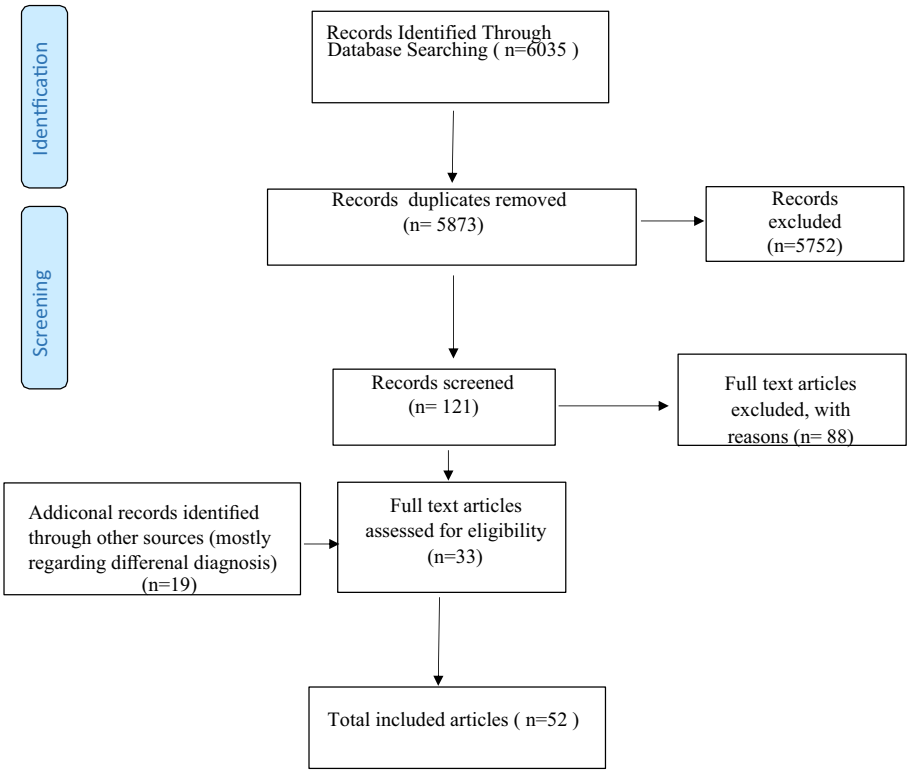

Fig. 1. Search strategy diagram.

mediated substance P release with orthodromic (causing pain) and antidromic (causing local reactions) impulses, explains why mucosal contact and pressure can cause pain, mucosal edema, hypersecretion, and even increased severity of pulmonary symptoms. This is specifically seen in patients with asthma, secondary to smooth muscle contraction [21,22,24].

To be credited as the source of facial pain or headache, the presence of mucosal contact points should be predictive of pain in the entire population. However, mucosal contact has been described in both symptomatic and asymptomatic patients (i.e., patients with and without headache). Furthermore, in symptomatic patients with unilateral pain, mucosal contact points were also observed on the contralateral side in up to 50% of patients. It is also worth noting that contact between mucous membranes is not known to cause pain anywhere else in the body [23]. In a retrospective study (2001) of approximately 900 patients, Abu-Bakra and Jones evaluated the correlation between headache and nasal mucosal contact points, identifying that the percentage of mucosal contact was synonymous in patients who experienced a headache and those who did not [23]. Thus, this correlation suggested that co-occurrence of mucosal contact points and headache might be purely coincidental [11,25].

Mendonça and Filho conducted a review to highlight headache causation with respect to nasal origin, including anterior ethmoidal nerve syndrome, Charlin's syndrome (nasociliary neuralgia), olfactory fissure syndrome, septal contact headache, and nasal spur headache [1]. Research indicated that nasal deformities were frequently unaccompanied by a headache, in accordance with the findings of Abu-Bakra and Jones [23,27]. They concluded that surgical treatment, besides correcting anatomical abnormalities, also influences the sensitivity of the nasal mucosa and exerts a certain placebo effect on the patient, which may be involved in clinical improvement [1]. Also, Wang et al. [56] investigated the correlation between nasal anatomical abnormalities and mucosal contact points with respect to headache presentation for 2 years [26]. Of the 185 patients, mucosal contact was observed in 85.9% of patients with refractory headache, but also in 80.4% of patients without a headache. Of all anatomical abnormalities detected, septal deviation was the most frequent (41.1%), followed by middle turbinate pneumatization (32.4%). Septal deviation with lateral nasal wall contact was the only significant abnormality ($P < 0.05$) that was more frequent in the headache group (55.1%) than among patients without a headache (40.2%). Nevertheless, it was concluded that mucosal contact points may not be accurately diagnosed prior to surgery and that a CT of the paranasal sinuses should be mandatory in patients with refractory headache, even in the absence of sinus signs or symptoms. Thus, mucosal contact may be an aggravating trigger for subsequent migraine or tension headache diagnoses coupled with pain origination [23,27,28].

Further supporting nasal septal defect commonality with headache causation, Kim et al. recruited thirty thousand participants with various cases of severity to assess pain scores. One third of the sample size presented with a deviated nasal septum and the rest represented no significant deviation. After a ten-year observational period, it was concluded that individuals who presented with a deviated septum indicated significantly greater pain scores in comparison with patients without a deviated septum [29].

In continuation of surgical treatment techniques, Patel et al. highlighted nasal endoscopy as an essential tool in headache diagnoses utilized by otorhinolaryngologists [26]. Upon observation, frequent misdiagnoses were erroneously termed as sinus headaches, often overlooking trigeminal autonomic cephalalgia and migraine classification (typically diagnosed by clinical history, response to treatment, and exclusion of other causes), in approximately 50–80% of cases (Table 1). Finally, it was understood that proper diagnosis requires a detailed medical history and nasal endoscopy to provide physicians with sufficient information for differentiation of headache causation or ruling out of sinonasal changes congruent with patient complaint [26]. Another non-systemic study performed by Eloy et al. emphasized the difficulties in correctly categorizing patients with migraine headaches associated with autonomic symptoms from patients with sinus disease. The authors concluded that up to 50% of patients diagnosed with sinus infections have normal CTs and nasal endoscopies. This data is significantly higher compared to that of the pediatric population, averaging 70% in those cases [27].

Table 1
Prospective studies of "sinus headache" suggesting migraine as the correct diagnosis (only studies with N>50).

Study	N	Level of evidence	Conclusion
Schreiber et al. [2]	2991	IIb	Migrane with or without aura is diagnosed in patients with "sinus headache" 80% of the time
Foroughipour et al. [46]	58	IIb	Most patients with "sinus headache" (68%) have migrane
Smith et al. [47]	327	Ib	50–70% of pediatric and adolescent patients with "sinus headache" have migraine. Autonomic symptoms can cause diagnostic errors

4. Diagnosis

Most patients who present to the emergency department with a headache have a primary headache disorder, such as a migraine, tension-type headache, or cluster headache. Thus, these cases require no further investigation, since simply fulfilling the clinical criteria establishes the diagnosis. Patients who do not meet diagnostic criteria for primary headaches are candidates for investigation of other etiologies, including rhinogenic headache classification.

Currently, diagnostic studies that directly compare headache causation differences (rhinogenic, temporomandibular joint dysfunction, tension-type, medication overuse, trigeminal neuralgia) are scarce in the literature.

The International Classification of Headache Disorders (ICHD-3), published in 2013 and updated in 2018, uses the term "headache attributed to chronic or recurring rhinosinusitis" when the duration of symptoms exceeds 12 weeks. Headaches that are both attributed to acute rhinosinusitis chronic rhinosinusitis uphold similar, four diagnostic criteria (Table 2), all of which must be met (A, B, C, and D) with evidence of causation demonstrated by at least two factors (criterion C). In addition, the ICHD-3 abolished the previously used term "sinus

Table 2
Diagnostic criteria for headache attributed to chronic disorder of the nose or paranasal sinuses according to the 2018 International Classification of Headache Disorders (ICHD-3).

A	Any headache fulfilling criterion C
B	Clinical, nasal endoscopic and/or imaging evidence of current or past infection or other inflammatory process within the paranasal sinuses
C	Evidence of causation demonstrated by at least two of the following:
	1. Headache has developed in temporal relation to the onset of rhinosinusitis
	2. Headache waxes and wanes in parallel with the degree of sinus congestion and other symptoms of the chronic rhinosinusitis
	3. Headache is exacerbated by pressure applied over the paranasal sinuses
	4. In the case of a unilateral rhinosinusitis, headache is localized ipsilateral to it
D	Not better accounted for by another ICHD-3 diagnosis.

From Headache Classification Committee of the International Headache Society. The International Classification of Headache Disorders: 3rd edition. Cephalalgia. 2018;38: 1-211.

headache" as obsolete, because it was used simultaneously to describe primary and secondary headaches attributable to various pathological conditions or disorders of the nose and paranasal sinuses [7,28–30]. The 2018 update of ICHD-3 affirms that chronic rhinosinusitis can produce persistant headaches, and recent evidence seems to support this causation. In further support, ICHD-3 states that CT images correlated with patient's pain are not sufficient to secure the diagnosis, even if clinical criteria are unmet [30,32].

Due to limited evidence, the ICHD-3 no longer includes mucosal contact point headaches, which was present in the previous Classification (ICHD-2, published in 2004) and based on the criteria in Table 3.

However, according to the EPOS 2020 [31], a reference commonly used in otolaryngology practice, acute rhinosinusitis is often accompanied by facial pain, usually severe and unilateral. In addition, patients have a history of upper airway infection immediately prior to onset of pain alongside nasal obstruction (which is often unilateral in these cases). The latest version of the EPOS, as well as the ICHD-3, also states that chronic rhinosinusitis rarely causes any type of pain, except when there is obstruction of the sinus ostium, in which case it resembles acute rhinosinusitis [31].

According to EPOS 2020, up to 40% of patients experiencing migraines also experience nasal discharge, unilateral nasal congestion, tearing, redness, or ocular swelling during attacks, although the duration of symptoms rarely exceeds 72 h [31]. These symptoms seem to increase difficulty in distinguishing migraines from acute rhinosinusitis. Thus, it is essential to determine via a detailed clinical history whether the patient had an upper respiratory tract infection prior to the onset of the current symptoms, as well as through physical examination of the middle meatus, either by anterior rhinoscopy when possible or, preferably, by nasal endoscopic examination. On the other hand, it is worth noting that more than 80% of patients with purulent secretion in any region of the nasal cavity seen by means of an endoscopy, do not experience a headache or facial pain [31]; hence, the importance of a detailed clinical history and physical and endoscopic examination ensures a more accurate diagnosis. Table 4 summarizes the diagnostic criteria for rhinosinusitis according to EPOS 2020.

Next, key features of a headache related to paranasal sinuses, according to EPOS, are classified by the level of pain exacerbation during upper respiratory tract infections, associated nasal symptoms (obstruction and/or rhinorrhea), and improvement of pain with associated antibiotic therapy [31]. Once a primary headache has been ruled out and a rhinogenic headache is suspected, in the absence of a typical history of rhinosinusitis, the workup should continue with some specific sinonasal abnormalities in mind. Negative results during previous examinations (clinical history and rhinoscopy) do not rule out sinus etiology. Some lesions imperceptible to physical examination can be identified through nasal endoscopy; but, the best diagnostic outcomes are achieved with a combination of nasal endoscopy and computed tomography of the paranasal sinuses. The combination of different diagnostic modalities can provide more of the information necessary to elucidate each case [10,26,30].

Regarding the diagnosis of a sinus headache, Maurya et al. [57] evaluated the pain and location patterns. It was concluded that individuals reporting pain near the eyebrows were diagnosed with frontal sinus disease. Conversely, patients with facial pain usually present with maxillary sinus disease. Furthermore, a paranasal CT scan should focus on coronal sections, which allows for a better interpretation of the narrowest areas of the lateral nasal walls, key regions of which (such as the ethmoidal infundibulum and frontal recess) extend to the frontal plane [10,26,30].

Table 3
Mucosal contact point headache according to the 2004 International Classification of Headache Disorders (ICHD-2).

A. Intermittent pain localized to the periorbital and medial canthal or temporozygomatic regions and fulfilling criteria C and D
B. Clinical, nasal endoscopic and/or CT imaging evidence of mucosal contact Points without acute rhinosinusitis
C. Evidence that the pain can be attributed to mucosal contact based on at least one of the following:
1. Pain corresponds to gravitational variations in mucosal congestion as the patient moves between upright and recumbent postures
2. Abolition of pain within 5 min after diagnostic topical application of local anesthesia to the middle turbinate using placebo or other controls
D. Pain resolves within 7 days, and does not recur, after surgical removal of mucosal contact points
Note: Abolition of pain means complete relief of pain, indicated by a score of zero on a visual analog scale (VAS).
From Headache Classification Committee of the International Headache Society. The International Classification of Headache Disorders: 2nd edition. Cephalalgia. 2004; 24:1–160.

Table 4
Diagnostic criteria for rhinosinusitis according to EPOS 2020.

• Inflammation of the nose and the paranasal sinuses characterized by nasal blockage/obstruction/congestion or nasal discharge (anterior/posterior nasal drip), plus:
◦ Facial pain/pressure, and/or
◦ Reduction or loss of smell.
• And either endoscopic signs of:
◦ Nasal polyps, and/or
◦ Mucopurulent discharge primarily from the middle meatus, and/or
◦ Edema/mucosal obstruction primarily in the middle meatus.
• And/or:
◦ Mucosal changes in the ostiomeatal complex and/or sinuses on CT.
Note 1: When the duration of symptoms is ≥12 weeks, rhinosinusitis is classified as chronic. When the duration of symptoms is <12 weeks, it is classified as acute.
Note 2: In children, reduction or loss of smell is replaced by cough, as it is the most commonly reported symptom in the pediatric population (50–80%).

5. Differential diagnosis

The main differential diagnoses of rhinogenic headaches are hemicrania continua, trigeminal neuralgia, tension headache, medication overuse headache, giant-cell arteritis (temporal arteritis), temporomandibular joint (TMJ) dysfunction, and migraine.

First, paroxysmal hemicrania and hemicrania continua are characterized by strictly unilateral pain with ipsilateral conjunctival injection, tearing, nasal congestion, rhinorrhea, facial (particularly forehead) sweating, miosis, ptosis, and/or eyelid edema. The former is hyperacute, with attacks lasting from 2 to 30 min, while the second is persistent (lasting more than 3 months) [32,33]. Second, trigeminal neuralgia is characteristically unilateral, recurrent, and shock-like with abrupt onset and resolution of symptoms, specifically limited to the distribution of one or more divisions of the trigeminal nerve [32,35]. Third, a tension headache is typically bilateral, characterized by a feeling of pressure or tightness, of moderate intensity, and lasting minutes to days. The pain does not worsen with routine physical activities, nor is it associated with nausea, although there may be photophobia and phonophobia [26,32]. Fourth, a medication overuse headache is defined as that occurring on 15 or more days per month, in a patient with pre-existing headaches, and accompanied by excessive use of one or more acute or symptomatic headache medications for more than 3 months. Pain usually resolves after drug overuse is stopped [36,37]. Fifth, giant-cell arteritis, or temporal arteritis, may present with a headache as its only symptom, usually with associated scalp hypersensitivity and/or jaw claudication most commonly in women with an onset mean age of 70 years. There is also an elevated erythrocyte sedimentation rate (ESR) or C-reative protein (CRP) and wall thickening observed in temporal artery biopsy. It has grave consequences if not diagnosed and treated in a timely manner [38,39] (Table 5).

Sixth, a headache attributed to TMJ disorders is usually unilateral, when the temporomandibular complex is the cause of pain, or bilateral when there is muscle involvement. This factor may be evidenced by clinical imaging to elucidate pathological process correlation with TMJ.

Table 5
Differential diagnosis of rhinogenic headache and respective treatments.

Diferential diagnoses	Diagnosis	Treatment
Paroxysmal hemicrania and hemicrania continua	Clinical	Oral indomethacin
Trigeminal neuralgia	Clinical	Anticonvulsants, muscle relaxants, neuroleptic agents and surgery (refractory cases)
Tension headache	Clinical	Nonsteriodal anti-inflammatory agents, muscle relaxants and antidepressants
Medication overuse	Clinical	Discontinuation of medication
Giant-cell arteritis, CRP	ERS, biopsy	Corticosteroids
Headache attributed to TMJ disorders	Clinical	Behavioral changes and surgery (refractory cases)
Migraine	Clinical	Triptans, ergots, nonsteroidal anti-inflammatory agents, among others

The criteria for diagnosis includes: pain precipitated by jaw movements and/or chewing hard or tough food; reduced range of or irregular jaw opening; noise from one or both TMJs during jaw movements, and tenderness of the joint capsule(s) of one or both TMJs. Also, a headache may be exacerbated by jaw movement and/or provocative maneuvers applied to TMJ structures [35]. Finally, a migraine consists of a typically unilateral headache, lasting 4 to 72 h, pulsatile in nature, moderate to severe in intensity, typically aggravated by physical activity, associated with nausea and/or vomiting, and occasionally presents photophobia and/or phonophobia tendencies [40,41].

6. Treatment

Once the proper diagnosis has been established among the variable causes of headaches, the most appropriate treatment should be instituted [26].

Paroxysmal hemicrania and hemicrania continua respond well to oral Indomethacin, which, in addition to being one of the diagnostic criteria, provides excellent relief for the patient. Indomethacin should be prescribed at a dose of 150 mg or higher, although maintenance doses should be lower [32,38]. Current treatment for trigeminal neuralgia consists of anticonvulsants, muscle relaxants, neuroleptic agents, and surgery (refractory) [44,45].

The treatment of tension headache is complex and involves a wide range of medications, such as nonsteroidal anti-inflammatory agents, muscle relaxants, and antidepressants, among others [26,29]. Medication overuse headaches should be treated in an opposing manner by complete discontinuation of medications, followed by a multidisciplinary approach [26,29].

Despite dosage controversies, corticosteroids remain the treatment of choice for giant- cell arteritis [26,29]. A headache attributed to TMJ disorders should be treated initially with conservative measures, such as behavioral changes and oral appliances. If no improvement is evidenced, occlusion-change and joint surgery intervention may be needed [26,29]. Nevertheless, considering the most prevalent pain experienced in temporomandibular joint disorders is myofascial. Thus, muscle relaxants, nonsteroidal anti- inflammatory drugs (NSAIDS), and physiotherapy are important modalities for the treatment of this condition [31,35].

The abortive treatment of a migraine consists of the use of triptans, a class of agonists of the 5-HT1B, 5-HT1D, and 5-HT1F serotonin receptors. Triptan administration leads to reduced meningeal vasodilation, decreased synaptic transmission at trigeminal nerve endings, and reduced release of neuropeptides, including CGRP. Examples include Sumatriptan, Rizatriptan, Zolmitriptan, and Naratriptan [26,29,32,33].

The combination of these recent studies prompted Patel et al. [26] to surmise a relationship between a sinus headache diagnosis and triptan therapy. When there is no evidence of soft-tissue content in the paranasal sinuses or obstruction of sinus drainage ostia on a CT scan with no coupled signs/symptoms of headache etiologies, a trial of triptan therapy is the best for pain relief until the patient can be referred to a neurologist [26].

As noted above regarding mucosal contact points and headache etiology, there is still insufficient data that provide robust scientific evidence for establishing causal links. Controversies surrounding surgical efficacy have yet to provide evidence of symptom improvement. Despite this research gap, some patients may benefit from nasal surgery to eliminate mucosal contacts and relieve headaches. Those who have failed therapy for a primary headache diagnosed by a neurologist simultaneously experience improvement of pain after application of anesthetic to the mucosal contact point. Even in this scenario, the otorhinolaryngologist should have an in-depth talk with the patient to clarify risks, benefits, and therapeutic alternatives, with an emphasis on the fact that surgery may or may not provide relief of facial pain or headaches [26,52].

In 1992, Novak and Makek [41] evaluated subjective improvement in 299 patients with frequent or treatment-refractory migraines and concluded that surgery is a successful approach for patients with headaches and mucosal contact points. In 2000, Tosun et al. [42] evaluated subjective improvement of pain in 30 patients with mucosal contact points and no other cause of headache and found that surgery is a favorable approach for these patients. Welge-Luessen et al. [43] performed surgery with the aim of achieving subjective pain improvement in 20 patients with refractory migraine or cluster headaches and mucosal contact, concluding that surgery is a successful approach.

Bektas et al. [44] selected 36 patients with mucosal contact headaches (defined as recurrent headache or facial pain in the absence of inflammation, allergy, or tumors in the nasal cavity at CT, alongside normal neurological and ophthalmologic examinations, and identifiable mucosal contact points on nasal endoscopy and/or CT). The outcome of interest was improvement in visual analog pain scale scores. The authors concluded that mucosal contact removal surgery is effective. Pain management was also the pursuit of Yazici et al. [49], as 73 patients presented with migraine or tension headaches associated with mucosal contact points. It was concluded that the correlation responds to nasal surgery intervention. With respect to visual analog scale evaluation, Peric et al. [50] surmised that removal of mucosal contact points serves as an effective treatment for headaches that are resistant to pharmacological treatment. As a result, outcomes were better for patients with concha bullosa and septal spurs than for those with non-contact sidewall septal deviation.

More specifically, surgical efficacy was investigated for patients who presented with contact points between the nasal septum and inferior turbinate. Yilmaz et al. [19] divided the sample size into clinical and interventional groups and gathered upon observation that surgical intervention reflected significantly lower pain score one-year post procedure, as compared to the clinical treatment group (Table 6).

7. Conclusion

According to the literature, many migraine or tension headache reside as undiagnosed or misdiagnosed or termed as a rhinogenic headache. Delay or misdiagnosis associated with treatment can negatively impact patient quality of life. Otolaryngologists should take particular care in establishing a precise diagnosis. A thorough clinical history, well-performed nasal endoscopy, and CT scan of the paranasal sinuses are essential components for effective diagnosis. Recent evidence suggests that triptans may be the best choice for pain relief in patients with suspected rhinogenic headaches, but no CT evidence of paranasal soft-tissue content or obstruction of sinus drainage ostia is able to rule out specific therapy. Surgery for resolution of mucosal contact points can be an excellent therapeutic alternative for carefully selected patients, even in cases of migraine or tension headaches.

Table 6
Studies of surgical treatment for patients with mucosal contact point headache.

Study	N	Study group	Assessment of improvment	Conclusion
Novak & Malek [41]	299	Frequent or pharmacological treatment-resistant migrane	Subjective	Effective for patients with headache and mucosal contact points
Tosun et al. [42]	30	Mucosal contac and no other cause of headache	Subjetive	Favorable for patients with mucosal contact and headache with no other apparent cause
Welge-Luessen el al. [43]	20	Refractory migrane or cluster headache with mucosal contact	Subjective with visual analog scale	Effective for patients headache and mucosal contact points
Bektas et al. [44]	36	Patients with mucosal contact point headache[a]	Visual analog scale	Effective for carefully selected patients
Yazici et al. [49]	73	Migraine or tension headache with mucosal contact	Visual analog scale	May benefit some patients with primary headache and mucosal contact point
Peric et al. [50]	42	Headache resistant to pharmacological treatment associates with mucosal contact	Visual analog scale	Removal of mucosal contact points may be effective in treatment of contact-point headache, with better results in concha bullosa and septal spur than in non-contact lateral-wall septal deviation
Yilmaz et al. [19]	99	Headache with contact point between nasal septum and inferior turbinate	Visual analog scale	Effective for selected patients

[a] Headache or facial pain described as chronic, recurrent, or severe; absence of inflammatory/allergic signs or masses in the nasal cavity and paranasal sinuses on endoscopy and CT; normal neurological and ophthalmological examination; identifiable mucosal contact points on endoscopy and CT.

Declaration of competing interest

All authors declare they have no conflicts of interest.

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