



# The aetiology underlying sinus headaches

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## Abstract

**Objective:** Patients with sinus headaches usually complain of pain and pressure sensation around the sinuses and periorbital area; most are misdiagnosed with sinusitis and receive unnecessary treatment. This prospective study investigated the aetiology of sinus headache in patients with negative endoscopic or computed tomography (CT) scan findings.

**Methods:** This multicentre study included patients who could be followed regularly after being admitted to otorhinolaryngology outpatient or emergency units due to sinus headache, in whom endoscopic and radiological examinations did not show sinonasal pathology. The study group comprised patients with primary headache, according to International Headache Society criteria. Participants were followed monthly for 3 months and treatment response was evaluated as complete remission, partial remission or no response.

**Results:** The study included 98 patients. The main reason for diagnosing and treating sinus headaches that arose from neurovascular events was attributed to the accompanying symptoms, e.g. nasal obstruction, nasal discharge and sinus sensitivity.

**Conclusions:** A better understanding of vascular event-derived headaches (especially migraine) and a detailed examination of patients via endoscopy and CT scanning are expected to minimize misdiagnosis rates, in patients with sinus headaches.

## Keywords

Aetiology, computed tomography, endoscopy, headache, migraine, otorhinolaryngology, sinus

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## Introduction

Sinus headache is a condition that is commonly observed in otorhinolaryngology practice. Patients usually complain of pain and pressure sensations around the sinuses and the periorbital area. Most of these patients are misdiagnosed with sinusitis and receive unnecessary medical (or even surgical) treatment. Patients' conditions do not improve as expected, however.<sup>1,2</sup>

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The most important cause of the over-diagnosis of rhinosinusitis is that conditions other than rhinosinusitis (such as tearing [epiphora], nasal congestion or rhinorrhoea) may also result in nasal and ocular symptoms. Barbanti *et al.*<sup>3</sup> reported that 46% of patients with migraine, who were diagnosed according to criteria defined by the International Headache Society (IHS),<sup>4</sup> had unilateral cranial autonomic symptoms, the most frequent of which were nasal and ocular symptoms. Moreover, it has been suggested that mucosal contact points in patients without any endoscopic or computed tomography (CT) positive findings can induce sinus pain.<sup>5</sup>

According to the IHS criteria,<sup>4</sup> headaches may accompany acute exacerbations of acute or chronic sinusitis. Other conditions such as nasal septal deviations, hypertrophy of the turbinates, sinusoidal membrane atrophy or mucosal contact, which are often considered to elicit headaches, are not sufficiently validated among headache aetiologies. The latter is defined in the IHS criteria appendix under A11.5.1 (mucosal contact point headache).<sup>4</sup>

The present study investigated the aetiology of sinus headache in patients, in the absence of any positive endoscopic or CT scanfindings.

## Patients and methods

### Study Population

This prospective study was conducted in the following centres, between February 2012 and May 2012: Department of Otorhinolaryngology, Head and Neck Surgery, Balikesir University, Balikesir, Balikesir, Turkey; Şevket Yılmaz Research and Education Hospital, Bursa, Turkey; Balikesir Hospital, Balikesir, Turkey. Consecutive patients who could be followed regularly after being admitted to either otorhinolaryngology outpatient or emergency units because of sinus headache, and

in whom subsequent endoscopic and radiological examinations did not reveal any sinonasal pathology, were included in the study. The exclusion criteria were as follows: acute rhinosinusitis exacerbation within the previous 6 months; any signs of an ongoing infection (such as purulent nasal discharge or fever); sinonasal polyposis; any previous sinus or nasal surgery; evidence of mucosal contact points in paranasal CT scans; septal deviation; any concha pathologies.

Study approval was obtained from the Ethics Committee of Balikesir University. Treatment procedures were explained to the study participants, each of whom provided informed verbal consent.

### Study Assessments

For each patient, a detailed medical history was taken, physical and endoscopic nasal examinations were performed and coronal plane paranasal CT images were obtained. Patients who did not have findings that could be considered to cause headaches in the sinonasal area were diagnosed according to the IHS criteria.<sup>4</sup> Patients who were diagnosed with primary headaches according to the IHS criteria<sup>4</sup> were included in the study group; patients in whom a diagnosis could not be confirmed were referred to a neurologist. Appropriate treatment was initiated for each patient. Patients were followed monthly for a 3-month period and the response to treatment was evaluated as follows: complete remission (never had a headache); partial remission (reduction in headache frequency and severity); no response.

## Results

The study evaluated 103 out of 132 patients who were available for regular follow up; 29 patients were not available for regular follow up and were therefore excluded from the study. In total, 98 patients received

a diagnosis of primary headache according to IHS criteria<sup>4</sup> and comprised the study group; five patients who could not be diagnosed were referred to a neurologist and were excluded from further evaluation.

The median age of the study group was 44 years (range 17–63 years); 72 (73%) patients were female. The mean duration since the first headache was  $34 \pm 1.0$  months (range 7–41 months) and the mean duration of headache at each flare-up was  $7.4 \pm 0.8$  h (range 1–14 h).

There were 14 (14%) patients who complained of sinus headache for the first time (i.e., with no previous similar symptoms), whereas 84 (86%) patients had previous experiences of sinus headache with repeated (irregular) analgesic use. When the 98 patients were evaluated according to the IHS criteria<sup>4</sup> for type of primary headache, 61 (62%) patients had migraine (18 patients with aura and 43 without aura), 26 (27%) patients had tension-type headache and 11 (11%) patients had cluster headache. Only 17 (28%) of the 61 patients with migraine had a previous migraine diagnosis, yet they did not have regular follow up. When the patients' medical histories were examined, it was found that 75 (77%) patients had received at least one previous medical treatment for suspicion of rhinosinusitis (52/61 [85%] patients with migraine, 16/26 [62%] patients with tension-type headache and seven of 11 [64%] patients with cluster headache). Similarly, six of 61 (10%) patients with migraine and three of 26 (12%) patients with tension-type headache had undergone nasal septal surgery. Although one patient with a diagnosis of migraine who had received surgery stated that the pain had decreased, none of the other patients reported any improvement. Complete remission of the patients' headaches occurred, however, after proper treatment for the actual underlying reasons.

Patients described their pain localizing most commonly in the frontal and temporal

regions, and unilaterally in the periorbital region. With respect to the different types of pain reported, 71 (72%) patients described their pain as throbbing and 64 (65%) patients as crushing, 23 (23%) patients complained of a burning pain and five (5%) patients had a 'vague-type' of pain. Eighty-one (83%) patients described their headache as a sudden-onset pain and 27 (28%) patients reported the pain as bilateral.

The following symptoms were observed: nasal congestion in 27 (28%) patients; rhinorrhoea in 15 (15%) patients; vertigo in three (3%) patients; photophobia or phonophobia in 67 (68%) patients; nausea and/or vomiting in 18 (18%) patients; sinus sensitivity in 75 (77%) patients; blurred vision in 29 (30%) patients. A total of 90 (92%) patients presented with at least one symptom such as nasal obstruction, nasal discharge or sinus sensitivity.

At the end of 3 months following treatment initiation (Table 1), 72 (73%) patients were in complete remission, 15 (15%) patients described a decrease in their headache symptoms and 11 (11%) patients had not responded to treatment.

## Discussion

Sinus headache is a common problem in the general population. Neurovascular event-based headaches, which develop as a result of diseases other than sinonasal pathologies but present with similar symptoms (namely, rhinorrhoea, nasal obstruction and tearing) are often evaluated as rhinosinusitis.<sup>1,6</sup> Many patients are wrongly treated with either medical or surgical approaches and, despite these different interventions, their symptoms persist.<sup>5,7</sup> Some authors suggest, however, that sinonasal contact points may evoke sinus headaches in some patients, and that these patients may benefit from surgical interventions.<sup>8–13</sup> These endonasal contact points are suggested to provoke

**Table 1.** Outcomes at the end of 3 months following treatment initiation in patients diagnosed with primary headache, according to International Headache Society Criteria,<sup>4</sup> in whom endoscopic and radiological examinations did not reveal any sinonasal pathology.

Outcome	Complete remission	Partial remission	No response	Total
Migraine	52	7	2	61
Tension-type headache	14	5	7	26
Cluster Headache	6	3	2	11
Total	72	15	11	98

Data presented as *n* of patients.

miscellaneous forms of headaches by the trigeminovascular system, as well as through the release of substance P.<sup>14,15</sup> There are no absolute diagnostic tests available for such patients. The detection of a contact point on a CT scan or during endoscopic examination, and subsequently observing pain relief upon administration of a local anaesthetic, has been used for diagnostic purposes.<sup>10,11,16,17</sup> Despite this, several authors have suggested that surgical removal of the contact points has no therapeutic value.<sup>5,18,19</sup> It has been suggested that most published case series that are pertinent to patients with headache may reflect incidental variations in anatomy; thus, it is difficult to establish whether headaches indeed result from anatomical variations or contact points. The explanation for the proportion of patients with contact points who benefit transiently from surgery is proposed to be either a result of the influence of cognitive dissonance or a possible modification of the neurological pathways to (and in) the caudal nucleus of the trigeminal nerve.<sup>20–22</sup>

The present study demonstrated that sinus headaches in patients with normal CT and endoscopic findings were mainly of neurovascular origin. Of the 103 patients initially recruited into the study, 98 had a diagnosis of migraine, tension-type headache or cluster headache as the primary cause of headache, according to IHS criteria.<sup>4</sup> Most (62%) were diagnosed with migraine. The rate of migraine has been

reported to be as high 90% in the literature.<sup>2,23</sup> Moreover, it was observed that 77% of all patients had previously received medical treatment due to rhinosinusitis (85% of patients with migraine, 62% with tension-type headache and 64% with cluster headache); none of these patients described any relief of pain afterwards. The reported proportion of patients who did not benefit from treatment of rhinosinusitis is as high as 80%.<sup>1,5</sup> Six patients with a final diagnosis of migraine and three with tension-type headache in the present study had previously undergone unnecessary surgical interventions.

A study that evaluated 2991 patients with sinus headache reported that 80% of all cases were eventually diagnosed with migraine.<sup>24</sup> In the present study, 89% (87/98) of patients complaining of sinus headache were also diagnosed with either migraine or tension-type headache. The main reason for diagnosing and treating sinus headaches that arise from neurovascular events such as rhinosinusitis may be attributed to the accompanying symptoms, such as nasal obstruction, nasal discharge and sinus sensitivity. In total, 92% of the patients in the present study presented with at least one or more of these complaints. Sinus symptoms associated with migraine are believed to originate from the activation of the trigeminal autonomic reflex. This reflex includes the trigeminal and parasympathetic afferents that stimulate the lacrimal

glands in addition to the sinonasal mucosa.<sup>25</sup> Accordingly, it was shown that, in patients with migraine, referred pain might arise in facial and sinus areas following meningeal traction.<sup>26</sup>

Diagnoses of sinus headaches that are made by referring only to sinonasal symptoms may lead to misdiagnoses and inappropriate treatments. A better understanding of vascular event-derived headaches (especially migraine), as well as a detailed examination of this group of patients using endoscopy and CT imaging, are expected to minimize the rates of misdiagnosis.

The evaluation of patients complaining of sinus headaches with negative endoscopic and CT findings according to the IHS criteria<sup>4</sup> revealed that most were vascular event-based headaches, mainly migraine. Thus, a multidisciplinary approach is necessary in this group of patients. Furthermore, we believe that, although the IHS diagnostic criteria<sup>4</sup> were originally developed for neurologists, they should be familiar to all physicians (especially otorhinolaryngologists) who encounter patients complaining of headaches in their routine daily practice. Only by this route will misdiagnosis and inappropriate treatment rates diminish.

### Declaration of Conflicting Interest

The authors declare that there are no conflicts of interest.

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