

HEADACHE--A SINONASAL SYMPTOM AND MORE... A REVIEW ARTICLE

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ABSTRACT

Headaches and facial pain are common complaints. In many cases, patients are referred to an otolaryngologist to determine if head pain is sinus related. In the absence of other nasal or sinus symptoms, some rhinogenic headaches can be overlooked or misdiagnosed. A complete history and thorough ENT examination, including nasal endoscopy with or without coronal CT scans is key to the correct diagnosis.¹ Headache resulting from disease of the nose or paranasal sinuses are usually associated with symptoms (congestion, fullness, discharge, obstruction) that point to the site of origin. Occasionally, however nasal or sinus disease can be manifested solely as headache.

Key words: Headache; Sinusitis; FESS.

INTRODUCTION

Headache is nearly a universal human experience. The lifetime incidence of headache is estimated to be at least 90%. Moskowitz has described headache as the symptom produced by the nervous system when it perceives threat and as such is considered part of the protective physiology of the nervous system. When the cause of headache is a definable underlying pathologic process, the headache is diagnosed as a secondary headache. Causes include metabolic, infectious, inflammatory, traumatic, neoplastic, immunologic, endocrinologic and vascular entities.

When no clear pathologic condition can be identified, headache is considered to be a manifestation of a primary headache syndrome. The common primary headache disorders as defined by the International Headache Society, are migraine, probable migraine, tension type and cluster headache.²

The term 'sinusitis' refers to a group of disorders characterized by inflammation of the mucosa of the paranasal sinuses. Because the inflammation nearly always also involves the nose, it is now generally accepted that 'rhinosinusitis' is the preferred term to describe the inflammation of the nose and paranasal sinuses.³

Patients with chronic headache pain often present to a variety of specialists, including their primary care physician, neurologist, dentist, otolaryngologist and even psychiatrist. They present to otolaryngologist because they or their physician believe the headache to be related to underlying sinus pathology. The primary focus of the otolaryngologist is to exclude this possibility. The diagnosis of headache secondary to acute-sinusitis can be relatively straightforward. Diagnosing headache related to chronic sinus disease can be much more difficult depending on patients presentation.⁴ This article will help us in understanding and refresh our knowledge regarding headache and sinusitis.

DISCUSSION

The knowledge of the presence of the paranasal sinuses dates back to early mankind as well as attempts to treat their disease. In ancient times, the paranasal sinuses, were thought to be a system of hollow spaces through which mucus produced by brain was drained. Leonardo da Vinci in Milano in 1489 was the first to prepare and draw anatomical specimens of the paranasal sinuses. Highmore N in England in 1651, presented the first detailed description and drawing of the maxillary sinus and hence it is named Highmore's antrum. Drake J. and Cooper W in England in 1707 reported that in some cases ozaena was due to suppuration in the maxillary sinus and could be cured by extraction of a tooth and opening the sinus via the alveolus.

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Caldwell GW in New York in 1893 published his method, opening the canine fossa wall, removal of the mucous membrane and opening a window in the lateral wall of inferior nasal meatus.⁵

Hippocrates was the first to describe lesions that obstruct the nasal passages. Andreas Vesalius described the maxillary, frontal and sphenoid sinuses. Siebenmann was apparently the first to recommend supranasal antrostomy in the middle meatus which is now fashionable again.⁶ The maxillary sinus has been the focus of surgical attention from the 17th century onwards largely as a result of its size and accessibility, initially reinforced by plain X-ray.⁷

The surgical treatment of chronic inflammatory frontal sinus disease over the past century has varied between intranasal and external procedures. However, a single approach that will lead to relief of symptoms, eradication of disease with preservation of function, and a minimum of deformity has not yet been attained.⁸

From the otolaryngologist's point of view, there are multiple causes for the frequent symptoms of facial and head pain, headaches due to ear disease, pain extending to the ear region, with special regard to "referred otalgia" involving the cranial nerves V, IX, X, facial pain due to temporomandibular dysfunction, rhinological causes of facial and head pain, including post-traumatic trigeminal neuralgia and "facial sympathalgias", the syndrome of the elongated styloid process.⁹

Recent studies have demonstrated that a neuropeptide (substance P) is likely to be a mediator of pain arising in the nose or paranasal sinuses.¹⁰

Headache due to pressure on nasal mucosa of anatomical variations, nasal polyps or mucosal swelling in the absence of inflammation of the paranasal sinuses is a clinical entity that has gained wide acceptance. In the absence of any other identifiable etiological factors, intranasal mucosal contact must be kept in mind as a cause of headache.¹¹

Headache can be of sinogenic origin even if this cause may not be suspected from the case history. Endoscopy of the lateral wall with rigid cold light endoscopes in combination with polytomography or computed tomography usually will reveal the underlying causes hidden from the unaided eye, the operating microscope and standard X-ray examination. Small lesions in the lesser cells of the ethmoid complex may give rise to headaches, especially when located in key areas of the ethmoid infundibulum or frontal recess.

The neuropeptides recently were newly identified as a group of mediator besides the neurotransmitter noradrenaline and acetylcholine. Substance P is one of the most important neuropeptides that we can identify in human nasal

mucosa. It mediates pain impulses to the cortex via afferent C-fibers.¹²

Sinus infections are much less common today than they were in the pre-antibiotic era, but they still are over diagnosed. Acute sinusitis, a relatively uncommon cause of headache is the result of infection of one or more of the cranial sinuses. Acute sinusitis usually is characterized by purulent discharge in the nasal passages and a pain profile determined by site of infection. Sinusitis is over diagnosed as a cause of headache because of the belief that pain over the sinuses must be related to the sinuses. Paradoxically, sinus disease also tends to be under-diagnosed, as sphenoid sinus infection frequently is missed.¹³

Headache associated with acute sinusitis is a well recognized entity, the diagnosis is easily made due to the associated nasal and sinus symptoms. However, the phenomenon of referred headache from chronic sinusitis or intranasal abnormalities or both without upper respiratory symptoms is not well understood^[14]. Headache can be caused by a multitude of factors, but experienced physicians accustomed to treating patients with headache are adept at making an accurate diagnosis. Occasionally, however a patient has an unusual presentation of headache or facial pain.¹⁵

There is a frequent coincidence of headache and sinusitis. In acute sinusitis, the localization of the headache can yield good diagnostic clues, while chronic inflammations do not offer reliable diagnostic indications. Further characteristics of rhinogenous headache are typical periodicity during the day, occasional distributions of sensitivity in a specific cutaneous area and certain typical pressure points in the facial region.¹⁶

Nasal signs and symptoms commonly accompany cephalgia in some headache syndromes. Head pain associated with sinusitis is also fairly well recognized. However, referred cephalgia of rhinogenic origin in the absence of sinonasal symptoms is poorly understood.¹⁷

Long neglected as a clinical entity, sinus headache has become a common complaint of patients with facial pain. Although pain is associated with some sinus disease, many experts feel the magnitude and instances of sinus headache have been exaggerated to the public.¹⁸ Intranasal and sinus disease may result in disabling head and facial pain and serious complications. Awareness of the symptoms of acute and chronic sinusitis and their various presentations will enhance diagnostic accuracy and improve patient outcome. It is important to remember that nasal mucosa is under autonomic control. Sinus symptomatology, whether from anatomic abnormality or chronic inflammation, may occur with and will typically be exacerbated by increased parasympathetic outflow or reduced sympathetic tone.¹⁹

Evaluation of the paranasal sinuses and nasal cavity in patients with headache and or facial pain must include a thorough medical and social history, with close attention to the pattern and character of the pain, a thorough physical examination that includes a palpation and nasal endoscopy and imaging studies such as CT scan and magnetic resonance imaging.²⁰ Some patients with facial pain are undergoing endoscopic sinus surgery in the mistaken belief that rhinosinusitis is the cause of their facial pain. All surgeons dealing with facial pain should be familiar with non-sinonasal diagnosis.²¹ Contact point headaches are caused by contact between the nasal septum and the lateral nasal wall by a mechanism of referred pain involving the trigeminal nerve.

A retrospective chart review was performed on patients who underwent septoplasty and sinus surgery for headache. The total number of patients who opted for surgery was 23. These patients underwent surgical intervention in order to relieve the contact points. Postoperatively, 83% no longer complained of headache, while 8% had significant relief.²²

Headaches secondary to sinonasal anatomic abnormalities continue to remain a difficult entity to diagnose and to manage. A study conducted to analyze the outcome of care for 34 patients who presented with headaches as one of their primary sinonasal complaints and were subsequently found to have contact points between the nasal septum and one or more turbinates on nasal endoscopy. After surgery, reduction in intensity and frequency of headaches was experienced in 91% and 85% of the patients respectively.²³

Some migraine and cluster headaches may be triggered by stimulation of intranasal contact points via the trigeminovascular system. The craniofacial region is the most common location in which pain drives patients to seek medical attention.²⁴

Innervations for Pain

Nociceptors serve as the sense organs in which noxious stimuli create a response that excites afferent nerve fibres that provide the brain with information about location, intensity, quality and duration of the response.²⁴

Neurochemicals responsible for the excitation include serotonin and substance P as well as other neurotransmitters. These afferent fibers are carried to the central nervous system in cranial nerves V, IX, X, XI and the first three cervical nerves.

Pain sensitive innervation of facial structures is extensive, whereas intracranial pain sensation is limited to specific structures. The extra-cranial tissues innervated for pain sensation include the muscles of the head and neck, the scalp and facial skin, sinonasal mucosa and perichondrium, temporomandibular joint synovium and capsule, tooth pulp, the external and

middle ear, orbital contents, salivary glands, cervical spine and craniofacial periosteum.

Specific pattern of referral of pain are common, for example from the temporomandibular joint and muscles of mastication, radiation is to the ear, cheek and temple, from the tonsillar fossa and supraglottic larynx to the middle ear and from the maxillary sinus to the maxillary teeth, whereas pain from the sphenoid is more often referred to the vertex or occiput and of course, angina is sometimes referred to the jaw.

Pathophysiology

Multiple mechanisms resulting in excitation of nociceptive neurons (i.e., generating the perception of pain) are partially understood. One common mechanism is sustained muscle contraction resulting in tension headache. Another common scenario is vasodilatation of intracranial arteries stimulating trigeminal sensory pathways, which release vasoactive peptides that increase the pain response.

An inflammatory mechanism is thought to be responsible when neuropeptides such as substance P are released with mucosal inflammation.

Direct nerve pressure may induce nociceptor activity, as seen in foramina stenosis. Many agents that result in vasodilatation can trigger headache including hypoxia, carbon monoxide, caffeine withdrawal, acute alcohol withdrawal, oral contraceptives and hypoglycemia.²⁶

History taking in Facial Pain

In common with many areas of medicine, the key to a correct diagnosis in patients with facial pain is taking an accurate history. In making a diagnosis it is helpful to classify facial pain into broad categories, namely rhinological pain, dental pain, vascular pain, neuralgias, pain caused by tumors, mid-facial segment pain and atypical facial pain.

Where is the pain and does it radiate anywhere?

Is the pain continuous or intermittent?

Character of the pain?

What precipitates or is associated with the pain?

What relieves the pain?

What effect does the pain have on daily life?

The majority of patients who present to an otorhinolaryngologist with facial pain and headaches believe they have sinus trouble.²⁷

Classification

Understanding headache and facial pain is essential to facilitate diagnosis and treatment. To this end, definitions and features of clinical syndromes were organized by the International Headache Society (IHS).

This classification, with inclusion of diagnostic criteria for headaches, cranial neuralgias and facial pain, was created in 1988 and has facilitated the

diagnostic approach and management of craniofacial pain across many medical fields.^{28,76}

Table-1: International Headache Society Classification of Headache and Facial Pain²⁶

Migraine type

Without aura (common migraine)

With aura (classic migraine)

With prolonged aura (complicated migraine)

Ophthalmoplegic

Retinal

Tension type

Episodic (muscle contraction headache)

Chronic (chronic daily headache)

Oromandibular dysfunction (myofascial pain dysfunction syndrome) (temporomandibular joint pain dysfunction syndrome)

Cluster (Horton's cephalalgia)

Post-traumatic headache

Vascular intracranial disorder

Transient ischemic attack-associated headache

Intracranial hematoma

Subarachnoid hemorrhage

Unruptured aneurysm

Giant cell arteritis (temporal arteritis)

Carotid or vertebral artery pain

Dissection

Carotidynia

Cerebral venous thrombosis

Acute arterial hypertension

Pheochromocytoma

Malignant hypertension (accelerated)

Pre-eclampsia and eclampsia

Non-vascular intracranial disorder

Benign intracranial hypertension (pseudo tumor cerebri)

Post-lumbar puncture headache

Cerebrospinal fluid fistula headache

Intracranial infection

Meningitis

Brain abscess

Subdural empyema

Intracranial neoplasm

Headache from substance exposure or withdrawal

Acute exposure

Nitrate or nitrite-induced headache (hotdog headache)

Monosodium glutamate-induced headache (Chinese restaurant syndrome)

Carbon monoxide-induced headache

Alcohol-induced headache

Chronic exposure

Ergotamine-induced headache

Analgesics abuse headache

Oral contraceptives use

Acute withdrawal

Alcohol (hangover)

Chronic withdrawal

Analgesics

Ergotamine

Caffeine

Narcotics

Headache with extracranial infection

Viral

Bacterial

Headache from metabolic disorder

Hypoxia

High-altitude headache

Sleep apnea headache

Hypoglycemia

Headache or facial pain associated with craniofacial disorder

Cranial disorder

Osteomyelitis

Multiple myeloma

Paget's disease

Cervical spine disorder (cervicogenic headache)

Eye disorder

Acute glaucoma

Refractive errors

Sinonasal disorder

Acute sinus headache

Rhinogenic headache

Odontomandibular disorder

Periodontitis

Pulpitis

Glossitis (burning mouth syndrome)

Temporomandibular joint disease

Cranial neuralgia

Compression of cranial nerve or cervical root 1, 2 or 3

Inflammation of cranial nerves

Acute herpes zoster

Chronic postherpetic neuralgia

Tolosa-Hunt syndrome

Gradenigo's syndrome

Trigeminal neuralgia (tic douloureux)

Idiopathic

Compression of trigeminal ganglion

Vascular

Tumor

Cholesteatoma

Aneurysm

Multiple sclerosis

Glossopharyngeal neuralgia

Occipital neuralgia

Anesthesia dolorosa

Postsurgical after trigeminal rhizotomy

Unclassifiable pain (atypical facial pain)

Sinonasal disorders are a frequent source of headaches but are probably accredited by the population as a whole. However, frontal headache and facial pain are two of the three major symptoms suggesting the presence of sinusitis, the other being purulent nasal drainage. Acute sinusitis is a leading cause of facial pain, second only to dental disorders.

Pain for sinusitis referred to upper maxillary is typically originating in the maxillary sinus. Occipital or vertex pain from sinusitis is most likely to represent sphenoid sinus disease. Any infected sinus can refer pain to the frontal, retro-orbital and temporal regions.²⁶

The location and extent of the sinusitis do not correlate well with the severity or site of pain.²⁹

Rhinologic headaches other than those caused by sinusitis also occur, albeit much more rarely nasal anatomic abnormalities occasionally associated with facial pain include impacted septal deviations or spurs, hypertrophic turbinates, and even an occasional large maxillary retention cyst.³⁰

Facial pain syndrome according to sinonasal pathology is reported by International Headache Society classification (1988). It is underlined that a clear and proven nasal pathology with adequate painful stimuli must be present i.e., acute sinusitis, vacuum sinus or other unspecified pathologies. One of the most difficult problems in dealing with patients with sinonasal headaches is the definition of the primary cause of the pain.³¹

Sinus headache is not a recognized entity by allergy, otolaryngology or neurological organizations. Headache is a minor feature in the diagnosis of acute rhinosinusitis and is not validated as a symptom in chronic sinusitis. Over 90% of the self diagnosed and doctor diagnosed sinus headaches meet the International Headache Society criteria for migraine and those migraines misdiagnosed as sinus headache respond to sumatriptan. Sinus headaches are usually severely disabling migraine misdiagnosed and mistreated with 61% of patients receiving antibiotic prescriptions for non-infectious causes.³²

Sinus headache is a widely accepted clinical diagnosis, although many medical specialists consider it as uncommon cause of recurrent headaches. Both the IHS and the American Academy of Otolaryngology, Head & Neck Surgery have attempted to define conditions that lead to headaches of rhinogenic origin.³³

CONCLUSION

Headache is nearly a universal human experience. It has significant impact on public health and healthcare cost. Proper understanding, evaluation, and prompt management would go a long way in improving the quality of life of the patient of headache. Holistic approach in headache patients varying from proper history taking to Computerised Tomographic scan should be taken before solutions to headache become easier said than done.

REFERENCES

- Campos A, Solomons NB, Armengot M, Zapater E, Bastera J. *Acta Otorhinolaryngol Esp.* 1998 Nov-Dec; 49(8): 615-20.
- Roger L and Curtis PS. Sinus headache: A clinical conundrum. *Otolaryngologic Clinics of North America.* 37: 267.
- Michaels B. Rhinosinusitis. *Scottbrown's Otorhinolaryngology HNS.* 7th edition. 1439-1448.
- Allen MS and Vincent TM. Headache and the frontal sinus. *Otolaryngologic Clinics of North America.* 34: 227.
- Feldman H. *Laryngorhinootologie.* 1998 Oct; 77(10): 587-95.
- Luckhampt H, Bertram G, Bruses T, *HNO* 1990 Aug; 38(8): 279-86.
- Lund V. *Laryngoscope* 2002 Mar; 112(3): 415-9.
- Jacobs JB, *Laryngoscope.* 1997 Nov. 107(11 pt 2): 1-36.
- Jahnke V. *Laryngol Rhinol Otol (Stutt g)* 1997 Apr; 56(4): 305-12.
- Close LG, Aviv J *Semin Neurol* 1997; 17(4): 351-4.
- Tosun F, Gerek M, Ozkaptan Y. Headache. 2000 March; 40(3): 237-40.
- Stammberger H, Wolf G, *Annotolrhinolaryngol.* 1998 Sept-Oct; Suppl 134: 3-23.
- Silberstein SD. *Neurol Clin.* 2004 Feb; 22(1): 1-19.
- Clerico DM. Headache 1995 Apr; 35(4): 185-92.
- Cosenza MJ, *JAM Osteopath Assoc.* 2000 Sep: 1000 (9 suppl): S22-6.
- Albergger KW. *MMW Munchmed Wochenschr.* 1997 Apr 8: 119 (14):457-8.
- Clerico DM, Fieldman R. Headache. 1994 Apr; 34(4): 226-9.
- Schor DI, *Cranio.* 1993 Jan. 11 (1): 36-47.
- Kennedy DW, Loury MC. *Semin Neurol* 1998 Dec.; 8(4): 303-14.
- Rebeizz EE, Rastani K. *Otolaryngol Clin North Am.* 2003 Dec; 36(6): 1119-26.
- Jones NS, Cooney TR. *Rhinology* 2003 Dec. 41(4): 193-200.
- Behin F, Behin B, Behin D, Baredas S. Surgical management of contact point headaches. Headache. 2005 Mar; 45(3): 204-10.
- Parsons DS, Batra PS. FESS outcomes for contact point headache. *Laryngoscope* 1998 May; 108(5): 696-702.
- Dalesio D, Siberstem S. *Wolff's Headache*, New York, Oxford University Press. 1993.
- Sessle BJ. Neural mechanisms and pathways in craniofacial pain. *Can J Neurol Sci.* 1999; 26 Suppl: S7-11.
- James M Hartman Richard A Chole. Headache and facial pain. 788-806. *Ballengers Otorhinolaryngology and Head and Neck Surgery.*
- Tim J Woolford and Nicholas S. Jones. Diagnosis and management of facial pain. 1718-1729. *Scott Brown's Otorhinolaryngology, Head and Neck Surgery*, 7th Edition.
- Headache Classification Committee of the International Headache Society. Classification and diagnostic criteria for Headache Disorders, Cranial

- Neuralgias and Facial Pain, Cephalgia, 1988; 8 Sppl. 7: 1-96.
29. Tarabichi M. Characteristics of sinus related pain. Otolaryngol Head Neck Surgery 2000; 122: 842-7.
30. Chow JM. Rhinologic Headaches. Otolaryngol Head Neck Surgery 1994; 111: 211-8.
31. Giacomini PG, Allesandrim M, DePadava A. Septoturbinal surgery in contact point headache – Long-term results.
32. Tepper SJ. New thoughts on sinus headache. Allergy Asthma Proc. 2004 Mar-Apr; 25(2): 95-6.
33. Cady RK, Dadick DW, Levine HL, Schreiber GP, Eross EJ et al. Sinus headache: A neurology, otolaryngology, allergy and primary care consensus on diagnosis and treatment. Mayo Clinic Proc 2005; Jul; 80(7): 908-16.

SOURCES OF SUPPORT-NIL

CONFLICT OF INTEREST-NONE DECLARED