

Clinical Research on Relation between Nasal Mucosa Contact Point and Headache

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Abstract

Mucosal contact point headache is a new type of secondary headache in International Headache Classification-2. At present, this concept is widely quoted in otolaryngology head and neck surgery, and applied in clinical practices. Functional endoscopic sinus surgery (FESS) is a common method to treat mucosal contact point headache, but the surgical results were quite different among hospitals. Whether the contact point of nasal cavity is the cause of contact point headache is controversial. This paper summarizes diagnostic criteria, clinical features, etiopathology, epidemiological studies, evaluation method of headache, surgical methods and effect of the disease.

Keywords: Headache; Contact point; Substance P; Endoscopy; Abnormal anatomy; Etiology; FESS

Introduction

Headache is a common symptom, 69% of city's residents have experienced headaches. The incidence of headache in the 30-45-year-old population is more than 70%, headache has become one of the four leading causes that is influencing people aged 30-45. International Headache Society [1] divided headaches into three classification, they are primary headache, secondary headache and cranial nerve pain, central and primary facial pain and other headache, a total of 14 categories, covering more than 150 kinds of diseases and causes. According to reports, about 30% of people have long been plagued by various types of headaches, and the drug effect is poor [2].

Related Concepts

Mucosal contact point headache is a newly added type in the International Headache Classification Standard -2 (ICHD-II) [3], it is a secondary headache. At present, the concept of mucosal contact point headache has been widely cited in Otolaryngology Head and Neck Surgery all over the world, and has been widely used in clinical practice. It is considered that there is a certain correlation between the presence of nasal mucosa contact area and the difficulty of treatment, the pathological basis is abnormal of the nasal anatomic structure [2]. The characteristics of headache are constant within the site, mostly located in inner canthus, forehead, peri-orbit, tempora, patients often feel heavy pressure on the top of head [4], and the existence of contact area can be proven by endoscopic or CT exam. Patients often go to neurological physicians due to lacking of nasal symptoms, and were diagnosed with a migraine, cluster headache, tension headache. Although accepted long-time medication treatment, the results were unsatisfactory, that seriously affected patients' normal work and the quality of life [5].

Diagnostic Criteria

Diagnosis of Mucosal contact headache need to have the following important features [6,7]: Endoscopic and image evidences of exist of mucosal contact point; application of local anesthesia can make the pain disappeared in 5 min (with comparison of placebo); headache disappear in 7 days after surgery. Abu-Bakra and Jones [8] believe that the diagnosis should be combined with the phenomenon that the contact area is still exist after fully contracted with local usage of decongestant. Recent years, some authors put the positive result of lidocaine test as one of the inclusion criteria for mucosal contact headache surgery, this means that, after the application of a piece of cotton wool soaked in the 5% solution of lidocaine for 15 min, there was a reduction in pain intensity of more than 50% [9,10].

Abnormal Anatomic Site

In 1980 Morgenstein and Krieger [11] found that anatomic abnormalities of middle turbinate may lead to headache, he first put forward the concept of "mucosal contact zone headache", then known as the middle turbinate headache syndrome. With the development of endoscopic technology and understanding of the anatomy and physiology of the nasal cavity, the understanding of nasal contact headache was also further deepen. People found that nasal anatomic deformity can present a variety of types, far more than just the contact of middle turbinate and nasal septum. There are a large number of literatures describing the existence of nasal mucosa contact area. The contact of middle turbinate and nasal septum [12] or the lateral wall of nasal cavity, superior turbinate and nasal septum, ethmoid bulb and middle turbinate, nasal spur or superior turbinate and nasal lateral wall is the cause of reflexive facial pain. Wang [4] analyzed 187 cases of nasal anatomical abnormality by CT scan and found the most common nasal anatomic abnormality was nasal septum deviation (41.1%), followed by pneumatization of the middle turbinate (32.4%). Others abnormality include 21.6% of pneumatization of superior turbinate, 20.0% of abnormal curve of middle turbinate, 16.2% of pneumatization of nasal septum, 9.2% of hypertrophy of inferior turbinate, 5.4% of Haller cell, 3.8% of pneumatization of uncinat process. Some patients

showed more than one abnormality. For example, one patient had hypertrophy of the bilateral inferior turbinates in contact with the nasal septum, and pneumatization of the bilateral superior turbinates in contact with the nasal septum. Shaofeng [13] retrospectively analyzed 58 cases of nasal contact headache patients who were assessed for nasal anatomic abnormalities by nasal sinus CT and nasal endoscopy, and underwent nasal endoscopic surgery. The curative effect was evaluated 3 months after surgery, it revealed that nasal anatomic abnormality is obvious of high deviation of nasal septum, middle turbinate variation and lesions of adjacent structures, and to remind people paid more attention to headache caused by contact of superior turbinate and nasal septum or nasal septum and the medial wall of ethmoid sinus.

Mechanism of Headache

In recent years, people have made some researches on the mechanism of nasal mucosa contact headache and found that the main causes are the following aspects:

Negative pressure cause headache

Sinus mucosa has respiratory function [14], gas cannot be exchanged when there are stenosis, ventilation and drainage limitation in sinus cavity, the concentration of O₂ in sinus decrease and CO₂ accumulate, the sinus cavity is under negative pressure which lead to vacuum headache. The exist of nasal mucosal contact area make nasal passages more narrow that affect the ventilation function of maxillary sinus, frontal sinus and anterior ethmoid sinus, increase obstacles of ventilation and drainage.

Nerve compression leads to headache

Anterior ethmoidal nerve distribute on middle turbinate and nasal septum. Middle turbinate hypertrophy and excessive gasification of ethmoid sinus can squeeze adjacent structures, losing of normal clearance cause mucosal extrusion and result in mechanical compression on branches of the trigeminal nerve-the anterior ethmoidal nerve and posterior ethmoidal nerve, which induce reflex headache and eye symptoms or nasociliary neuralgia [7,8,14,15].

Neuropeptide theory

in recent years, Blumenthal suggest that nasal mucosa contact can induce local nerve endings release substance P, which cause headaches, and the concentration of substance P in normal mucosa was higher than mucosa of chronic nasal mucosa hyperplasia and nasal polyps, therefore, pain caused by simple nasal mucosal contact more than chronic inflammation [16]. Stammberger and Wolf believe that stimulation of the nasal mucosa receptors results in the release of neuropeptide substance P through the central and peripheral systems [17]. The local substance P resulted in vasodilatation and secretion, whereas the substance P released by the central nervous system arrived at the cortex through the unmyelinated C fibers induced reflex pain. Peric [18] explained that neuropeptides substance P and CGRP (Calcitonin Gene Related Peptide) are mediators of rhinogenic pain. Zhao [19] found distribution of SP and NK-1R, especially NK-1R, in nasal mucosal tissue at contact point was higher compared with non-contact point. It was suggested that SP and NK-1R were associated with mucosal contact point headache. Although substance P is present in human nasal C fibers, there is no evidence that substance P is produced by mucosal contact.

Headache Level Assessment

According to Visual Analogue Scale (VAS) [20], the pain intensity is divided into 5 levels. Level 0: no headache; Level 1: have a headache, but easily overlooked, only feel headache when focusing on it; Level 2: have a headache - sometimes overlooked; Level 3: have a headache - cannot be ignored, but can do daily work and life; Level 4: have a headache - cannot be ignored, it is difficult to concentrate attention, only can do some simple works; Level 5: have a severe headache - need to rest in bed, unable to do any work. Aleksandar [18] scored the facial pain as follows: 0, absence of pain; 1-3, mild pain; 4-6, moderately severe pain; 7-9, severe pain; 10, the worse pain imaginable. They assessed two additional parameters: the frequency of headaches (number of days with pain in one month) and the duration of headaches (number of hours with pain for 24 h). Patients can give the scores of their headache form intensity, frequency and duration according to the VAS, there are huge differences among their headache levels.

Epidemiological Investigation

Nasal mucosa contact area headache is a hot topic in otolaryngology head and neck surgery all over the world. This concept has been widely accepted because of the evidence of the presence of contact area both in anatomical and radiological aspect. It is generally believed that there is a direct relationship between the headache and the nasal mucosa contact area, so endoscopic mucosal contact area remove surgeries were actively carried out. But there is still a lack of systematic epidemiological investigation. Some international scholars had carried out researches about the morbidity of nasal mucosa contact area, however, there is still much controversy about whether nasal mucosa contact area is indeed the pathogenic factors of headache, there is still much controversy.

Behin et al. thought that the nasal mucosa contact area was the cause of secondary headache or the aggravation of primary headache [1,6]. Abu-Bakra and Jones [17] observed 973 patients and found that the incidence rate of nasal mucosal contact in 58% of the population without headache (566) was approximately 4% and in 42% of the patients with headache (407), the incidence rate was about 4% (18 people). In these 18 people, 2 of them were diagnosed with migraine and had good result from drug treatment, another 2 people were diagnosed with cluster headache and underwent nasal septum spine surgery, no improvement in headache postoperative and continued on their medication. Therefore, they believed that the incidence of nasal mucosa contact area in the group with/without headache is similar, indicating that it may be related to the physiopathology factor of headache occasionally, but it is not a trigger factor. They believed that the cause of head and facial pain is likely to be related to other central nervous system pathology processes, so it is not necessary to remove nasal mucosa contact area. Devendra [21] argued that the presence of a mucosal contact zone is a causal relationship with headache, rather than cause and effect. Herzallah [22] said radiological identification of mucosal contact points (MCP), concha bullosa (CB) or hyperpneumatized sinuses does not seem to be a predictor of headache causality. Further studies are required to identify clinical scenarios in which these variations may contribute to pain symptoms.

Surgical Methods and Effect

Selection standard of patient [6,11]

1. In line with the migraine without aura in International Headache Classification-2, or accord with the variability migraine headache in the criterion recommended by Silberstein and Lipton [23]; 2. Drug treatment is invalid; 3. CT confirmed the presence of nasal mucosal contact area; 4. Using local anesthetics can significantly improve headache (headache disappear completely and degree of headache reduce more than 50%); 5. Excluding any other sinus lesions. Recent years, some authors put the positive result of lidocaine test as one of the inclusion criteria for mucosal contact headache surgery, this means that, after the application of a piece of cotton wool soaked in the 5% solution of lidocaine for 15 min, there was a reduction in pain intensity of more than 50% [9,10].

Surgical methods

The basic principle of surgical treatment is the minimally invasive technique, which is removing mucosal contact area on the basis of preserving normal anatomical structure of nasal cavity as far as possible. Operative procedures include septoplasty [2,6]; if there is superior turbinate contact zone at higher position, ethmoidectomy is feasible; partial middle turbinectomy can be used to correct middle turbinate hypertrophy, polyps and reverse bending; remove lateral wall of middle turbinate to eliminate vesicular middle turbinate; apply uncinat process excision to remove uncinat process lesion; anterior ethmoidal cell resection be used to correct ethmoid bulla hypertrophy; Open nasal agger to solve agger excessive gasification; partial resection of inferior turbinate or push it laterally can eliminate the contact of nasal septum and lateral nasal wall.

Surgical effective evaluation

International general visual analogue scale (VAS) [20] divided pain and treatment effects into following levels: 0 to 2 is excellence (completely painless); 3 to 4 is good (mild pain); 5 to 6 is (moderate pain); >7 points is poor (Severe pain, need to use analgesics). Antje [7] judged completely disappeared of headache after operation to be "cure", the degree, frequency and duration of pain significantly reduced is "improve", no significant change of symptoms is "non-effective". They made a prospective study on the surgical treatment of mucosal contact area headache for up to 10 years, the follow-up time was 6 months, 18 months, 24 months, 36 months and 120 months after the operation, endoscopic examination and questionnaire were taken in 6, 18 and 24 months follow-up, 36 and 120 months only took a telephone follow-up and filled out questionnaire, collected data and made a statistical analysis. 2 years after surgery, the success rate was 85%, of which 60% had a headache completely disappeared, 25% got obvious relieve, but 10 years after the surgery, only 6 patients got rid of the headache completely, and the success rate dropped to 65%. But given that the patients with refractory headache for many years, other treatment are not effective, the 65% success rate of operation is acceptable. The success rate of surgery decreased from 85% in 2 years to 65% in 10 years, which highlights the importance of long-term follow-up. Behin [6] followed up patients in 6-62 months during treatment and postoperative, standardized questionnaire were used to collected data and assess the efficacy of surgery from the headache frequency, intensity, clinical characteristics, clinical symptoms, headache related behavioral disorders and previous treatment etc. The

frequency and intensity of headache after endoscopic sinus surgery were significantly decreased, associated symptoms and behavioral disorders were significantly decreased, 76.2% of the patients postoperative headache score decreased more than or equal to 50%, the headache disappeared in 42.9% of the patients at the last follow-up. Only 1 patient had postoperative improvement of symptoms less than 25%, 2 cases of postoperative symptoms increased less than 25%. They thought that the nasal mucosa contact area is the trigger factor of refractory headache. Tosun [15] did 30 cases surgical efficacy observation of mucosal contact area headache, 43% of them complete remission, 47% significantly improved, 10% no improvement. Harley [24] retrospectively analyzed the clinical data of 34 patients with headache as the only symptom, and nasal septum contacted with at least one of turbinate. All of these patients underwent nasal endoscopic surgery, headache intensity postoperative was reduced by 91%, headache frequency decreased by 85%. In Wang's research [2], 45 cases of nasal mucosa contact headache received nasal endoscopic surgery were analyzed retrospectively by differences of headache degree, headache frequency, lasting time and total time between pre-operation, after 6, 18, and 24 months surgery. The conclusion was that one of the key causes of patients suffered intractable headaches is mucosal contact in the nasal cavity. Whose pain could be relieved through surgical correction of intranasal anatomic abnormalities. Nasal mucosa contact might not be the only etiology of intractable headache since the mechanism of headache is complicated and variable. The effect of endoscopic surgery needs to be estimated by long period of follow-up. Aleksandar's results suggested that [18] topical medications have no effects and that surgical removal of mucosal contacts could be effective in the treatment of contact point headache. The results of surgical treatment were better in cases of facial pain caused by septal spur (SS) and concha bullosa (CB), than in those caused by septal deviation (SD).

Conclusion

Through the literature for nearly 20 years, we found that the concept of nasal mucosal contact point headache has been widely accepted by otolaryngologists in the world, and applied in clinical practices. Doctors' awareness of the disease has gone through the process of blindness to rationality. Earlier, doctors believed that the existence of nasal mucosal contact points related to headaches directly and performed operations blindly, the operative effect (especially the long-term effect) was not ideal. After that, doctors thought about the problem deeply and put forward strict operative inclusion criteria, which made the effect improved, but the mechanism of the phenomenon was not clear, they just put forward some hypothesis. Recent years, a few scholars began to study the expression of nerve factors in nasal mucosa contact area and advanced the study of the disease to molecular level. We hope that with the deepening of the study, scholars will be able to elucidate the pathogenesis of nasal mucosal contact point headache, provide reliable basis for clinical screening of surgical indications, improve the treatment efficiency of the disease and relieve human suffering.

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