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REVIEW ARTICLE OPEN ACCESS

Diagnostic Dilemma of Sinus Headache and Migraine

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This review article aims to clarify and elucidate how to diagnose correctly sinus headache by discussing sinus headache as regards to its epidemiology, clinical picture, radiological investigations, as well as its medical and endoscopic management. The article also will clarify the relationship between a sinus headache and other co-morbidities, namely migraine, facial pain, and allergy, and the differential diagnosis of sinus headache. That sinus headache is not indicating life-threatening health problem, not a common disease, and usually is overrated. Usually the patient and sometimes the physician will attribute the patient's facial pain to a sinus headache, while in fact it is caused by another pathological condition. Sinus headache is better to be diagnosed by exclusion and to be confirmed by nasal endoscopy before rushing into its treatment. Although it is neither sensitive nor specific in cases of chronic rhinosinusitis, plain X-ray is beneficial in the diagnosis of acute rhinosinusitis. Computed tomography (CT) is recommended, but it is not conclusive and it is important to know that a CT scan may remain abnormal even after endoscopic sinus surgery. Magnetic resonance imaging (MRI) is excellent and it is the choice option wherever possible. Pharmaceutical treatment of sinus headache should be addressed first before adopting surgery option; and if functional endoscopic sinus surgery (FESS) is chosen, which is the most common type of surgery used, preoperative assessment is very important to reduce complications.

Keywords: Headache, sinus, migraine, clinical picture, facial pain

Introduction

The Sinus headache is a common term used by patients and primary health care providers to describe a sort of headache that feels like pain of sinusitis. It is felt like pressure sensation in the forehead, cheeks and nose, and is associated with symptoms of sinusitis (1). There is no specific definition of the sinus headache, even in the International Classification of Headache 2013. It concluded that the term "sinus headache" is outmoded because it refers to both primary and secondary headache. Headache is considered as a symptom of rhinosinusitis (RS or true sinus headache) (2), which is defined by the Sinus and Allergy Health Partnership Task Force as a group of disorders characterized by inflammation of the mucosa of the nose and paranasal sinuses. Acute rhinosinusitis usually is preceded by acute upper respiratory tract infection then the patient develops fever, unilateral severe facial

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pain and nasal obstruction. One of the common complaints at the oto-rhino-laryngology clinics is the difficulty of diagnosis of sinus headache as usually sinus headache is a misinterpreted migraine (3). Acute sinusitis is characterized to endure for four weeks as a maximum, while chronic sinusitis duration could be endured for twelve weeks or more (4).

Classification of Headache Disorders

Headaches attributed to both acute and chronic rhinosinusitis have been classified by The International Classification of Headache Disorders (ICHD-3) (2). The international society of headache (HIS) has classified headache syndromes depending on diagnostic criteria. Other non-sinogenic facial pain that mimic sinus headache is several and either primary headache such as migraine, tension headache, cluster headache and trigeminal cephalagia, or secondary headache which is uncommon, such as psychiatric illness, vascular pathology, infection or injuries of cranial nerves (5).

Rhinogenic Headache

Rhinogenic headache is a pain syndrome affecting the face and is caused by impinging mucosal surfaces in the nose and sinuses. Symptoms most probably affect the area surrounding the orbit, the medial canthus and superiorly, or the zygomatic-temporal region and are one-sided, even if both sides may be affected in some cases, usually the pain is affecting the patient in paroxysmal attacks. Three features must be present in cases of rhinogenic headache: an area of mucosal impingement, confirmed endoscopically or radiologically; infiltrating the suspicious area with local anesthesia should abolish nociception for 5 minutes; and the pain should disappear within a week (5).

Tension Headache

The tension headache is the most common type of headache that 78% of the world's population experienced it. It is described as band like pain of the whole vertex. It can be misdiagnosed as sinus headache as it overlaps the frontal sinus area (4).

Trigeminal Neuralgia

Trigeminal neuralgia is a unilateral pathology caused by irritation of the trigeminal nerve leading to acute sharp pain like electric shock which is felt in area supplied by trigeminal nerve and the pain will cease abruptly. This unique character of pain differentiates it from sinus headache easily, but the patient may undergo nasal endoscopy just to be convinced (6).

Giant Cell Arteritis

Giant cell arteritis is the synonym of temporal arteritis. Usually a unilateral, but may be bilateral disorder. It affects females in seventies more. It is commonly presented with unilateral facial pain on chewing with jaw claudication. Usually the investigations show raised ESR and CRP and diagnostic temporal artery biopsy (6).

Pneumocephalus

Pneumocephalus is a condition occurs because of collection of air in the spaces inside the skull such as intraparenchymal, intraventricular, extradural, subdural and sub arachnoid spaces. It may be associated with increase in the air pressure during diving or valsalva. Also, it may result from petrous bone dehiscence, post-traumatic, post-surgical or associated with tumor. It may be misdiagnosed as sinus headache, but the key difference in pneumocephalus is the relation of pain to change in the air pressure especially if accompanied with any one of the previously mentioned cases (7).

Sinonasal Anatomy

Rhinosinusitis is not the only nasal cause of daily headache. Contact between the mucosal surfaces in the nose which will stimulate the nocireceptors. Deviation of the nasal septum, enlarged nasal turbinates, and nasal septal spur may cause the patient to suffer from chronic daily headache that may be attributed to sinus headache (8).

Nerve Related Conditions

There are rare causes of facial pain that may be misinterpreted as sinus headache such as glossopharyngeal neuralgia, occipital neuralgia, nervus intermedius and supraorbital neuralgia (5).

Medication Overuse Headache

Medication overuse headache is difficult to be diagnosed and is easily misdiagnosed as sinus headache. The patient will be resistant to treatment as most probably the patient has a primary headache that will be diagnosed once he stops the overused medication (9). Katsarava and Obermann (2013) showed three features of medication overuse headache identification: as it is the result of continuous overuse for three months or less using one or more medication which is taken for acute and/or treatment of headache; the headache has markedly worsened during the overuse of medications; the headache will disappear or returns to its former pattern within two months of stopping the overused medication (10).

Sinogenic and Non-sinogenic Headache

De Corso et al. (2018) described the severity of pain of sinogenic headache as a mild to moderate of a pressure sensation or congestion which continue for more than 72 hours, mostly unilateral, depending on the sinus of origin. The triggers of sinogenic headache vary in relation to atmospheric pressure changes (e.g. diving, flying, skiing); frequently associated with congestion, nasal blockage, or discharge, in addition to Reduction and in sometimes loss of smell. The non sinogenic headache is characterized being moderate to severe of tightening nature or pulsatile not exceeding 72 hours; its location is either unilateral or bilateral with poor interrelationship between the site of facial. The triggers of non sinogenic headache including some foods (e.g. cheese, chocolate), some exercises' types, menstrual cycle. The non sinogenic headache is frequently associated with vomiting, nausea, photophobia or phonophobia., in addition to unilateral conjunctival injection (5).

The ear, nose and throat (ENT) examination of sinogenic headache include mucosal oedema, nasal congestion, and purulent nasal discharge. Nasal endoscopy examination of sinogenic headache may revealed purulent nasal discharge, mucosal oedema, nasal polyps, occlusion of osteomeatal complex and/or spheno-ethmoidal recess.

Computed tomography of sinogenic headache showed sinuses opacification; osteomeatal complex and/or spheno-ethmoidal recess occlusion. While The non sinogenic headache showed no abnormalities or nasal mucosal congestion in the ENT examination, nasal endoscopy or computed tomography (5).

Headache Attributed to Rhinosinusitis

Chronic rhinosinusitis/chronic recurrent rhino sinusitis are the most common nasal condition seen in oto-rhino-laryngology OPD which has enormous economic burden and significant morbidity on general population (11). The headache attributed to rhinosinusitis is characterized by being a frontal headache pain accompanied by pain in one or more regions of

the face, ears, or teeth; with a clinical picture, nasal endoscopic examination, CT and/or MRI, and/or laboratory evidence of acute or acute on top of chronic rhinosinusitis. The pain also develops simultaneously with onset of rhinosinusitis or its acute exacerbation, and resolve within seven days after remission or successful treatment of acute on top of chronic rhinosinusitis (12).

The acute sinusitis should be diagnosed by clinical, nasal endoscopic, and/or radiological; the evidence of causation is confirmed by two headache symptoms of the following: developed in relation to the onset of rhino sinusitis; worsened with worsening of the rhinosinusitis; significantly improved or resolved with improvement in or resolution of the rhinosinusitis; exacerbated by pressure over the paranasal sinus. In the case of unilateral rhinosinusitis, headache is limited to the affected side**.**

While the chronic or recurrent sinusitis should be diagnosed by clinical, nasal endoscopic, and/or radiological proof of current or previous infection or other inflammatory process within the sinuses; the evidence of causation is confirmed by two headache symptoms of the following: developed in temporal relation to the onset of chronic rhinosinusitis; its waxes and wanes with the degree of sinus congestion and other symptoms of the chronic rhinosinusitis; exacerbated by pressure over the paranasal sinuses. In case of unilateral rhinosinusitis, headache is limited just to the affected side (6).

Involvement of the frontal sinuses will cause tenderness on the medial side of the orbital floor, while the maxillary sinusitis will result in unilateral facial and dental pain (13). Chronic rhinosinusitis is often painless (6), but sometimes it results in chronic facial pain which predispose the patient to experience migraine and increase the morbidity (14). Sometimes it is difficult to correlate the site of pain to the affected sinus such as acute sinusitis of the sphenoid sinuses, in which the pain may affect the vertex, temporal bone or even the whole head (6).

Clinical Association with Migraine

It is a great challenge to physicians to achieve a correct accurate diagnosis of sinus headache. It is a common complaint at the oto-rhino-laryngology clinics, but actually this is not the true story. Usually sinus headache is a misinterpreted migraine. i.e.: the patient is suffering from migraine, but wrongly assumes it as sinus headache because of associated symptoms (3). It was found that migraine is misdiagnosed as sinus headache in about 42 % of patients having sinus headache (15) while other studies suggest that about 90% of sinus headache cases are actually experiencing migraine (16, 17) There is no specific diagnostic code for sinus headache in the international classifications of diseases, 9th edition, but all types of headache are coded as ICD-9 code 784 (3). It is given to all types of headache including migraine, tension headache and sinus headache (which are commonly difficult to be differentiated) and includes all other types of headache as well.

There are a lot of factors contribute to this conflict. First of all, there is a possibility that migraine and allergy are comorbidities and are commonly associated together (18). This may add to the difficulty to distinguish between them. A patient who is having chronic allergic sinusitis is expected to experience pain and pressure sensation over any of the affected sinuses, and if he suffers from migraine that is unilateral pain in the head, he will attribute his

pain to sinusitis rather than to migraine, especially if associated with sense of pressure and nasal blockage (5).

Another factor related to this conflict is about the pathogenesis of migraine. Migraine stimulates the trigeminal nerve, which supplies both meninges and paranasal sinuses; so that the patient will experience symptoms related to both and got confused between both. Continuing with factors contributing to the strong relation of both diseases, sometimes migraine resembles sinusitis and be associated with nasal congestion, nasal block or rhinorrhea due to its vascular component. Again, this confuses the patient: which was the first event? (3). Patient with migraine may feel pain over the site of one of the sinuses which will be assumed to be caused by the underlying anatomical structure (the sinus), rather than migraine, which further leads to under-diagnosis of migraine (6). Some patients who were thought to have sinus headache had good response to the treatment by migraine medications rather than nasal decongestants and other common cold and sinusitis medications (3).

Jackson and Dial (2004) found that 49 out of 100 patients visited otolaryngology clinic complaining of sinus headache had an undiagnosed migraine. Among the 49 patients with migraine, 19 had allergic rhinitis as well, 11 had sinusitis, and 6 had allergic rhinitis and sinusitis (19). Thus, migraine and allergy are often co-morbidities, and both are frequently seen by the otolaryngologists. Whether or not two diseases are linked remains controversial. A study conducted in 1952 reported that half of the study group of patients complaining of migraine, had recovered from migraines attacks after restriction of some allergenic food elements such as chocolate and wheat and that most of the patients with migraine already had positive history to allergic rhinitis and sinusitis (20). More recent studies failed to confirm the association between migraine, allergy and so the sinus headache (21). However, there is a theory attributing migraine to allergy. This theory can explain the common association between allergy, rhinosinusitis and migraine. According to this, migraine is caused by hypersensitivity of intracranial pain receptors; so, its pathogenesis is due to degranulation of the intracranial mast cells which induces prolonged state of excitation of the meningeal nocireceptors and activation of the trigeminal nucleus as well (18,22). Gelfand (2004) had noted migraine-related elevation of serum prostaglandin D2 and F2, interleukin-1, tryptase, histamine, and TNF-α; and compared between different mediators in migraine and allergic rhinitis (23). Another supporting study was conducted United Kingdom General Practice Database in 2008. It showed a relative risk of having asthma in patients with migraine is 1.3 compared with patients who are not suffering from migraine. It showed the common association between the two entities, but diagnosis of migraine is not meaning an increased risk of asthma. This was concluded after a thorough case control analysis which showed an adjusted OR of only 1.17 (24).

The association between migraine and sinusitis is further confirmed by Eross et al. (2007) who noticed that many of patients suffering from migraine are developing an attack of migraine secondary to exposure to triggering factors such as weather changes (83%), seasonal changes (73%), and exposure to allergens (62%) (25). Schreiber et al. (2004) involved 2991 patient were self-reported or diagnosed by their physicians as having sinus headache. They

were subjected to the international headache society criteria. The study resulted in a fact that migraine should be included as a first differential diagnosis of sinus headache, as 88% of the study patient met the criteria of migraine rather than of sinus headache (16).

Moreover, another study done by Alpay et al. (2010) evaluated 30 patients with migraine for IgG antibodies against 266 food antigens then used the information to do food exclusion or inclusion in a crossover study design. The elimination periods were found to provide a statistically significant reduction in the number of headache days and the number of migraine attacks (26).

This common overlap between sinus headache and migraine has a lot of drawbacks such the patients and physicians are misdiagnosing migraine as sinus headache, which in turn leads to the overdose of antibiotics and nasal decongestants. The patient may even undergo endoscopic sinus surgery without actual need or benefit (3). This overlap between sinusitis and its pain and headache from one side, and migraine is not just at the level of the misinterpretation of the complaints; it extends to the radiological investigations. The patient may have a concomitant radiological sign of sinusitis which will further harden the differentiation. The location, variation, pattern of the headache can guide us towards the correct diagnosis (11).

Diagnosis of Sinus Headache

It needs careful detailed history, examination of the head and neck then nasal endoscopy and imaging studies. There are several diseases that lead to facial pain and pressure sensation and are misdiagnosed as sinus headache other than rhinosinusitis and migraine. Those clinical problems are: tension headache, cluster headache, paroxysmal hemicrania medication overuse headache, temporal arteritis, temporo mandibular joint dysfunction, trigeminal neuralgia, and hemicrania continua (6). Patel et al. (2013) divided factors of diagnosing sinusitis to major and minor factors; the major factors included facial pain or pressure associated with another major factor, facial congestion or fullness, nasal obstruction or blockage, hyposmia/anosmia, nasal discharge or drainage, and fever in acute conditions. While minor factors of diagnosing sinusitis included headache, fever associated with another major nasal symptom, halitosis, fatigue, dental pain, cough, ear pain or pressure or fullness sensation (1).

Thus, because of the similarity of symptoms of rhinosinusitis such as lacrimation, rhinorrhea and nasal congestion, it is easily misinterpreted by the patient suffering from migraine. These symptoms are caused in migraine due to activation of trigeminal-autonomic reflex, while in sinusitis they occur due to local pathology. The same symptoms are experienced by patients suffering from tension headache. A recent observational study was conducted by Petersen et al. (2019) to detect the association between headache and sinus headache in patients who were self or physician reported as having sinus headache. This was to determine wither neck pain is a co-morbid symptom in self-reported sinus headache cases or not. The authors defined cervical musculoskeletal dysfunction that may be suffered by self-reported sinus headache patients as any reduced neck muscle function, reduced range of cervical movement and painful cervical segmental joint dysfunction. Thus the authors concluded that neck pain is a common co-morbidity in patients with self-reported sinus

headache, and as a result, they assumed to be troublesome in patients who are treated at physiotherapist as having just neck pain, which found to be difficult to correlate this neck pain to the rhinosinusitis in the suffering patients. So endoscopic evaluation is essential; it shows hyperemia of the sino-nasal mucosa with purulent discharge (2).

Radiology and Imaging of Sinus Headache

Plain X-ray: is beneficial in the diagnosis of acute rhinosinusitis, but is neither sensitive nor specific in cases of chronic rhinosinusitis.

Computed tomography (CT): is recommended, but it is not conclusive same way as nasal endoscopic study. It shows the anatomy and pathology of the nose and sinuses. Sometimes CT scan remains abnormal many weeks after resolution of the sinusitis. Unfortunately, CT may give an impression of abnormal sinus features in normal persons. 30% of normal people show thickened mucosae and increased opacification on their CT (5). The CT scans use variable methods of scoring didn't succeed in improving the correlation. There was a weak association between CT appearances as scored using Lund-Mackay and the degree of chronic rhinosinusitis (27,28). It is important to know that a CT scan may remain abnormal even after endoscopic sinus surgery, even there might be CT features of chronic sinusitis while the patient is clinically free Those patients are not in need of treatment.

Magnetic Resonance Imaging (MRI): Magnetic resonance imaging is excellent to visualize the soft tissues and the anatomy of the nose and paranasal sinuses. It offers excellent visualization of the nasal mucosa. It can differentiate between bacterial, viral and fungal infection. Also, it is able to identify area of bone erosions (29).

Laboratory Tests of Sinus Headache: Some laboratory tests such as sedimentation rate, white blood cell counts, and C-reactive protein levels are reported by some researchers to be used to help of acute sinusitis diagnosis (30). But the practical experiences showed that those tests appear to have little value for helping in clinical findings in the sinusitis diagnosis. So, cultures should not routinely obtain for evaluation of acute sinusitis but should be obtained in a patient in intensive care or with immunocompromised patients, in children not responding to appropriate medical management, and in patients with complications of sinusitis. Because the nose is colonized with multiple nonpathogenic species of bacteria, care must be taken when evaluating culture results (31).

Treatment Approach of Sinus Headache

Pharmaceutical Treatment of Sinus Headache

Rhinosinusitis is like other upper respiratory infections, usually results from a viral infection. Despite this, antibiotics are overused for its treatment which may predispose to emergence of widespread antibiotic resistance (32).

Broad spectrum antibiotics are used for the treatment of acute on top of chronic bacterial exacerbation of rhinosinusitis. Amoxicillin and its combination with clavulanic acid are the first antibiotics of choice (33). Long course of low-dose macrolides also may be used.

Fluoroquinolones are used for treatment of upper respiratory tract infections for its effect effectiveness against wide variety of bacteria responsible for upper respiratory infections (34).

The physician should treat the underlying cause of rhinosinusitis at first. Oral anti-histamines may be needed for patients with known allergy, but there is little evidence of their efficacy in chronic rhinosinusitis even in cases of nasal polyps. Another group of medications are proton pump inhibitors. They have great benefit for the patients with gastroesophageal reflux disease associated with chronic rhinosinusitis (35).

Finally, environmental factors or allergic factors may predispose individuals to chronic rhino sinusitis. In these patients, It is beneficial to avoid their exposure to pollution, cigarette smoke, dust, moulds, or other environmental and chemical irritants.

Physicians usually describe nasal decongestant to patients having from chronic rhinosinusitis. It was notice that there is a transient effect of the nasal decongestants on the inferior and middle turbinates with no shrinking of maxillary and ethmoid linings after using xylometazoline.

There are no enough studies as regards the use of capsaicin and ipratropium bromide for managing with chronic rhinosinusitis (36).

Surgical Treatment of Sinus Headache *(Nasoendoscopy)*

Functional Endoscopic Sinus Surgery (FESS)

It is a modality of treatment chronic rhino sinusitis and is a common method to treat mucosal contact point headache that was used successfully over the past 20 years. It has been used as a safe and effective treatment for paranasal sinus disorders.

Contact point is a site where opposing mucosal surfaces touch each other inside the nasal cavity, which may result from deviated nasal septum, nasal septal spur or abnormal position of the superior and middle nasal turbinates. The problem of contact mucosal points as a cause of sinus headache was discussed in many literatures and is much debated, and is controversial (1). The target of functional endoscopic sinus surgery is to remove the tissue obstructing the Osteo Metal Complex (OMC) thus facilitating the drainage of secretions in the paranasal sinuses. This removal is done while conserving the normal non-obstructing mucous membrane and with preservation of the intranasal anatomy. This endoscopic surgery is performed through the nasal cavity and results in no external scars. It has with low incidence of associated complications (37).

Indications of Endoscopic Sinus Surgery

The functional endoscopic sinus surgery (FESS) was indicated at first at 1980s and early 1990s to resolve the chronic sinusitis allowing drainage of the mucous accumulated in the paranasal sinuses, thus hinder its infection and reliefs the sensation of compression and fullness of the sinuses felt by the patient. Patients who followed medical treatment and that medical treatment had failed to relief his symptoms are suitable to undergo this sinus surgery. The benefit of this endoscopic surgery is not limited to the treatment of rhinosinusitis, but extends to the eyes like orbital decompression of thyroid orbitopathy, lacrimal obstruction, optic nerve decompression, traumatic loss of vision, and pituitary tumor surgery (38).

Procedure of Endoscopic Sinus Surgery

The endoscopic sinus surgery is better to be done under local and topical anesthesia for safety concerns especially if done for ocular purpose (38). The fiberoptic nasal telescope provides optimum visualization of the osteo-meatal complex. Television monitor is allowed during the surgery. There are microdebriders

that excise only the diseased tissue from the nasal mucosa (39). However, there is a risk of developing some complications. The cutting instrument is thought to be safe around the skull base and lamina papyracea, but this sense of safety is undermined by the information that this cutting tool can grasp and cut free edges of the bone. The extent to which the surgeon widens the ostium of inferior turbinate is crucial. Excessive anterior extension carries a risk of damaging the nasolacrimal duct and should be avoided. If there is ethmoiditis and orbital edema or subperiosteal abscess located lateral to the lamina papyracea, it is better to use the endonasal approach of this surgery. There are other indications of FESS like repair of defects of the skull base, and excision of benign and some malignant nasal tumors (37).

Complications of FESS

Functional endoscopic sinus surgery was having a lot of complications in earlier years of its discovery, but the new technology of instrumentation had reduced the incidence of these complications (37). An example of such a complication includes nasal hemorrhage, extraocular muscle injury, optic nerve damage, intraorbital, cerebrospinal fluid leak, meningitis, orbit nasolacrimal duct damage, intracranial hemorrhage, and emphysema. Any delayed complications may occur, but in the young it is expected that even limited endoscopic sinus surgery can affect the development of the face. The formation of mucocele, due to scarring in the frontal recess, is difficult to resolve rapidly, as it takes long time to be formed. All of the major of endoscopic, external or conventional intranasal ethmoidectomy show incidence of major complications is less than 1%. It was found that both intranasal ethmoidectomy and endoscopic sinus surgery resulted in more complications in the right side which is suspected to be related to the right-handed ness of the surgeons or may be due to anatomical variations (40).

Means of Reducing Incidence of Complications

Physicians should take a detailed history prior to the surgery to verify any potential risk of bleeding, which may not be mentioned by the patient unless asked for. It is recommended that the patient don't undergo surgery for chronic rhinosinusitis and/or nasal polyposis until an adequate course of medical therapy was administered. This medical treatment may include antibiotics, steroids or short courses of systemic steroids for some cases of nasal polyps; this will optimize the condition of the nasal mucosa before surgery. The visual status of the patient should also be checked before surgery and the discussion and informed consent should be taken after clarifying all the expected complications (40). The patient should be instructed not to blow his nose during first 48 hours postoperatively because there is a risk of orbital surgical emphysema. Also, the surgical emphysema can extend sometimes to the face and cranial cavity (37).

Outcomes of FESS

Tosun et al. (2000), conducted a prospective study. They included patients suffering from chronic headache lasting at least 3 months. Evidence of contact points by endoscopy, CT, or both; non response to medical treatment of the headache; disappearance of headache after applying local anesthetic to the contact points; and remaining of contact points even after decongestion, all were the inclusion criteria. They excluded cases with observed features of inflammation on ENT examination including nasal endoscopy and CT scan, and the presence of any prominent cause of headache

(including migraine) after a complete examination physician of different related specialties. After surgery directed to contact points to patients, they noticed good response in 91% of patients, 43% experienced complete relief and 47% showed significant relief (41). Another study was conducted by Welge-Luessen et al. (2013), who included 20 patients who had a long history cluster headache or migraine not responding to treatment but they had a positive result of endoscopy as regards to presence of mucosal contact points. The study patients underwent surgeries to correct it. The patients were followed up for 112 months. The success rate of the surgery was 65%, 6 out of the 20 patients showed complete disappearance of pain, while 7 patients showed partial improvement and last 7 patients had never improved (42).

In addition to FESS which is considered as the most common sinus surgery, there are other techniques such as FEDS, image-guided surgery (FESS done with an image-guided system that uses computed tomography (CT) scans to aid the surgeon in identifying the anatomy and removing as little tissue as necessary). In addition to other procedures used for more serious sinus problems such as Caldwell-Luc operation, endoscopic skull base surgery, turbinate reduction surgery, balloon sinus ostial dilation (BSOD). The decision for using sinus surgery technique is based upon many factors, including the type and extent of inflammatory disease, patient anatomy and patient preferences.

Endoscopic Dilatation Sinus Surgery (FEDS)

Functional endoscopic dilatation of the sinuses (FEDS) is a new technique of sinus ostial balloon dilatation and is specifically aimed at restoring the patency of sinuses without removing any tissue thereby decreasing morbidity. Cadaver studies confirm the potential use of this method in rhinosinusitis (43). Clinical trials in the USA have also shown the safety and effectiveness in selected patients with rhinosinusitis. Some studies anecdotally reported that FEDS effectively relieves sinus ostial obstruction with less post-operative pain, scarring and bleeding than typically seen with traditional instruments (44). Achar et al (2012) reported that FEDS is as effective as FESS in treatment of chronic rhinosinusitis, and can be considered an additional tool in endoscopic surgery and has the potential to be undertaken as a day procedure (45).

Conclusion

Sinus headache is not a common disease, but is overrated due it similarity and proximity to paranasal sinus and the common association between allergy and migraine. Most of sinus headache cases are actually experiencing another disorder such as migraine or other causes of primary and secondary headache; so, it should be investigated comprehensively before rushing into diagnosis. This will improve the patient's quality of life and satisfaction and will avoid the side effects of prolonged treatment that is not hitting the target. Although it is neither sensitive nor specific in cases of chronic rhinosinusitis, plain X-ray is beneficial in the diagnosis of acute rhinosinusitis. Computed tomography (CT) is recommended, but it is not conclusive and it is important to know that a CT scan may remain abnormal even after endoscopic sinus surgery. Magnetic resonance imaging (MRI) is excellent and it is the choice option wherever possible. Pharmaceutical treatment of sinus headache should be addressed first before adopting surgery option; and if functional endoscopic

sinus surgery (FESS) is chose, preoperative assessment is very important to reduce complications. We recommend paying more attention to the cases allaying to have sinus headache and take enough time to get a detailed history and examination associated with nasal endoscopic examination to identify the cause accurately. This will protect the patient from side effects and complications of wrong medication and surgeries without actual benefits.

Conflicts of Interest

The author has declared no conflict of interest for the present article.

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