Claire Hopkins

Rhinosinusitis Update

Abstract: Rhinosinusitis is a common condition, affecting more than one in ten adults. This article will review current management strategies. While multi-factorial in aetiology, odontogenic rhinosinusitis is an important subgroup that is often misdiagnosed and recalcitrant to management. Patients with rhinosinusitis often report facial pain, but when it is severe, and mismatched in severity to other sinonasal symptoms, facial migraine should be suspected. Finally, the risks of implantation in the setting of maxillary sinus mucosal thickening and the need for ENT referral in such cases will be discussed.

CPD/Clinical Relevance: Sinus issues may present to a dentist as dental pain, and dental disease may itself cause sinusitis. With increasing use of cone beam imaging, sinus pathology will be detected frequently in dental practice and this review will help to advise practitioners on current best practice.

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Introduction

Rhinosinusitis is a condition of inflammation of the nose and paranasal sinuses. Rhinosinusitis is divided into acute and chronic forms. In Acute Rhinosinusitis (ARS) symptoms resolve within 12 weeks (although usually within 4 weeks) and often have an infective aetiology, while in Chronic Rhinosinusitis (CRS), symptoms last more than 12 weeks without complete resolution, with multiple potential aetiologies, which may include inflammation, infection and obstruction of sinus ventilation.[1] CRS is subcategorized into Chronic Rhinosinusitis with Nasal Polyps (CRSwNP) and without nasal polyps (CRSsNP), based on visualization of polyps on rhinoscopy or endoscopy. In a worldwide population study, 10.9% of UK adults reported CRS symptoms.[2]

Acute rhinosinusitis

Acute rhinosinusitis is usually caused by a viral infection, and is usually self-limiting. NICE guidance[3] advocates avoidance of antibiotic prescribing unless symptoms persist for more than 10 days, or if the patient has a high risk of complications, or is systemically very unwell. First choice antibiotics in such cases would be co-amoxiclav or doxycycline. A large number of high quality randomized trials support restricting usage of antibiotics.[4] Although antibiotics can shorten resolution of the episode, only 1 in 20 benefits, while 1 in 8 will develop side-effects of antibiotic treatment. Despite this evidence, ARS accounts for over 20% of antibiotic prescriptions, with antibiotics being issued in over 90% of consultations for ARS.[5]

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Chronic rhinosinusitis

In contrast, most chronic rhinosinusitis (CRS) is associated with inflammation as the primary abnormality, with preservation of drainage pathways, although acute infective exacerbations may occur. It is thought that the persistent inflammation found in CRS is due to a dysfunctional host-environment, with abnormal responses of the mucosa to a wide variety of microbes and irritants. Targeting inflammation is therefore central to treatment options, rather than targeting the microbes or simple drainage procedures. This is reflected in the move away from antibiotic treatment in chronic disease. Chronic rhinosinusitis has been shown to have significant impact on quality of life (QOL), with symptoms such as nasal obstruction, nasal discharge, facial pain, anosmia and sleep disturbance.

Diagnosis of CRS is made by the presence of two or more persistent symptoms for at least 12 weeks without complete resolution, one of which should be nasal congestion/obstruction/nasal discharge and/or facial pain/pressure/headache or loss/reduction in smell. Symptoms must be accompanied by endoscopic evidence of mucopurulent secretions, polyps or oedema or radiological evidence of disease, as a symptom-based diagnosis alone has high sensitivity but poor specificity – only 50% meeting the symptom-based definition have supporting objective signs of disease.[6]

First-line treatment in CRS usually includes a trial of intranasal corticosteroids (INCS) and saline irrigation. INCS have been shown to be effective in a large number of randomized trials, with a low incidence of adverse effects.[7] This treatment is the same for both CRS with and without polyps, although steroid drops may be considered for patients with polyps to help achieve better nasal entry. Patients should be advised that steroid sprays work best when used regularly and do not perform well as a rescue medication. It is important that compliance is encouraged. Daily large volume saline irrigation should be recommended,[8] and a number

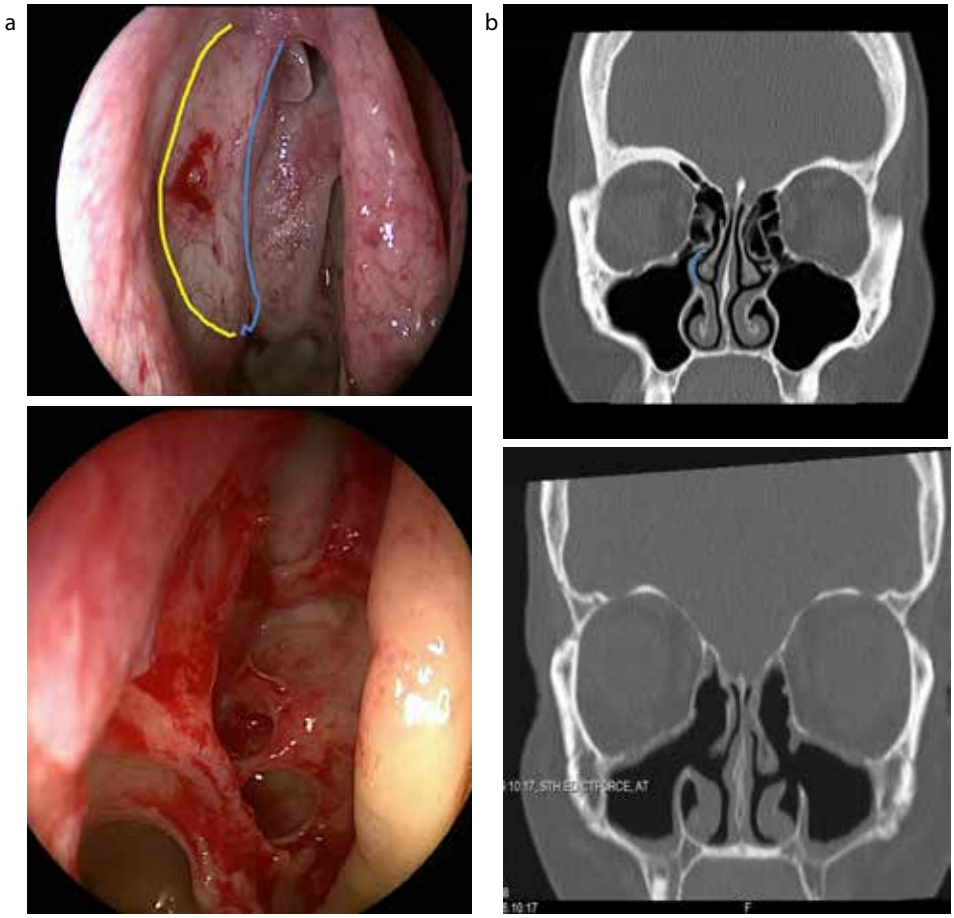

Figure 1. Pre-operative CT and endoscopy images. **(a)** The cleft between the free posterior margin of the uncinate process, marked in blue on the CT and outlined in blue on the endoscopy image below: the ethmoid bulla is known as the hiatus semilunaris, and is key to the drainage of the anterior ethmoid, maxillary and frontal sinuses. This common drainage pathway is called the ostiomeatal complex. During functional endoscopic sinus surgery, the uncinate is removed along its anterior margin (marked in yellow) to expose the maxillary sinus ostium and the ethmoidal bulla and partitions are removed to remove any obstruction to sinus drainage and allow topical access to the sinuses. **(b)** The post-operative CT shows the widely opened sinus cavities; on the endoscopic image the frontal recess (F) skull base and maxillary sinuses are exposed.

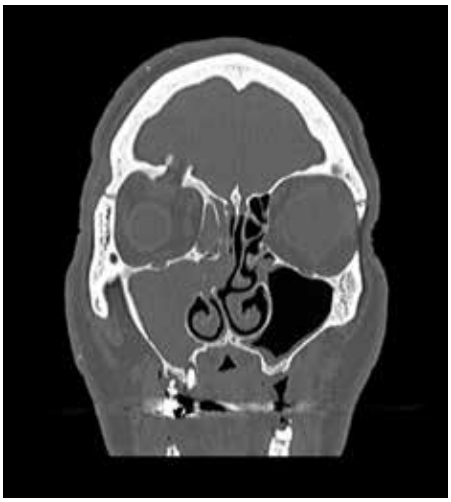

Figure 2. Odontogenic sinusitis, periapical lucency and extensive opacification of the ipsilateral sinuses. The patient developed orbital cellulitis and an extradural collection secondary to the odontogenic infection.

of positive pressure squeeze bottles or irrigation jugs are available commercially.

Antibiotics are not recommended for routine management of CRS, except in the setting of an acute exacerbation. Patients with CRS often receive multiple courses of oral antibiotics that may increase risk of antibiotic resistance. There is little evidence for any benefit of short-term oral antibiotics in CRS. There is weak evidence for the use of a 12-week course of a low dose macrolide,[9] in highly selected patients with CRSsNP, although there is a small risk of cardiac toxicity.[10]

Patients who fail to achieve sufficient symptomatic control with medical treatment may be considered for surgery. Surgical intervention typically involves endoscopic sinus surgery to open and ventilate sinuses, restore normal mucociliary functioning and improve access to topical steroids (Figure 1). 'Functional' endoscopic surgery focuses on opening the ostiomeatal complex, and the key drainage pathway of the maxillary, anterior ethmoid and frontal sinuses in the middle meatus. Inferior meatal antrostomies and sinus wash-outs are no longer performed as they do not improve mucociliary drainage.

In more extensive sinus disease, or in the presence of tumours, extended procedures may be undertaken, including complete ethmoidectomy, sphenoidotomy, medial maxillectomy and median drainage of the frontal sinuses. Use of navigation systems may facilitate surgical dissection in the setting of complex anatomical variations or revision cases. Nasal polyp removal, surgery to manage underlying nasal abnormalities such as septal deviation, or turbinate hypertrophy may also be performed. Studies have shown greater benefits in surgery performed at an early stage in the disease process.[11] Currently, commissioning restrictions and delays in primary care result in 50% of patients who currently undergo endoscopic sinus surgery waiting for more than 5 years from the onset of symptoms of CRS, potentially missing the window of greatest benefit. Although up to 15% of patients with CRSwNP require revision surgery over a 5-year period, surgery improves the effectiveness of ongoing topical therapy and achieves significant improvements in disease-related quality of life that is maintained long term.[12]

Facial pain and rhinosinusitis

Facial pain is reported by 50% of patients with CRS, but is infrequently severe and usually mirrors the severity of other nasal

Figure 3. Right-sided maxillary mucous retention cyst.

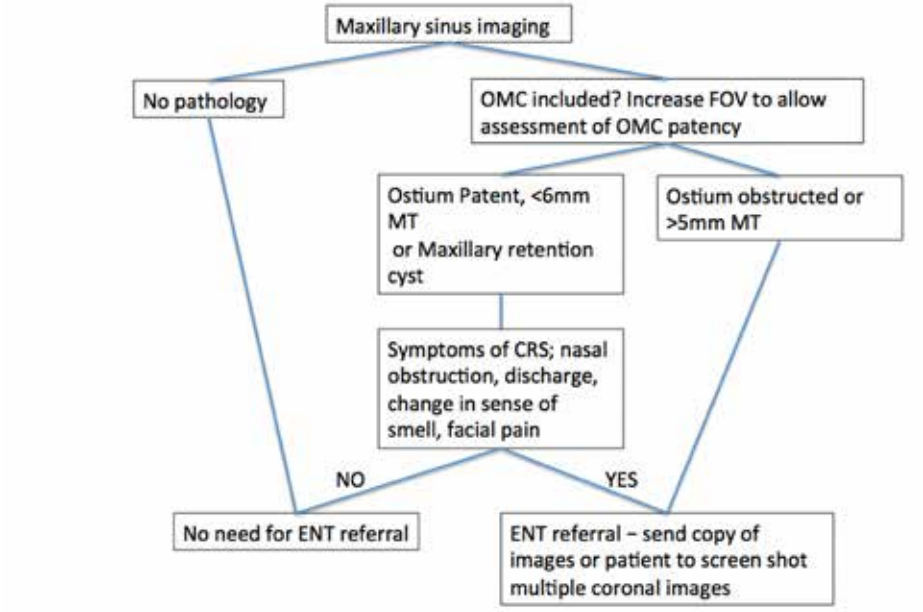

Figure 4. Management algorithm for mucosal thickening discovered during pre-implantation planning.

symptoms. When pain is severe, and is the main presenting symptom, then a careful history for migraines should be taken, and key features of the pain should be elicited. Indeed, facial pain, particularly if reported as 'throbbing' or associated with light sensitivity, has a significant negative predictive value in diagnosing CRS; its presence makes CRS LESS likely.[13] This is also found when there is a mismatch in the severity of facial pain and aural fullness compared with the overall severity of nasal symptoms,[14] or a mismatch in the severity of symptoms and endoscopy and radiological scores.[15]

Facial migraine is commonly misdiagnosed by both patients and physicians as chronic or recurrent acute rhinosinusitis; it typically presents with severe pain over the paranasal sinuses and is often associated with tenderness over the glabellar area, and may be accompanied by congestion and clear rhinorrhoea. Pain is usually intermittent, but episodes can be frequent and are often exacerbated by overuse of codeine analgesia. Often patients are given repeated courses of antibiotics, but with limited effectiveness. Of patients who met IHS criteria for migraines, 84% of patients reported sinus pressure, 82% reported pain in the sinus areas, 63% reported nasal congestion, and 40% reported rhinorrhea at the time of their initial consultation[16] – it is therefore easy to understand why the symptoms are thought to arise in the sinuses. Vasodilation, occurring as a downstream effect of migraines, may cause sinonasal symptoms, and may be relieved by the use of decongestants, thereby falsely re-affirming the diagnosis of sinogenic headache.[17] In a large series of nearly 3000 patients with self diagnosed sinus headache, 88% were found to have migraine and 8% tension headaches.[18]

Recurrent acute rhinosinusitis is actually very rare, and facial migraine should certainly be considered in the setting of frequent intermittent episodes of facial pain in the absence of mucopurulent discharge. Often, endoscopy or a CT scan performed during an acute episode is required to differentiate between the two, as imaging performed in between episodes. In one study of patients referred to tertiary care thought to be having recurrent episodes of ARS, CT performed at baseline was normal at baseline and remained so when repeated at the time of an acute episode, excluding recurrent ARS in 96% of cases:[19] 47% were ultimately diagnosed with rhinitis, 37% with migraine, and 12.5% with otherwise unspecified facial pain. Correct and early diagnosis of migrainous headache is important, both to achieve adequate symptom control and to avoid unnecessary and often repeated courses of medical, and sometimes surgical, treatment. One patient, referred to my practice with 'recalcitrant recurrent acute sinusitis', had undergone seven sinus procedures despite no evidence of mucosal thickening or other radiological signs of CRS, but made an excellent response to treatment for facial migraine.

Within specialist clinics, 'upfront' CT should be considered in patients with negative endoscopy before prescribing 'maximal medical therapy' and reinforcing a diagnosis of sinus disease.[20] Primary care and dental practitioners should similarly avoid reinforcing patient perceptions of a sinogenic headache, unless there is clear supporting evidence on examination or radiology.

Odontogenic sinusitis

Odontogenic sinusitis, where a dental origin is identified clinically, radiologically, or suggested by anaerobic predominance on culture, may present as an acute or chronic picture. It is estimated that 10% of all sinusitis cases, and up to 40% of recalcitrant maxillary sinusitis cases,[21,22] have an odontogenic cause. The incidence of odontogenic sinusitis appears to be increasing,[23] possibly related to the rising rates of dental implantation.[24] Only 50% of patients have a history of previous dental

surgery or known periapical disease[25] and, as dental pain is often absent, odontogenic disease may present directly to ENT, where the diagnosis can be easily missed.[26] Foul-smelling unilateral mucopurulent nasal discharge should raise suspicion of an odontogenic sinusitis. Facial pain and pressure, nasal obstruction and post-nasal drip may also be reported.

Anterior rhinoscopy and endoscopy, which may reveal mucopurulence and oedema in the middle meatus, and dental examination, are helpful in making the diagnosis but radiological imaging is essential. CT is considered the gold standard (Figure 2), as high rates of false negatives are reported with periapical radiography.[27] Ideally, if CBCT is used, the field of view should include the ostiomeatal complex, the drainage pathway of the maxillary sinus found in the superomedial aspect of the sinus.

Anaerobic streptococci, gram-negative bacilli and enterobacteriae are the most commonly isolated microbes,[28] although infections are usually polymicrobial.

Initial medical management should include nasal decongestants and appropriate broad-spectrum antibiotics, such as co-amoxiclav or clindamycin. The dental origin should be addressed. While many patients will settle with conservative management, sinus surgery will likely be required in up to 50% of cases;[29] this is more likely if there is a history of preceding dental procedure (particularly implantation) or if there is obstruction to the drainage of the maxillary sinus.

Management of the sinuses prior to dental implantation

No doubt driven by a wish to avoid iatrogenic odontogenic sinusitis, an increasing number of patients appear to be being referred to the NHS to investigate incidental findings in the maxillary sinus found on CBCT prior to implantation.

There are currently few published studies upon which to guide management in such cases, although the British Rhinological Society are in the process of developing a consensus document.

One of the most common incidental findings is a mucosal retention cyst (Figure 3); these are found in a third of CT scans performed for non-rhinological conditions and are not a manifestation of rhinosinusitis.[30] They are rarely symptomatic and have a high recurrence rate after marsupialisation, and therefore treatment is not required.

Mucosal thickening is also common in the absence of sinus disease. A study of patients undergoing sinus imaging for non-sinusitis causes found that only 25% had no mucosal thickening, with a mean Lund-Mackay score (a staging system that quantifies the amount of mucosal thickening on a scale of 0–24) of 4.26.[31] Dental literature defines rhinosinusitis based on radiological thickening of the mucosa of >2 mm,[32] but this definition has poor specificity and will include many healthy asymptomatic patients.

The presence of mucosal thickening on CT has been shown not to affect the success of dental implants. In one study, with strict inclusion criteria, 29 CBCT scans were being evaluated prior to dental implantation. Of these, 6.9% had minimal thickening (1–2 mm), 20.7% of cases had moderate thickening (2–5 mm), and 65.5% had severe thickening (>5 mm). There was a 100% success rate of the implants with no loss of implantation or infection.[33] This is also supported by a study by Jungner *et al*, in 2014, whereby radiographic signs of sinus pathology, opacification, polyp-like structures, and thickening of the sinus membrane, were not correlated to implant survival.[34] A key feature is whether the drainage pathway of the maxillary sinus, the ostiomeatal complex, is patent; this should be included in the field of view on cone beam imaging if rhinosinusitis is suspected. If the drainage pathway is unobstructed, there is only mild mucosal thickening and, if the patient is asymptomatic, there is no need for ENT assessment. In all other cases, onward ENT referral should be made, with transfer of the appropriate imaging. As NHS systems are often unable to open CDs or import images, it can be helpful to ask the patient to take pictures of relevant images on their smartphone. A treatment algorithm is proposed in Figure 4.

Conclusions

Rhinosinusitis is a common chronic condition requiring early, correct diagnosis, medical management and, at times, surgical intervention. Radiological imaging may be required to distinguish between facial migraine in the setting of normal endoscopy.

Odontogenic sinusitis should be considered with unilateral rhinosinusitis, and expedient management of the dental cause will result in resolution in over 50% of cases.

Mild mucosal thickening and mucous retention cysts in the maxillary sinus are not contra-indications to dental implantation, but ENT assessment is advised if the sinus drainage is obstructed.

Compliance with Ethical Standards

Conflict of Interest: The author declares that that there is no conflict of interest.
Informed Consent: Informed consent was obtained from all individual participants included in the article.

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CPD ANSWERS July/August 2020

1. C	**6.** B
2. C	**7.** B
3. C	**8.** B
4. A	**9.** B
5. B	**10.** B