

Evidence of an increase in the incidence of odontogenic sinusitis over the last decade in the UK

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Abstract

Background: Dental disease is a recognised cause of sinusitis. We perceived an increased incidence of sinusitis secondary to dental disease in recent years. This study reviews the incidence of odontogenic sinusitis, its clinical features and treatment.

Methods: Medical records of patients with odontogenic sinusitis were identified using the senior author's clinical database and Hospital Information Support System data (January 2004 to December 2009).

Results: Twenty-six patients were identified, nine females and 17 males (age range, 17–73 years). Rhinorrhoea and anosmia were the commonest symptoms (81 and 73 per cent, respectively), with presence of pus the commonest examination finding (73 per cent). Causative dental pathology included periapical infection (73 per cent), oroantral fistula (23 per cent) and a retained root (4 per cent). In all 26 cases, treatment resulted in complete resolution of symptoms; 21 (81 per cent) required sinus surgery. The number of patients with odontogenic sinusitis undergoing surgery has steadily increased, from no cases in 2004 to 10 in 2009 (accounting for 8 per cent of all patients requiring sinus surgery). Reduced access to dental care may be responsible.

Conclusion: The incidence of odontogenic sinusitis appears to be increasing. The importance of assessing the oral cavity and dentition in patients with rhinosinusitis is therefore emphasised.

Key words: Sinusitis; Dental Caries; Diagnosis

Introduction

Rhinosinusitis is a common condition which, in the acute setting, affects an estimated 15 per cent of adults in the UK throughout their lifetime.¹ Chronic rhinosinusitis is reported to affect over 31 million people per year in the US.² One US study found that diagnosed chronic rhinosinusitis, validated by a physician using International Classification of Disease 9 codes as an identifier, had a prevalence of approximately 2 per cent.³

Recent studies have drawn attention to the problems involved in accurate diagnosis of chronic rhinosinusitis. In Pynnonen and Terrell's series,⁴ 40 per cent of patients labelled as having chronic rhinosinusitis were found not to have this condition. The diagnosis of chronic rhinosinusitis should be supported by endoscopic and/or computed tomography findings.

The most common bacterial pathogens for acute sinusitis include *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Moraxella catarrhalis*.⁵

There are many factors that predispose to inflammation of the nasal mucosa, including upper respiratory

tract infections, immunodeficiency, asthma, dental pathology, and inhalation of foreign bodies and irritants.

Dental disease is a recognised cause of maxillary rhinosinusitis due to the close proximity of the maxillary teeth to the maxillary sinus floor.⁶ However, there is little in the literature addressing dental or odontogenic sinusitis. The European Position Paper on Rhinosinusitis and Nasal Polyps commented that accurate epidemiological data on chronic rhinosinusitis of dental origin is difficult to obtain because the literature is limited to anecdotal reports.⁷

Before the 1970s, odontogenic sinusitis was said to account for 10–12 per cent of maxillary sinusitis,⁸ but with improvements in healthcare it became uncommon in the 1970s, 1980s and 1990s.

Odontogenic sinusitis should be considered as a diagnosis when the patient has dental symptoms, a history of dental surgery, and sinusitis which is refractory to treatment.⁶ A dental source should also be suspected in isolated maxillary sinusitis if the sinus

contents at surgery have a foul, anaerobic smell. We emphasise the importance of an accurate aetiological diagnosis, from clinical history-taking and thorough examination, because the management of odontogenic sinusitis differs from that of community-acquired bacterial sinusitis.⁶ Treating the dental cause can sometimes make sinus surgery unnecessary, but not always, as demonstrated in the current series. Performing sinus surgery without treating the dental cause is unlikely to cure the problem, as the source of the infection remains.

Community dental healthcare in the UK is currently provided both publicly, by the National Health Service (NHS), and privately. National Health Service dental treatment is free for patients aged up to 18 years in full-time education, for pregnant women and those up to 12 months post partum, and individuals qualifying for income support; for others, there is a scale of charges.

However, over the last two decades access to NHS dental care has become more difficult, with an increasing number of dental practices undertaking more private work.⁹ The decline in the NHS dental service has implications for the provision of dental care in the UK, and subsequently for the overall health of the population.

Materials and methods

Data were collected prospectively for all patients with odontogenic sinusitis treated under the care of the senior author (NSJ).

As there was no diagnostic code for odontogenic sinusitis, it was not possible to identify patients with this aetiology from the Hospital Information Support System data.¹⁰ Therefore, in addition to the prospectively collected data, the names of all patients who had undergone any type of endoscopic sinus surgery between 1 January 2004 and 31 December 2009 were obtained, and their medical records reviewed, in order to identify those who had received endoscopic sinus surgery due to odontogenic sinusitis.

The resulting data therefore represented two overlapping patient datasets: one composed of prospectively collected information on odontogenic sinusitis patients (including those not requiring surgery), and another historical dataset which included only those patients requiring surgery.

Data were identified by reviewing case notes and associated radiology and microbiology reports.

Results

Twenty-six patients were included in the study, nine (34.6 per cent) females and 17 (65.4 per cent) males. Patients' ages ranged from 17 to 73 years, with a mean of 46.2 years.

Rhinorrhoea and cacosmia were the commonest presenting complaints, being found in 81 and 73 per cent of cases, respectively. Pain and nasal obstruction were also frequently present (Figure 1).

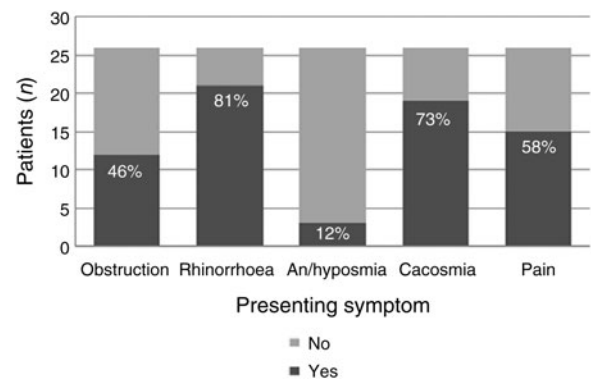


FIG. 1

Presenting symptoms in 26 patients with odontogenic rhinosinusitis.

Clinical examination identified a range of findings, the commonest being pus on nasoendoscopy, present in 73 per cent of cases. Nearly a quarter of patients (23 per cent) had an oroantral fistula, 19 per cent had oedema at nasoendoscopy, and 12 per cent had nasal polypoid tissue secondary to purulent maxillary sinusitis on initial examination.

Examination of the oral cavity showed positive signs in all 26 cases. The most common was periapical infection (73 per cent), followed by oroantral fistula (23 per cent) and a retained root fragment (one patient; 4 per cent).

Only 15 (54 per cent) of the 26 patients identified with odontogenic sinusitis had visited a dentist prior to their attendance at the ENT clinic. One patient (4 per cent) was a direct referral from a dental practitioner.

Of the 26 patients, 21 (81 per cent) required sinus surgery. The most common management was synchronous endoscopic sinus surgery and dental surgery, undergone by 10 patients (35 per cent). Other patients had endoscopic sinus surgery alone (in 34 per cent), their dental problem having been treated; 8 per cent underwent endoscopic sinus surgery and fistula closure. All cases were given targeted antimicrobial treatment; in 4 per cent of cases, sinusitis resolved without any further intervention.

There appeared to be an increase in the number of odontogenic sinusitis cases requiring endoscopic sinus surgery, from zero cases in 2004 to 10 cases in 2009 (Figure 2). When these cases were expressed as a percentage of the overall number of endoscopic sinus surgery cases performed in our unit, there was also a correlative increase, from 0 per cent in 2004 to 8 per cent in 2009.

Discussion

These results show an apparent increase in the incidence of odontogenic sinusitis, with no cases in 2004 to 10 cases in 2009; the latter group comprised 8 per cent of patients undergoing endoscopic sinus surgery in that year.

In our cohort of 26 patients, the most common presenting symptoms were rhinorrhoea (81 per cent) and

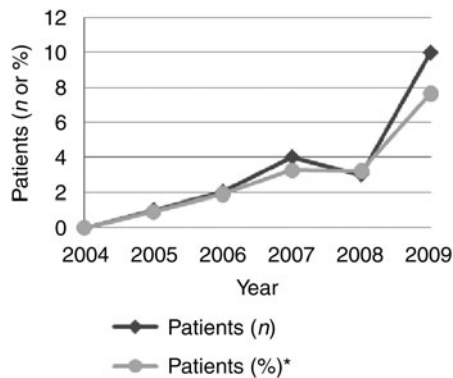


FIG. 2

Patients with odontogenic sinusitis undergoing endoscopic sinus surgery, expressed as total number and as a *percentage of all endoscopic sinus surgery cases.

cacosmia (73 per cent). Clinical signs were seen in all cases, the most common being pus on rigid nasoendoscopy (73 per cent). Examination of the oral cavity also revealed clinical signs in all 26 cases, emphasising the importance of this step. Only 54 per cent of patients had visited their general dental practitioner in the 12 months prior to presentation, although one patient (4 per cent) was a direct referral from a dental practitioner.

All patients were treated with targeted antimicrobials. The majority of patients (81 per cent) required sinus surgery, either alone or in conjunction with dental surgery.

In the 1960s, maxillary sinusitis due to odontogenic infection constituted 10–12 per cent of all cases.⁸ The maxillary sinuses typically lie in close proximity to the maxillary teeth,⁶ the distances between the sinus floor and the dental roots may be very small or nonexistent.^{11,12} Any breach of the Schneiderian membrane, caused by periapical infection or penetrating trauma, increases the risk of maxillary sinusitis development.¹³ In cases of dental caries, bacteria infiltrate the tooth pulp chamber, and may spread from the dental pulp through the root canal and apex into the maxillary sinus.¹² Specific dental pathogens are associated with maxillary sinusitis (e.g. α -haemolytic streptococcus, *Staphylococcus aureus*, and anaerobic bacteria including Gram-negative bacilli and peptostreptococcus),¹⁴ hence the importance of targeted antimicrobial treatment.

Patients with odontogenic sinusitis may initially present to the otolaryngologist instead of the dental practitioner. Features in the clinical history which may indicate an odontogenic source include purulent rhinorrhoea, cacosmia and generalised dental pain, which may have been alleviated when infection spread to the maxillary sinus, due to pressure release.⁶ This is consistent with our findings of rhinorrhoea (81 per cent) and cacosmia (73 per cent) as the most common presenting symptoms in our series. Any recent history of periapical surgery is also important, as surgical trauma may potentially violate the nasal mucous Schneiderian membrane. In our series,

15 patients (53.8 per cent) had visited their dentist prior to presentation with odontogenic sinusitis, although details of their dental treatment were not available.

Clinicians should be sufficiently aware of odontogenic sinusitis to perform a thorough clinical examination of the oral cavity, alongside nasoendoscopic examination, as this may elucidate the source of infection. All our patients had oral cavity signs, ranging from previous extraction (4 per cent) to periapical infection (73 per cent) or fistula (23 per cent).

Orthopantomograms have been shown to have a sensitivity of only 85 per cent in detecting periapical disease¹⁵ (i.e. oroantral fistulae, projecting roots or apical abscesses), and are thus not recommended for the diagnosis of periapical disease. Bomeli *et al.* found that cases of acute maxillary sinusitis with computed tomography signs of this condition were 86 per cent more likely to have a dental cause.¹⁶ Hence, clinical history and examination are crucial steps in the diagnostic process. A periapical radiograph is the most sensitive investigation for confirming the presence of periapical infection.

All our 26 patients had full resolution of odontogenic sinusitis after treatment. However, as with other causes of sinusitis, there is always the potential for the development of serious sequelae, such as periorbital infection and intracranial spread.¹⁷ Accurate diagnosis of odontogenic sinusitis is important, and a thorough oral examination must be performed in order to initiate appropriate management.

Principles for the management of odontogenic sinusitis include (1) addressing the dental cause, and (2) performing endoscopic sinus surgery to improve sinus drainage and to clear the sump of mucopus in the sinus. If the attendant ENT surgeons do not have dental training, then input from other specialists (i.e. a multidisciplinary approach) may be required. In our case series, 81 per cent of patients required sinus surgery.

- **Maxillary rhinosinusitis may be caused by dental disease, due to close proximity between the maxillary teeth and the maxillary sinus floor**
- **Access to National Health Service dental care has become more difficult in the last two decades, with expansion of the private sector**
- **This study found an increase in the incidence of odontogenic sinusitis over six years**
- **Patients with odontogenic sinusitis may initially present to the otorhinolaryngologist**

There is no Hospital Information Support System coding option for odontogenic sinusitis. Hence, one limitation of our study was the potential for under-reporting of patients managed conservatively, as we

only identified patients undergoing endoscopic sinus surgery retrospectively. It is therefore possible that the incidence of dental sinusitis was even greater than identified. Our attempt at using National Hospital Information Support System data identified only 75 to 86 patients per year as having sinusitis secondary to dental infection, throughout the whole of the UK; this exposes the inadequacies of this coding system, and/or the under-reporting of this condition.

In addition to the apparent increase in the incidence of odontogenic sinusitis, the incidence of cervicofacial infections secondary to dental disease also appears to be increasing.¹⁸ Burnmam *et al.* reported a 62 per cent increase in the number of patients requiring admission in 2008 for spreading odontogenic infections, compared with 2003–2005 admissions.¹⁹ Furthermore, Thomas *et al.*²⁰ reported a doubling of the number of admissions, and bed days, due to dental abscesses requiring drainage, comparing 1998–1999 and 2005–2006. The potential increase in dental pathology and its sequelae has implications for public health, and for future NHS service provision.

Conclusion

There appears to have been an increase in the incidence of odontogenic sinusitis over the last decade, which may be due to decreased provision of NHS dental care.¹⁰ All patients in our case series had clinical signs on examination of the oral cavity, highlighting the importance of oral examination in patients with bacterial sinusitis.

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