Silent Sinus syndrome- should we be concerned?

Ashana Gupta (✉ ashana.gupta2@nhs.net)  
Southend Hospital

Kandasamy Ganesan  
Southend Hospital

Case Report

Keywords: Maxillary sinus, Osteo-meatal complex, Radiology, Computer Tomography

Posted Date: January 20th, 2023

DOI: https://doi.org/10.21203/rs.3.rs-2477656/v1

License: ☇️ This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License
Abstract

In this paper, we report on the radiological findings of silent sinus syndrome. This is significant because silent sinus syndrome can lead to enophthalmos, facial asymmetry and diplopia if left untreated. It is usually diagnosed based on radiological findings. Patients normally present to the head and neck specialty for unrelated concerns and upon taking radiographic imaging, features of silent sinus syndrome can be seen. It is the duty of the surgeon to be aware of sinus abnormalities and inform the patient of such findings. This paper highlights the radiological features clinicians should be aware of.

Clinical relevance: Radiologists and head and neck clinicians should be aware of the features of silent sinus syndrome. The syndrome is poorly reported on but radiological features are consistent across case reports.

Objectives: The reader should have an awareness of the radiological signs of maxillary sinus pathology and understand features of silent sinus syndrome. They should be able to include sinus related findings in radiographic report for orbito-facial imaging.

Key Points

Radiographic report should encompass findings related to all irradiated structures.

Characteristic radiographic features of silent sinus syndrome include:

- Deviated nasal septum
- Opacification of the unilateral maxillary sinus
- Reduced sinus volume
- Increased orbital volume.

Intervention includes functional endoscopic sinus surgery. Early treatment can prevent the onset of symptoms including facial asymmetries.

Background

Sinus pathology is often difficult to diagnose because the sinuses are concealed within the facial skeleton. When nasal, orbital and alveolar symptoms begin usually investigation takes place only then. Silent sinus syndrome is diagnosed based on radiographic features due to the lack of measurable symptoms and it is poorly reported on in the literature.

Silent sinus syndrome- also known as ‘imploding sinus’ is a painless retraction in the maxillary sinus. The condition is unilateral and leads to facial asymmetry including unilateral enophthalmos due to the reduced support for the orbital floor. The affected age group is commonly 30–60 year olds. The
diagnosis is often delayed because silent sinus syndrome is painless and asymptomatic. Maxillofacial surgeons and Ophthalmologists may be the first to encounter patients who have been referred for trauma, jaw pathology, head and neck cancer and the proceeding imaging reveals signs of silent sinus syndrome\(^1\). Currently, radiologists are unfamiliar with the syndrome and helpful radiological features. This missed opportunity for diagnosis means many patients go on to live with the condition they are unaware they have.

**Maxillary Sinus Physiology**

The adult maxillary sinus has a volume on average of 15 cubic centimetres. Its function is to warm and humidify the inspired air.

Extensions of the sinus are from nasal cavity to zygomatic arch in lateral plane. The maxillary sinus roof is formed by the orbital floor and the floor is formed by the maxillary alveolar process (Fig. 1). The internal lining of the sinus emulates respiratory epithelium structures. Goblet cells secrete mucous to trap foreign bodies and bacteria. The ciliary action of the ciliated columnar cells propogates the movement of the mucous towards the ostium in the supero-posterior aspect of the medial sinus wall. The ostium is extremely narrow and obstruction of the space can occur\(^2\). One theory to explain the aetiology of silent sinus syndrome is owing to a blocked ostium. Consequences of disrupted drainage can include reduced gas exchange within the maxillary sinus; provided by the supplying maxillary artery, as well as mucous stasis. In silent sinus syndrome, because this process is slow occurring, chronic and unilateral, the patient remains free of sinusitis-like symptoms.

The accepted theory to explain the pathophysiology in silent sinus syndrome is related to obstruction of the ostium (Fig. 2).

In the maxillary sinus, an obstruction of the drainage pathway leads to negative pressure within the sinus. This leads on to contraction and thinning of the ipsilateral sinus walls through bone remodelling and resulting in sinus volume loss. The consequence of this is increased orbital volume. On radiographic imaging, there can be visible differences in the maxillary sinus volume, opacification of the affected sinus due to mucus accumulation from poor drainage and deviation of the nasal septum. Clinically, symptoms are rare however diplopia can result if the inferior rectus muscle descends into the created space. Therefore, early recognition and treatment is advisable to restore aesthetics and prevent functional issues of the extraocular muscles. Of course, other causes for spontaneous enophthalmos must be ruled out as well including trauma, tumour, linear scleroderma and orbital bands to name a few\(^3\).

**Case Report**

A 20 year old fit and well female was referred to the Oral surgery department of a UK hospital for lower third molar extraction. A diagnosis of pericorinitis was made. A dental pantomogram radiograph and computerised tomograph (CT) was taken to assess the distance to the inferior alveolar nerve and plan
surgical removal. CT imaging was chosen as CBCT had not yet been introduced in the department. CT was performed in the sagittal, coronal and axial planes (Fig. 3). The irradiated field included the maxillary sinuses. Review of the plain film and CT scan revealed a hypoplastic and opacified right maxillary sinus. Depression of the orbital floor can also be noted. The radiographic report did not mention these findings.

The patient was informed of these findings by the treating Oral Surgeon and she elected for a joint surgery with the rhinologist to remove the lower third molars and endoscopic right sinus surgery with reduction of turbinate of nose under general anaesthesia. This procedure would allow for opening of the osteo-meatal complex therefore draining of the static mucus.

The patient reported no sinusitis-like symptoms. On examination, she did have a slight enophthalmos but no hypoglobus, she only reported a propensity to sneezing. The prevention of symptoms could be due to the early diagnosis and intervention. She went on to make a full recovery and was discharged.

**Discussion**

In this patient's case, on retrospect she did appear to have slight enophthalmos but she was unaware that this deviated from the norm and thus never had it investigated.

There are few cases of silent sinus syndrome reported in the literature. Radiologists should be aware of the condition as the diagnosis is made from clinical as well as radiographic imaging. Manila et al. outline the difficulty in diagnosing this condition. They highlight the value of cone-beam computed tomography in identifying the syndrome in three cases where no clinical symptoms were evident. Sheikhi reported anatomical findings of the syndrome to include occlusion of the maxillary infundibulum with sinus opacification. Babinski et al demonstrated that early intervention in this syndrome reversed symptoms of diplopia and enophthalmos. The treatment of choice is functional endoscopic sinus surgery whereby the obstruction of the ostium is relieved. This often requires uncinectomy/ maxillary antrostomy. The treatment is done to restore ventilation of the sinus and reposition the ocular globe. This is achieved by removal of maxillary sinus obstructions and restoration of intra-sinus pressure. In rare cases, orbital floor reconstruction may be considered as an adjunct.

**Conclusion**

Silent sinus syndrome is a rare condition that is poorly reported in literature. The few publications on the topic are limited to small sample case studies. Complications of the syndrome include enophthalmos, hypoglobus, facial asymmetry, diplopia and rhinitis. Treatment options are available and effective in reversing the aetiology of the syndrome. Radiologists are likely to encounter signs of the syndrome when radiographic images are requested by head and neck physicians therefore, they should be aware of the radiological features discussed. Early diagnosis and intervention can reduce the progression of
debilitating symptoms in later life, furthermore joint surgery can be performed to resolve the condition under a single anaesthetic if diagnosed appropriately.

**Declarations**

Ethics approval and consent to participate: Patients consented to their clinical case and images be used and discussed as part of this publication.

Consent for publication: obtained

Competing interest: None

Author contributions: Gupta A is responsible for writing and editing the publication. Ganesan K is responsible for the management of the clinical case discussed.

Funding: Not Applicable

Availability of data and materials: The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

There is no conflict of interest in the publication of this article.

**References**


**Figures**
Figure 1

maxillary sinus boundaries
Figure 2

maxillary sinus structure
Figure 3

3A: axial view CT shows deviation of the nasal septum and complete opacification of the right maxillary sinus.

3B: coronal view CT demonstrates inward retraction of right maxillary sinus walls and slight increase in right orbital volume.
3C: Sagittal view CT again highlights the opacification and inward retraction of the right maxillary sinus.