

ORAL-SURGICAL TREATMENT OF MAXILLARY SINUSITIS OF ENDODONTIC ORIGIN

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ABSTRACT

Objectives: Both dental and medical literature recognize tooth pathology as a possible cause of maxillary sinusitis in up to 40% of all cases. Odontogenic sinusitis can be caused by various invasive dental procedures. However, periapical infection, manifesting in the maxillary sinus, remains underappreciated, and frequently goes undiagnosed. This report aims to show the extent to which maxillary sinusitis of endodontic origin (MSEO) can be manifested and the oral surgical approach in its treatment.

A case report: A 28-year-old woman presented with an acute premaxillary abscess at the beginning of endodontic treatment of her upper right canine. The acute condition was treated with an intraoral incision and a high dose of antibiotics. However, the patient failed to continue endodontic treatment and returned after a year with severe right-sided headache and pressure including unilateral nasal discharge. CBCT imaging revealed the opacification of the right maxillary sinus and periapical periodontitis of tooth 13. After chemo-mechanical preparation of the root canal of tooth 13, intraoperative canal obturation was performed alongside with exploration of the right maxillary sinus and removal of the pathological mucosa. The procedure resulted in the resolution of all symptoms.

Conclusion: When encountered unilateral maxillary sinusitis, endodontic origin of the condition should also be considered. Successful management of the advanced MSEO can be achieved with a combination of endodontics, dental surgery and antimicrobial treatment.

Keywords: odontogenic sinusitis, maxillary sinusitis, endodontic origin

Introduction

Tooth pathology has been reported as a cause of maxillary sinusitis in 10% of cases, but the real incidence could be as high as 25-40% [1]. Despite this prevalence, odontogenic sources of sinusitis are frequently overlooked in the diagnosis and management of chronic sinusitis [2]. Odontogenic sinusitis is generally caused by several factors and conditions, such as the maxillary spread of an endodontic infection, the intrasinus displacement of endodontic materials, tooth fragments, implant or augmentation grafts, perforation of the Schneiderian membrane during tooth extractions, periodontal surgery or sinus floor elevation surgery, dental traumas, or an oroantral fistula [1]. Maxillary Sinusitis of Endodontic Origin (MSEO), a term used in this paper, was introduced by the American Association of Endodontists, and it refers specifically to sinusitis secondary to paradicular disease of endodontic origin [3].

However, despite substantial scientific findings, the propagation of a periapical infection to the maxillary sinus often goes undiagnosed [3]. This report aims to show the extent to which the MSEO can be manifested, and the efficiency of oral surgical approach to its treatment.

Case Report

The Patient's First Visit

- The Premaxillary Abscess

In March 2018 a 28-year old woman was referred to the Department of Oral Surgery due to severe right-sided premaxillary swelling involving right eyelids. Her endodontist informed us that the swelling occurred the day after the root canal treatment (RCT) of the tooth 13 that included chemo-mechanical preparation of the root canal and placement of intracanal medication (calcium hydroxide). Clinical examination revealed a fluctuant abscess in the right vestibule. The incision was made, and purulent content evacuated. A surgical rubber drain was placed in

the abscess cavity. She was prescribed antibiotic therapy: Penicillin 2 000 000 IU was given intramuscularly in combination with Metronidazole tablets 500 mg (3 times a day) for 8 days. Orthopantomographic imaging was performed and showed periapical radiolucency of tooth 13 (**Figure 1.**). After the acute inflammation subdued, the patient was advised to continue with endodontic treatment, which she failed to do.

The Patient's Second Visit

- The Acute Unilateral Maxillary Sinusitis

A year later, the patient returned with severe symptoms of unilateral headache and pressure in the right nostril, eye and the right half of the head, as well as mucopurulent nasal discharge with

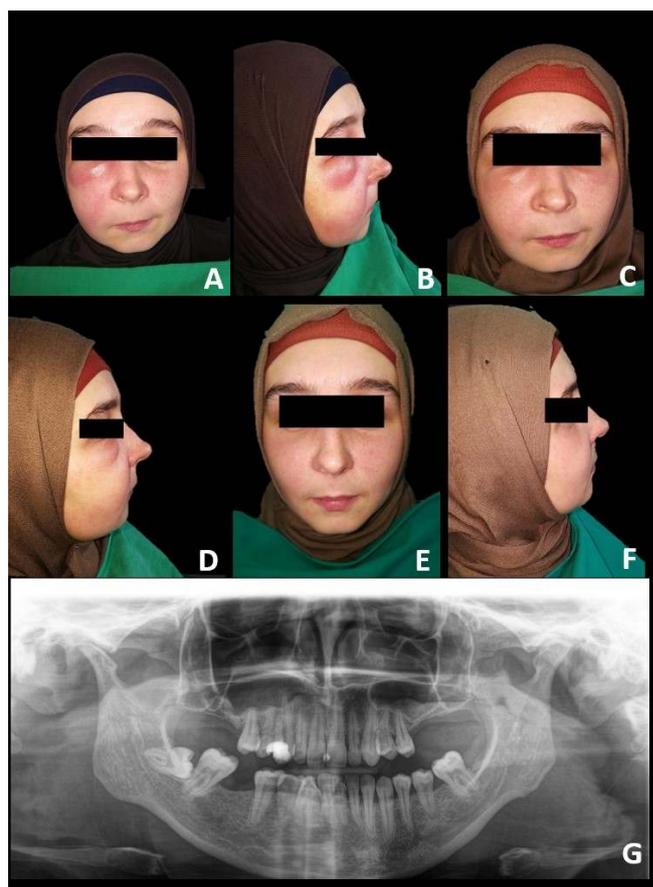


Figure 1. Premaxillary abscess after the initiation of endodontic treatment of the tooth 13.

A, B - Acute phase of the abscess.

C, D, E, F - Phases of resolution of the abscess after the incision was made.

G - Panoramic radiograph of the patient.

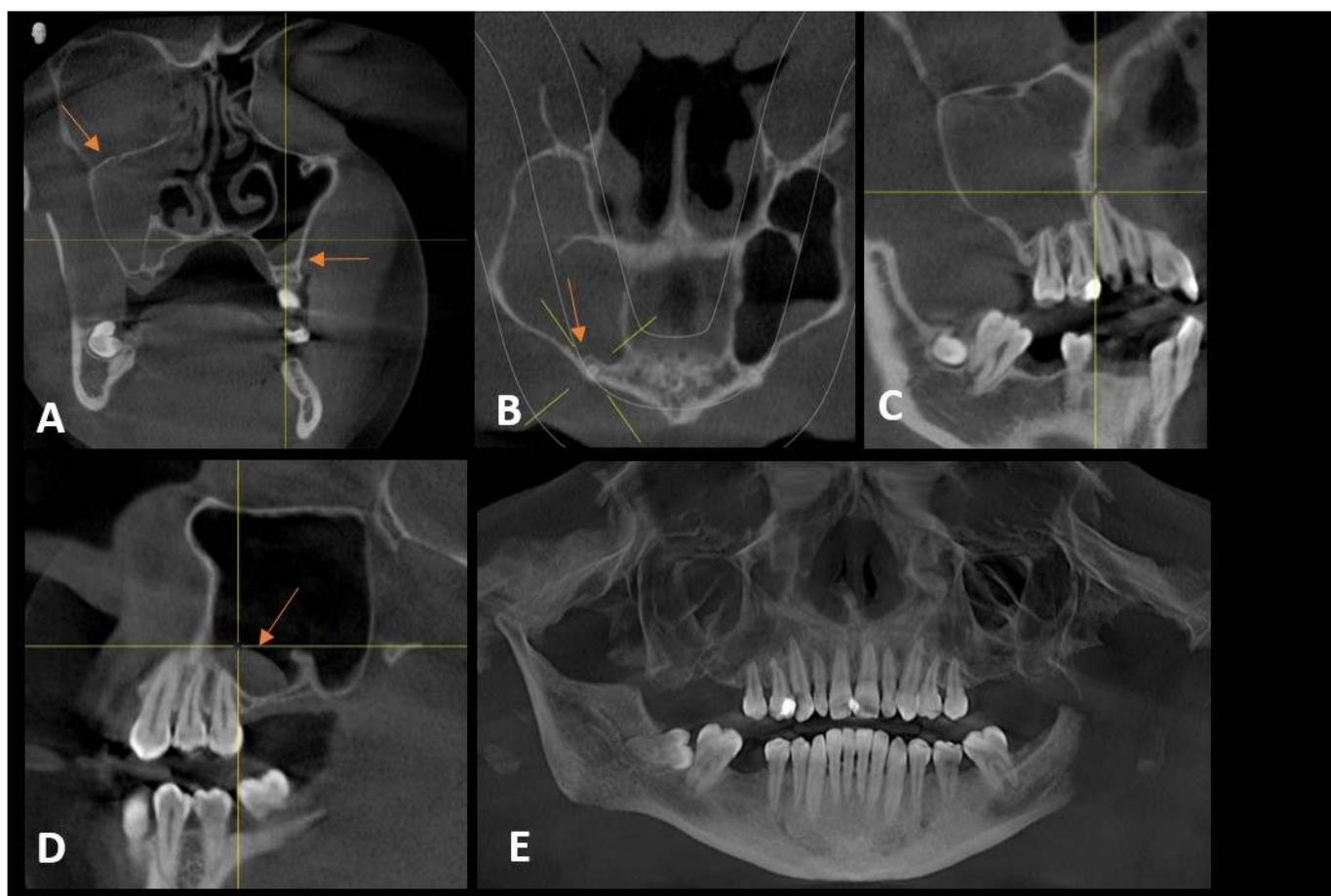


Figure 2. CBCT images showing maxillary sinuses.

A – Coronal CBCT image. Right maxillary sinus is completely radiopaque, whereas dome-shaped opacification on the floor of the left maxillary sinus can be noticed (arrow).

B – Axial CBCT image. Periapical radiolucency of tooth 13. The lesion has displaced sinus cortical floor upward (arrow)

C – Sagittal CBCT image. Completely opacified right maxillary sinus.

D – Sagittal CBCT image. Mucous retention cyst – like opacification of the left sinus (arrow)

E – Reconstructed panoramic CBCT image. Mild radiopacity of the left maxillary sinus.

strains of blood. CBCT imaging revealed complete radiopacity of the right maxillary sinus, whereas the left one showed mild dome-shaped radiopacity basally. The infraorbital ethmoid cells of the right maxillary sinus also showed signs of inflammation (**Figure 2A**). Minor periapical radiolucency of tooth 13 could be noticed. Furthermore, the sinus floor was elevated at the lesion site. Schneiderian membrane of the right maxillary sinus was intact. (**Figure 2B**). The patient was prescribed antibiotic treatment for eight days (2g of Amoxicillin per day) and scheduled for sinus exploration the next day.

Whether tooth 13 will be resected or extracted was to be determined intraoperatively. Therefore, respecting all endodontic principles, cleaning and

shaping of the canal was done. The root canal was sealed intraoperatively under direct visualization if we were to choose apicoectomy as therapy. The second stage of operative treatment was a surgical exploration of the maxillary sinus with the removal of pathologic tissue. The treatment was done in the operating ward under sterile conditions. Plexus anesthesia and infraorbital anesthesia were applied. Trapezoid incision in the region of tooth 12 – 15 was made and a full-thickness flap was elevated upon which we were able to observe intact vestibular cortical bone. Therefore, we decided to do root resection of tooth 13 as its survival is biologically indisputable. Corticotomy was made, and the root apex of tooth 13 was

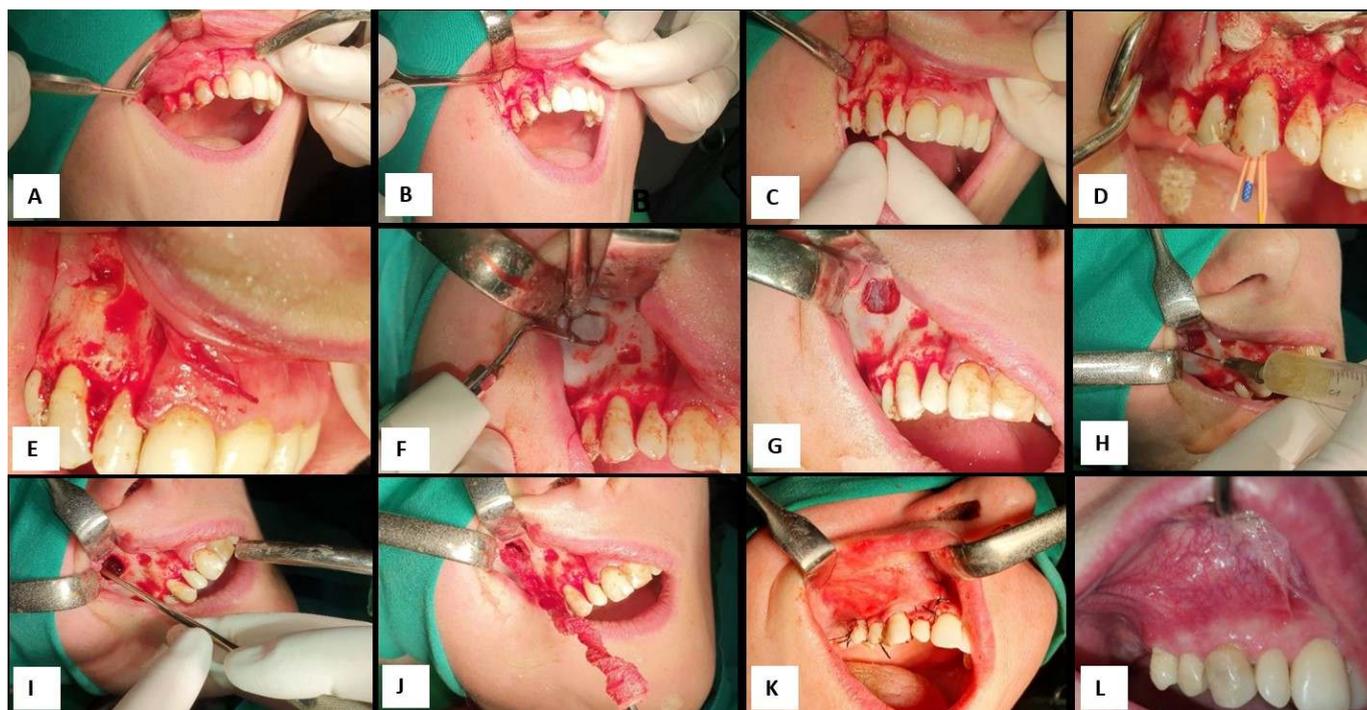


Figure 3. Operative protocol.

A, B – Mucoperiosteal flap design. C,D – Root canal obturation E –Root resection.

F,G - Bony opening in the infraorbital fossa. H – Yellow, opalescent aspirate.

I – Exploration of the right maxillary sinus. J – Removal of altered mucosa with a gauze.

K – Repositioned and primarily sutured flap. L – Status of mucosa at the 4-month recall.

visualized. The canal was sealed with gutta-percha and phosphate cement, and root resected. Dry surgical field was managed using surgical bone wax. A bony window was made in the upper right vestibule (infraorbital fossa) and yellow, opalescent fluid was aspirated and sent for cytological analysis. Exploration of the maxillary sinus was performed and the pathologically altered mucosa was removed. The flap was repositioned and the wound was primarily sutured (**Figure 3**). The patient was administered nasal drops for adults for the first 3 days postoperatively. Cytological findings showed inflammatory changes in the form of infiltrate consisting of predominantly neutrophil granulocytes, with some lymphocytes, histiocytes, and siderophages. At the first postoperative appointment, 3 days later, the patient reported complete resolution of the symptoms of pain and pressure. Eight days postoperatively the sutures were removed and continuous nasal irrigation using the Aqua Maris

irrigation system was advised. At the 4-month recall appointment, the patient reported no pain. CBCT imaging was planned at the 6-month recall but the patient failed to attend the appointment.

Discussion

Sinusitis is the inflammation of the mucosal lining of the paranasal sinuses [4]. Although odontogenic sinusitis is known cause of maxillary sinusitis, it is frequently misdiagnosed with chronic rhinosinusitis [2]. Proper diagnosis is fundamental for the treatment of any disease, including odontogenic sinusitis. Lack of specific symptoms is what makes clinicians overlook the dental cause of sinusitis. Pokorny and Tataryn [5] found that facial pain, postnasal discharge and congestion were the most common complaints in their study of odontogenic sinusitis - unspecific symptoms that are common for maxillary sinusitis

of different origins. That is why we rely to a great extent on radiography when making a diagnosis of chronic sinusitis.

Although periapical radiographs are the standard radiographs used in endodontics, they are not adequate to reveal the anatomical relationships between the maxillary molars and the sinus floor [6]. Studies comparing 2D radiography and 3D radiography show the superiority of CT scans in detecting periapical bone changes, as well as sinus pathologies, compared to panoramic or periapical radiographs [7-10]. This was the case with our patient as well. The reconstructed panoramic CBCT image, as a 2D image, although showing certain radiopacity of the right sinus, could not show the extent of the pathological process compared to the 3D cross-sections. The 3D evaluation showed dome-like opacification of the left maxillary sinus located basally. As no periapical pathology of the adjacent teeth could be noticed, it was diagnosed as a mucous retention cyst. Mucous retention cysts are frequently found on panoramic views and CT scans of the floor of the maxillary sinus, and are often confused with odontogenic inflammatory cysts [11].

Although chronic sinusitis in our case was unilateral, the severity of sinus changes was out of proportion to the size of the periapical lesion. However, we know that pathologically altered mucosa is impaired and less resistant than healthy mucosa to infection, and is a pathogenic factor in the progression of rhinosinusitis [3]. Furthermore, rhinogenic chronic rhinosinusitis may coexist with odontogenic sinusitis and confound diagnosis [2]. Therefore, we can hypothesize that our patient's MSEO was combined with rhinogenic sinusitis leading to the development of polysinusitis.

The therapeutic protocol of odontogenic sinusitis remains unclear. The American Association of Endodontists, in their Position Statement regarding MSEO, advise that root canal treatment should be a first choice option for sinusitis of endodontic origin, followed by surgical therapy in the case of failure of endodontic therapy [3]. However, there is a substantial amount of data showing that dental treatment alone is rarely

sufficient to treat odontogenic sinusitis, and that life-threatening complications of odontogenic sinusitis are possible [6], so we opted for a combined therapeutic approach. Besides, our patient was suffering unbearable pain, and we needed faster therapeutic results than the conventional endodontic therapy offers. Surgery of the maxillary sinus varies from endoscopic techniques to open surgery, depending on the mucociliary transport, anatomic landmarks such as the sinus ostium and the necessity of the width of access to the maxillary sinus floor [12]. Although endoscopic sinus surgery provides for removal of pathological mucosa alone, thus leaving unaffected specialized epithelia that will enable postoperative clearance and drainage [13], it carries the risk of general anesthesia and a longer hospital stay. Our patient requested an alternative to general anesthesia which was provided with an oral surgical approach.

Conclusion

When encountered with unilateral maxillary sinusitis, an endodontic origin of the condition should be considered. Oral surgical treatment, combined with endodontic and antimicrobial therapy, can be successful in the management of the advanced MSEO.

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Declaration of interest

The authors declare that there is no conflict of interest.

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