

Odontogenic Maxillary Sinusitis After Tooth Extraction Associated With Dry Socket: A Clinical Case Report

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ABSTRACT

Background: Odontogenic maxillary sinusitis (OMS) is a dental origin sinus infection, commonly associated with the extraction of maxillary posterior teeth. While alveolar osteitis (dry socket) is a common post-extraction complication, its progression to OMS is relatively low, though clinically observed. This case report discussed the management of OMS, for the general Practitioner, collaborating with an otorhinolaryngologist and eliminating the focal infection through non-surgical management.

Case: A 28-year-old female presented with severe pain, foul-smelling odor, facial discomfort, and postnasal drip following the extraction of the upper left maxillary molar (tooth 26). Clinical examination revealed dry socket, while panoramic radiography suggested sinusitis involvement. Multidisciplinary management, such as saline irrigation, antibiotic therapy, and nasal decongestant under otorhinolaryngologist supervision and for the focal infection included local debridement and curettage without any dressing, following with maintaining good oral hygiene. After 12 days, significant improvement was observed, and both clinical and radiographic evaluations confirmed complete resolution at three months of follow-up.

Conclusion: OMS associated with dry socket is relatively low but can be effectively managed with non-surgical multidisciplinary management. Good healing following extraction to eliminate the focal infection is fundamental. Ensuring a favorable prognosis further requires accurate diagnosis, appropriate pharmacological therapy, effective dental focal management, and comprehensive patient education

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INTRODUCTION

Odontogenic maxillary sinusitis (OMS) is an inflammatory condition of the maxillary sinus, typically caused by bacterial infection, secondary dental infections adjacent to the sinus, or complications arising from dental procedures¹. One of the most common dental procedures leading to OMS is the extraction of maxillary premolars and molars. Due to the anatomical proximity between the roots of the posterior maxillary teeth and the sinus floor, an oroantral communication may occur, creating a potential pathway for infection²

Early literature from the 1950s to the 1960s documented that approximately 10–12% of odontogenic maxillary sinusitis (OMS) cases are associated with odontogenic infections. Clinically, OMS presents with facial pain on palpation, purulent nasal discharge, nasal congestion, and postnasal drip. Importantly, OMS is often accompanied by dental complaints, including a history of recent dental procedures, periapical infections, or a long latent period, suggesting a delayed manifestation of odontogenic pathology extending into the maxillary sinus^{3,4}

A frequent post-extraction complication is alveolar osteitis (dry socket), characterized by severe pain that develops several days after tooth removal. Clinically, a dry socket is characterized by an empty extraction socket devoid of a blood clot, frequently containing debris and saliva, and often accompanied by halitosis. Multiple factors contribute to its pathogenesis, including excessive trauma during extraction, pre-existing dental infection, and poor oral hygiene, which facilitate bacterial colonization and fibrinolysis of the blood clot^{5,6}. This case report emphasizes the importance of appropriate management of OMS associated with dry socket under limited clinical resources and

highlights the role of multidisciplinary collaboration in patient care.

CASE REPORT

A 28-year-old female patient presented with anxiety and severe discomfort following the extraction of the upper left maxillary molar four days earlier. She reported intense pain starting on the third postoperative day, along with facial discomfort extending from the nasal area to the infraorbital region. The pain worsened during forward bending or prostration. Additional complaints included foul-smelling odor resembling rotten eggs and postnasal drip. The patient admitted to poor postoperative oral hygiene, avoiding tooth brushing due to fear of wound irritation, and irregular use of prescribed antibiotics.

General examination revealed a subfebrile temperature without systemic illness or drug allergy history. Clinical intraoral assessment showed an open alveolar socket containing debris, consistent with alveolar osteitis. The Valsalva test was negative, and no nasal fluid leakage was reported.

Local anesthesia was administered, followed by debridement, curettage, and irrigation of the socket with normal chlorhexidine 0.2%. Due to the patient's limited access to care and difficulty in returning for follow-up, no socket dressing was applied. Medications prescribed included ciprofloxacin, NSAIDs, and chlorhexidine mouth rinse. The patient was subsequently referred to an otorhinolaryngologist, who established a diagnosis of acute maxillary sinusitis. Management included the prescription of cefixime, paracetamol, pseudoephedrine HCl, loratadine, and saline nasal irrigation. Comprehensive patient education was provided, emphasizing proper oral hygiene maintenance, gentle rinsing, soft diet, and strict adherence to medications. Follow-up was conducted via telemedicine.



Figure 1. Clinical conditions in fourth days. Open alveolar socket containing debris with no blood clot



Figure 2. Panoramic Imaging, the presence of radiopaque shadow-like images in the left sinus area indicates the presence of gas fluid.

After 12 days, the patient reported substantial improvement, such as pain in the extraction socket disappeared, reduction of facial pain, and a reduction in foul-smelling odor. Symptoms

exacerbated by bending had subsided. She was instructed to continue nasal irrigation and maintain oral hygiene until few days.



Figure 3. The condition of the socket, taken from the patient's camera.

Three months later, the patient attended an in-person follow-up. Clinical and radiographic evaluations revealed complete resolution of both the extraction site and sinus pathology. Panoramic

radiography showed no evidence of radiolucency in the left maxillary sinus, and the extraction socket of tooth 26 was fully healed.

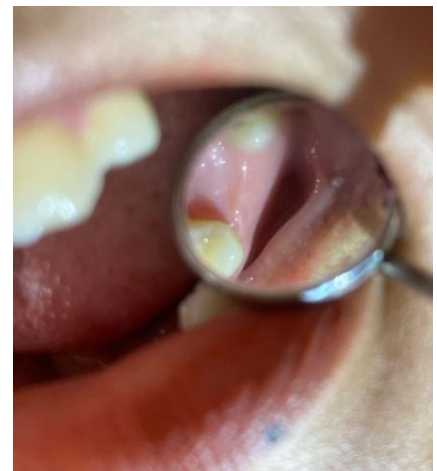


Figure 4. After three months post-extraction, followed up with Panoramic and Clinical Condition

DISCUSSION

Odontogenic maxillary sinusitis (OMS) is an inflammatory condition of the maxillary sinus of dental origin. It may present acutely (<12 weeks) with several symptoms, such as headache, fever, nasal congestion, and runny nose with or without *post-nasal drip*, foul odor, and suborbital pain. If untreated, OMS may progress to chronic sinusitis (>12 weeks), where symptoms like headache,

fever, foul-smelling odor, and suborbital pain diminish, but nasal congestion and runny nose still exist^{7,8}

In this case, OMS developed following by extraction of the maxillary first molar complicated with dry socket, presenting with sign and symptoms of acute sinusitis, including facial pain, postnasal drip, and foul-smelling odor. Diagnosis of OMS requires a comprehensive evaluation, including

detailed history-taking, clinical examination, and radiographic assessment. A history of procedures involving the postmaxillary posterior teeth is a common etiological factor for OMS. Complications, such as oroantral communication (OAC) or oroantral fistula (OAF), may arise during the extraction of posterior maxillary teeth and contribute to sinus infection. The Valsalva test is commonly used to detect OAC/OAF. The patient was asked to gently blow air through a blocked nasal airway with their hand and observe for condensation on the mirror. Nonetheless, a negative Valsalva test did not exclude the possibility of antral perforation^{9,10}. Although small perforations may not always be detected, without any infection may heal spontaneously if less than 2 mm, followed by blood clot formation¹¹.

The anatomical proximity of the maxillary sinus floor to posterior tooth roots facilitates the spread of odontogenic infection through the Schneiderian membrane, especially in cases of periapical abscess, periodontitis, or trauma.^{8,9,12}. When an infected tooth comes into contact with the Schneiderian membrane, it may trigger inflammation, hypertrophy, and even rupture. This pathological interaction stimulates the release of pro-inflammatory mediators, leading to the development of edema, fibrosis, and cystic degeneration¹³. The bacterial involvement in OMS, both in its acute and chronic forms, includes polymicrobial, with anaerobic species being the predominant pathogens. In acute OMS, anaerobic Gram-negative bacilli, such as *Fusobacterium* spp. and *Peptostreptococcus* spp., are commonly identified. In chronic OMS, however, the microbiota may also include aerobic bacteria, such as *Staphylococcus aureus* and *Streptococcus pneumoniae*, alongside anaerobic species including *Peptostreptococcus* spp. and *Prevotella* spp.¹⁰

Tooth extraction procedures involving roots in proximity to the maxillary sinus may increase the risk of postoperative complications.¹² Dry socket is a well-recognized post-extraction complication, typically occurring 1–4 days after surgery, marked by severe localized pain and absence of a blood clot¹⁴. In normal post-extraction wound healing, the socket is typically filled with a stable blood clot that facilitates tissue repair. However, in cases of dry socket, the healing process is significantly delayed due to the proliferation of mucosal tissue, which interferes with the formation and stabilization of the blood clot. The loss of a stable blood clot consequently impedes normal wound healing. Although historically attributed to clot disintegration, recent studies implicate bacterial colonization, with *Fusobacterium*, *Prevotella*, *Peptostreptococcus*, and *Parvimonas* frequently identified as the predominant microorganisms associated with dry socket.¹⁵

Although the incidence of dry socket involving the maxillary sinus is relatively low, if such a condition occurs, the post-extraction socket must be thoroughly debrided until fresh bleeding is induced, and a dressing material such as iodoform gauze may be applied to help the healing process⁷. Although dry socket and OMS are two different conditions, there is a potential correlation between the two. Tooth extraction, especially of upper molars, can open a pathway between the oral cavity and the maxillary sinus, creating the possibility of sinus infection if a blood clot does not form properly and infection is present. The bacteria that dominate dry sockets, such as *Fusobacterium*, *Prevotella*, and *Peptostreptococcus*, are also found in both acute and chronic cases of OMS.

Radiographic imaging with panoramic radiographs, although less sensitive than CT or CBCT, remains a practical diagnostic tool in settings with limited resources¹⁶. The primary

management of OMS involves non-surgical approaches, including antibiotics, corticosteroids, and nasal irrigation, in collaboration with dental management to eliminate odontogenic sources. Recent studies have reported favorable healing outcomes in patients with OMS following tooth extraction when managed with non-surgical treatment. Curettage and debridement of the extraction socket also represent basic principles in addressing impaired wound healing. The formation of a new blood clot stimulates the wound healing cascade, including haemostasis, inflammation, and proliferation. Irrigation of the socket with chlorhexidine (CHX), hydrogen peroxide, or saline is performed to initiate the healing process, and surgical intervention is reserved for refractory cases^{7,16}

In this case, the patient with non-surgical management in collaboration with an otorhinolaryngologist through a pharmacological approach and the management of dry socket complications, including debridement and curettage with chlorhexidine (CHX) until fresh bleeding appeared with maintain the oral hygiene. No dressing was applied in this case, considering the patient's distant and the anxiety feeling regarding repeated dental visits for follow-up. Furthermore, evaluation and observation of the patient were conducted through online consultations to alleviate psychological distress¹⁷

CONCLUSION

Odontogenic maxillary sinusitis (OMS) as a complication of dry socket following maxillary tooth extraction is relatively low. However, the anatomical proximity of posterior maxillary roots to the sinus floor predisposes to infection when pathogenic bacteria colonize the socket. The bacterial species most frequently implicated *Fusobacterium*,

Prevotella, and *Peptostreptococcus* are common to both dry socket and OMS.

First-line management of OMS is non-surgical, focusing on pharmacological therapy aimed at reducing inflammation, alleviating symptoms, and addressing odontogenic sources of infection. In this case, multidisciplinary non-surgical management achieved full recovery and resolution of all symptoms.

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