

**CASE STUDY****ROUTES OF SPREAD OF ODONTOGENIC OROFACIAL INFECTIONS WITH OROANTRAL FISTULA FORMATION, A MULTIPHASE CT DIAGNOSIS**Damandeep Singh Chawla<sup>1</sup>, Harsimar Chawla<sup>2</sup>, Divjot Chawla<sup>3</sup><sup>1,2</sup>SPS Hospitals, Ludhiana, Punjab, India<sup>3</sup>DMC Ludhiana, Punjab, India**ABSTRACT**

Complicated tooth caries / deep periodontal infections spreading beyond the alveolar bone are usually main stay of odontogenic orofacial infections. They extend to involve the fascial planes around the face and oral cavity causing facial swelling and contour abnormalities. They tend to spread along planes of least resistance involving the supporting structures of the affected tooth. The abscesses around the apices of the maxillary pre-molar and molar teeth usually results in Oro-antral fistula and periapical abscesses involving anteriorly located teeth notably the incisors can lead to Oro-nasal fistula formation.

**Keywords:** Dental caries, Orofacial infections, periodontal infections, periapical abscesses, Oro-antral fistula, Oro-nasal fistula

**INTRODUCTION**

The periapical abscess results from infection of the pulpal tissue causing the pulp to become infected and necrotic. It is formed when pus seeps from the walls of pulp compartment and the root-canal through the apical foramen. Area of pus and fluid accumulation forms in the bone surrounding the apex of the tooth. As the pressure increases, the abscess may perforate and drain into the oral cavity, the maxillary sinus or even the nasal cavity, extend into adjacent bone, causing osteomyelitis; or, may even spread to surrounding soft tissues, causing cellulitis and swollen face. Patients with odontogenic abscesses present with toothache, fever, dysphagia, swelling over face, trismus, and even dyspnea at times.

**DISCUSSION**

The upper jaw teeth in the alveolar process of the maxillary bone are located under the maxillary air sinuses posteriorly. The hard palate forms the floor of nasal cavity more anteriorly. So, abnormal fistulation and pathway can be created into the maxillary antrum resulting in Oro-antral fistula. However, the periapical abscess of the disease of maxillary teeth anteriorly can result into Oro-nasal fistula.

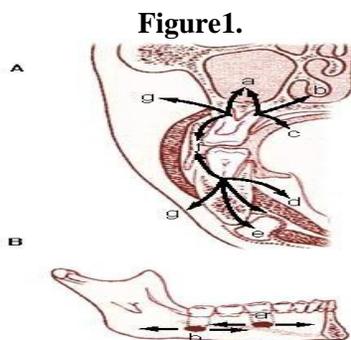
Odontogenic infection may spread in two ways:-

- The first path is provided by the formation of dental caries, which allows bacteria to enter the tooth and spread to its root, with resultant apical periodontitis, granuloma, abscess, and finally, radicular cyst formation.
- The second one involves bacterial overgrowth and inflammation in the space between the tooth and the gum, which eventually lead to the destruction of the periodontal ligaments and erosion of underlying bone. A focal abscess formation may also occur at the root of tooth.

Complicated tooth caries / deep periodontal infections spreading beyond the alveolar bone are usually main stay of odontogenicoro-facial infections. They extend to involve the fascial planes around the face and oral cavity causing facial swelling and contour abnormalities.

They tend to spread along planes of least resistance involving the supporting structures of the affected tooth.

In the maxilla, the alveolar bone on the buccal side is weakest throughout. In mandible, the alveolar bone is feeblest in the lingual aspect posteriorly affecting the molar teeth, and on buccal side anteriorly involving the incisors and canine teeth is the weakest. Thus, location of the affected tooth predicts the route of spread and which orofacial spaces will be infected.



**Routes of spread of odontogenicoro-facial infections along planes of least resistance. A,** coronal section in the region of the first molar tooth: a, maxillary antrum; b, nasal cavity; c, palatal plate; d, sublingual space (above the mylohyoid muscle); e, submandibular space (below the mylohyoid muscle); f, intraoral presentation with infection spreading through the buccal plates inside the attachment of the buccinator muscle; g, extraoral presentation to buccal space with infection spreading through the buccal plates outside the attachment of the buccinator muscle. **B,** lingual aspect: a, apices of the involved tooth --- spread of infection to the sublingual space; b, apices of involved tooth --- spread of infection into the submandibular space.

Panoramic X-ray relatively gives good sensitivity in diagnosing periapical abscess of the maxillary teeth (85% of cases). However, only 37.5% of cases of fistula could be diagnosed with X-ray. All the cases of missing crowns and retained roots were diagnosed with these X-rays. Fractures of the alveolar process of the maxillary bone could not be demonstrated in panoramic X-ray. Multidetector CT scan now offers itself as a non-invasive tool for diagnosis of the periapical abscess and for accurate detection of extent of the infection and fistula formation.

### CASE STUDY

Present a case of 67-year-old male patient presented with recurrent infection of right upper premolar and molar region with associated swelling and bleeding from gums while brushing. He was put on antibiotics which gave him temporary relief for short duration. He had past history of surgery for sinusitis.

He was referred to our hospital and underwent MDCT PNS. Study showed incomplete septa in right maxillary sinus arising from inferior wall. Posterior to this, floor of right maxillary sinus

appears deficient with soft tissue attenuation hypodensities seen in this region extending caudally surrounding the root of right second molar tooth, with involvement of distal root of adjacent 1st molar and proximal root of third molar. The defect measures approx. 10.4x 7.2mm. Dental capping are seen involving 1st, 2nd and 3rd molar teeth giving beam hardening artefacts limiting evaluation in this region.

**Figure 2.**



**(a)**



**(b)**

**Figure 2(a)**

Bone window sagittal view showing Bony defect involving the floor of the maxillary sinus above the diseased 2nd maxillary molar tooth. (Thick arrow)

**Figure 2(b)**

Erosion and irregularities of the laminadura of right maxillary 2nd and 3rd molar teeth with hypodense area (periapical abscess) seen surrounding the roots of the right maxillary 2nd molar (star)

**FIGURE 3**



**FIGURE 3:** 3D volumetric images showing erosion and irregularities of the laminadura of right maxillary molar teeth

**FIGURE4**



**FIGURE4** Coronal bone window also showing periapical soft tissue (abscess) with erosions and bony defect involving the floor of the maxillary sinus above the diseased 2nd maxillary molar tooth with resultant oro-antral fistula

**RESULT**

Right oroantral fistula at the level of 2nd molar tooth with soft tissue densities surrounding the molar teeth as described - periapical abscess/granulation formation.

**References**

1. Borgonovo AE, Berardinelli FV, Favale Met-al. Surgical options in oroantral fistula treatment. *Open Dent J.* 2012;6 (1): 94-8.[doi:10.2174/1874210601206010094](https://doi.org/10.2174/1874210601206010094)
2. Steinklein J, Nguyen V. Dental Anatomy and Pathology Encountered on Routine CT of the Head and Neck. *AJR Am J Roentgenol.* 2013;201(6):W843-53.[doi:10.2214/AJR.12.9616](https://doi.org/10.2214/AJR.12.9616)
3. Abrahams JJ. Dental CT imaging: a look at the jaw. *Radiology.* 2001;219(2):334-45.[doi:10.1148/radiology.219.2.r01ma33334](https://doi.org/10.1148/radiology.219.2.r01ma33334)
4. Abrahams, JJ; Berger, S B (1995). *Oral-maxillary sinus fistula (oroantral fistula): clinical features and findings on multiplanar CT.* *American Journal of Roentgenology*, 165(5), 1273–1276.[doi:10.2214/ajr.165.5.7572517](https://doi.org/10.2214/ajr.165.5.7572517)