Case Reports

Ectopic Teeth in the Maxillary Sinus: A Cone Beam Computed Tomography Report of Two Cases

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ABSTRACT

Ectopic tooth eruption is an uncommon condition, with reported occurrences in areas such as the nasal septum and mandibular condyle. Teeth located within the maxillary sinus are particularly rare and may result from trauma, infection, or developmental abnormalities. These teeth are often identified incidentally in the second or third decade of life and may remain asymptomatic. Advances in cone beam computed tomography (CBCT) have enhanced diagnostic accuracy in both routine and complex dental cases due to its ability to provide three-dimensional visualization. This report presents two cases of ectopic teeth in the maxillary sinus, both detected incidentally on CBCT; one in a female patient with no history of trauma, and another in a male patient with post-traumatic displacement following a road traffic accident. Both patients were asymptomatic at the time of diagnosis. Management options, including surgical removal and conservative monitoring, are discussed, with attention to potential complications such as sinusitis and impaired drainage. These cases highlight the need for patient-specific evaluation and demonstrate the indispensable role of CBCT in accurate diagnosis, risk assessment, and informed decision-making regarding rare ectopic teeth.

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Introduction

Ectopic tooth eruption refers to the eruption of a tooth in an abnormal location, often resulting from factors such as genetics, trauma, developmental disturbances, or spatial constraints. Commonly affected regions include the maxillary canine area and palate, while ectopic positions such as the nasal cavity or maxillary sinus are far less frequent [1].

Under normal circumstances, tooth eruption is a controlled physiological process guided by interactions among the dental follicle, periodontal ligament (PDL), and adjacent tissues. Disruption of these interactions during odontogenesis may lead to ectopic eruption.

Teeth usually erupt normally when the tooth germ is correctly positioned, the eruption pathway is unobstructed, and the dental follicle and PDL are intact. Disruption of any of these factors can lead to eruption abnormalities. Ectopic tooth eruption may arise from developmental disturbances, pathological conditions, or iatrogenic factors [2–3].

Ectopic teeth have been reported in approximately 1.5% to 4.3% of the general population [4–5]. However, ectopic teeth located specifically within the maxillary sinus are far less common; literature reviews indicate only about 50–60 documented cases worldwide rather than providing a population-based prevalence estimate [6-7]. Developmental conditions such as cleft palate, traumatic displacement, maxillary infections, genetic

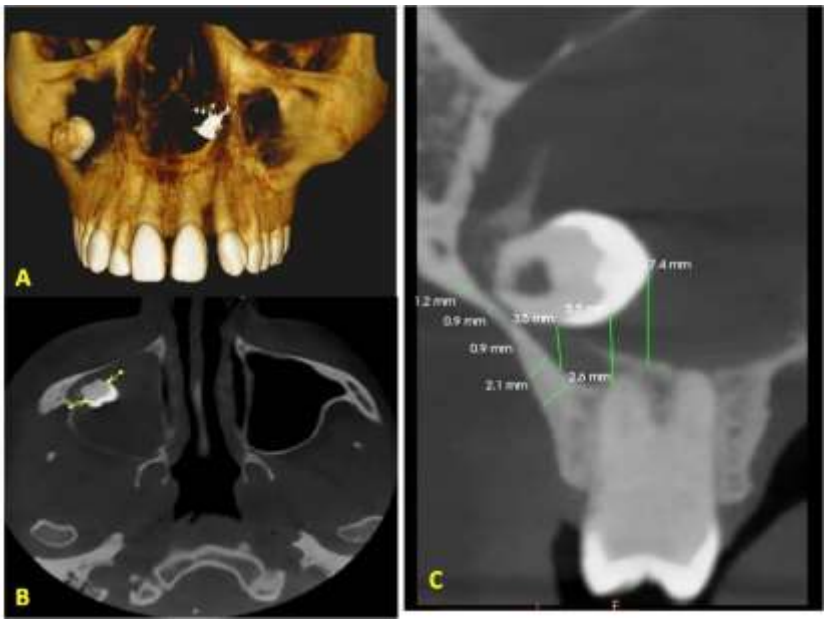

Figure 1: a: 3-D image showing tooth in right maxillary sinus; **b:** Axial section showing tooth in right maxillary sinus with haziness, **c:** Sagittal section showing tooth right maxillary sinus with measurements

factors, dental crowding, and increased bone density have all been linked to deviations in tooth eruption [8].

Ectopic displacement into the maxillary sinus is most often trauma-related and can lead to complications such as acute or chronic sinusitis, oroantral fistulas, and facial pain [9]. Cone beam computed tomography (CBCT) has become essential for detecting ectopic teeth due to its high-resolution, three-dimensional capabilities, enabling precise assessment of sinus anatomy and adjacent structures [10-11].

This study presents two asymptomatic cases of ectopic teeth in the maxillary sinus detected incidentally through CBCT. Their clinical relevance, radiographic features, possible etiologies, and management strategies are discussed.

Case Presentation

Case 1: Ectopic Tooth in the Right Maxillary Sinus

A 19-year-old female was referred for CBCT to evaluate her right maxillary third molar. Clinical examination revealed no abnormalities, and the patient denied any history of facial trauma, sinus infections, or other systemic illnesses. Her medical and dental history was otherwise non-contributory.

CBCT findings revealed a tooth-like structure positioned along the posterior wall of the right maxillary sinus (Figure 1). The crown was fully formed, with an incompletely developed root. The crown was oriented toward the sinus cavity while the root apex pointed posteriorly. Complete sinus haziness was present, suggestive of mucosal thickening; however, the osteomeatal complex (OMC) appeared patent upon coronal evaluation, with no evidence of obstruction. The surrounding bony walls remained intact (Figures 2-3).

A diagnosis of an ectopic maxillary third molar (#18) within the right maxillary sinus was established. The patient was informed about the ectopic location of the missing third molar. Since the patient was asymptomatic, OMC drainage was unobstructed, and mucosal

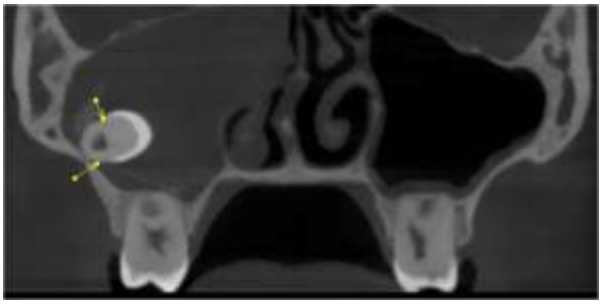

Figure 2: Coronal section showing tooth in right maxillary sinus with haziness

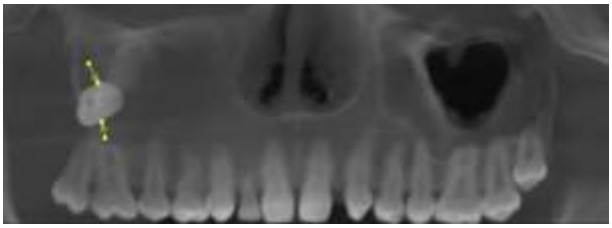

Figure 3: Panoramic image showing tooth in right maxillary sinus

changes were non-progressive, conservative monitoring was chosen. The patient consented to radiographic follow-up every six months. Surgical removal was deferred due to the potential risks of complications such as oroantral communication, sinus infection, or postoperative morbidity outweighing the benefits in an asymptomatic case.

Case 2: Ectopic Teeth in the Left Maxillary Sinus Following Trauma

A 22-year-old male presented for preoperative CBCT implant assessment. CBCT revealed multiple radiopaque objects within the left maxillary sinus, including an ectopic premolar tooth with a complete crown and two roots, one of which showed resorption (Figure 4).

Further history revealed a road traffic accident (RTA) two years earlier that resulted in loss of multiple anterior teeth. No radiographic evaluation had been performed after accident trauma. The patient recalled transient left-sided nasal discharge following the accident which has subsided by the use of nasal drops prescribed by a local physician and further he remained asymptomatic.

CBCT showed two additional root fragments anterior to the ectopic premolar. The sinus exhibited complete haziness with diffuse mucosal thickening, although the OMC remained radiographically patent, and no signs of active sinus infection or cyst formation were evident (Figure 5). Cross-sectional images also revealed a healed fracture line extending through the alveolar ridge and the sinus floor. The teeth identified corresponded to tooth #24 (with one resorbed root) and root fragments of teeth #23 and #22 (Figures 6-7). Given the radiographic findings and the history of trauma, a diagnosis of displacement of anterior teeth (#22, #23, #24) into the left maxillary sinus following RTA was established.

Figure 4: Three dimensional view showing presence of teeth in left maxillary sinus

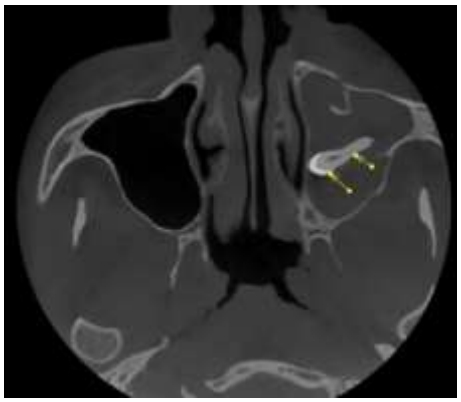

Figure 5: Axial view showing presence tooth in left maxillary sinus and complete haziness of sinus

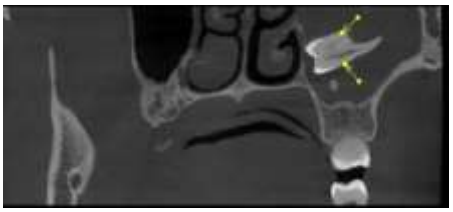

Figure 6: Coronal view showing presence tooth in left maxillary sinus and complete haziness of sinus

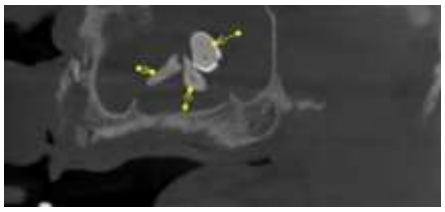

Figure 7: Sagittal view showing presence tooth in left maxillary sinus and complete haziness of sinus

Since the patient was currently asymptomatic and the OMC appeared to be patent, a conservative management approach was chosen. Surgical retrieval was deferred because of the potential risks of sinus membrane perforation and postoperative complications, which outweighed the benefits in an asymptomatic case. The patient was educated on the possibility of sinus-related symptoms developing in the future and advised to report immediately if such symptoms occurred. A follow-up plan was established, involving clinical and radiographic review every six months to monitor for mucosal changes or infection.

Discussion

Ectopic teeth are uncommon dental anomalies, and their presence within the maxillary sinus is particularly rare. Although ectopic teeth in general occur in approximate-

ly 1.5-4.3% of the population, displacement into the maxillary sinus has been documented in only a limited number of cases worldwide [9-10]. Recent literature continues to highlight the rarity of this condition and underscores the importance of accurate diagnosis and appropriate management [1-2].

The etiology of ectopic teeth is multifactorial and may involve developmental disturbances, trauma, pathological processes, dental crowding, or genetic factors [1-2, 12]. Abnormal odontogenesis, such as misdirected tooth germ development or disruption of the dental follicle, can lead to ectopic eruption. Trauma-induced displacement, particularly following maxillofacial injury, represents another significant mechanism [9, 2]. Additionally, infections and iatrogenic factors have also been implicated in contributing to ectopic tooth positioning [3].

Ectopic teeth in the maxillary sinus might be either permanent, deciduous, or supernumerary teeth and they are often associated with dentigerous cysts or chronic infections [13, 1]. Clinically, patients may present with nasal obstruction, facial pain, postnasal drip, or headaches- symptoms that often mimic chronic rhinosinusitis due to obstruction of the OMC [14, 2]. However, many cases, including recently reported ones, remain asymptomatic and are discovered incidentally on radiographic imaging [2-3].

In the present report, both patients were asymptomatic, and CBCT imaging revealed incidental findings of ectopic teeth within the maxillary sinus. Wu *et al.* [15] reported a case of an ectopic maxillary sinus tooth associated with a dentigerous cyst that was successfully managed using a transnasal endoscopic approach, highlighting the value of minimally invasive techniques in such cases.

CBCT remains the imaging modality of choice for evaluating ectopic teeth in the maxillary sinus, as it provides high-resolution, three-dimensional visualization of the teeth, sinus walls, and adjacent anatomical structures [10-11, 16]. This enables precise diagnosis and surgical planning and also allows for the detection of complications such as mucosal thickening, sinusitis, or root resorption [17-18]. Kumbul *et al.* [19] emphasized the diagnostic value of CBCT in assessing the relationship between an ectopic tooth and surrounding structures, thereby guiding surgical decision-making. In our cases, CBCT revealed mild sinus mucosal thickening and retained secretions, but no evidence of active infection, as the OMC remained unobstructed. The root resorption observed in second case suggested a chronic traumatic etiology, which influenced the decision to pursue conservative management with close follow-up.

Comparison of the two cases in this study highlights the etiological differences between developmental and traumatic origins. The first case, involving a developmentally displaced ectopic third molar, was managed conservatively due to its asymptomatic presentation and the absence of sinus complications. The second case, which followed RTA, demonstrated root resorption, indicating long-standing displacement, and was therefore monitored for potential late-onset sinus pathology. Zhao S *et al.* [20] reported a unique instance of an ectopic maxillary sinus tooth complicated by fungal infection, reinforcing the need for periodic monitoring even in cases that are initially asymptomatic.

Management of ectopic teeth in the maxillary sinus should be individualized based on the patient's clinical presentation, radiographic findings, and the potential risk of complications. Symptomatic cases, progressive mucosal changes, or associated cystic pathology typically warrant surgical removal. Minimally invasive transnasal endoscopic techniques, as described by Wu *et al.* [14], provide effective alternatives to traditional Caldwell- Luc procedures, offering reduced morbidity and faster recovery. Conversely, asymptomatic patients with stable radiographic findings may be managed conservatively with periodic CBCT monitoring every 6-8 months [1-2, 18].

Non-treatment approach, however, carries risks such as chronic sinusitis, oroantral fistula formation, and secondary infections, including fungal colonization [3]. Therefore, an individualized, multidisciplinary approach involving oral and maxillofacial surgeons, ear, nose and throat (ENT) specialists, and radiologists remains essential for optimal management [21]. In the present study, both cases were managed conservatively because the patients were asymptomatic, the OMC remained unobstructed, and CBCT findings showed no evidence of acute sinus pathology. These factors indicated a low risk of immediate complications, making observation with regular follow-up the most appropriate approach.

The limitations of this case report include the lack of adjunctive functional assessments such as nasal endos-

copy to complement CBCT findings, and the inability to obtain histopathological confirmation due to the conservative management approach. Additionally, the single-center case selection limits the generalizability of the findings. Future studies incorporating endoscopic evaluation and extended follow-up intervals would provide stronger clinical guidance for the management of asymptomatic ectopic teeth.

Patient consent

Patient consent was obtained.

Conclusion

Ectopic teeth in the maxillary sinus are uncommon and may result from developmental disturbances or traumatic displacement. Often asymptomatic and detected incidentally, these cases highlight the essential role of CBCT in precise localization, three-dimensional evaluation, and effective management planning. Management should be tailored to each patient; asymptomatic individuals may be safely monitored with regular follow-up, while surgical intervention is reserved for those with symptoms, progressive pathology, or complications affecting dental function. Awareness of potential complications, thorough imaging evaluation, and a multidisciplinary approach involving oral and maxillofacial surgeons, ENT specialists, and radiologists are essential to optimize patient outcomes and minimize sinus-related morbidity. Early recognition and tailored management of these uncommon cases can prevent long-term complications while ensuring the most appropriate, patient-centered care.

Conflict of Interest

The authors have declared that no conflict of interest exists.

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