

Dentigerous Cyst Associated with Impacted Supernumerary Tooth in Anterior Palatal Region: A Case Report

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ABSTRACT

The dentigerous cyst is the most common developmental odontogenic cyst, originating from the accumulation of fluid between the reduced enamel epithelium and the crown of an unerupted or impacted tooth. It is most frequently associated with the mandibular third molars and maxillary canines, followed by the maxillary third molars. Occurrence in the anterior maxillary region is exceptionally rare; however, when present in this location, it is typically associated with a supernumerary tooth. Supernumerary teeth are additional teeth that develop beyond the normal dentition and can be found in any region of the maxilla or mandible. The most common type is the mesiodens, typically located in the anterior maxilla, followed by the distomolar, situated distal to the third molars. Although most supernumerary teeth erupt normally into the oral cavity, a subset remains impacted. Of these, only a small proportion are associated with clinical complications such as crowding, delayed eruption of adjacent teeth, or the development of an odontogenic cyst or tumour. This article presents a rare case of a dentigerous cyst associated with an impacted supernumerary tooth in the anterior maxilla of a 40-year-old male, who presented with pain and mild swelling in the anterior palatal region. The case highlights the diagnostic process, radiographic evaluation, and surgical management of this uncommon presentation.

Keywords: Anterior maxilla, Mesiodens, Impacted tooth, Odontogenic cyst

CASE REPORT

A 40-year-old male patient presented to the clinic with a chief complaint of mild swelling in the palatal region for the past two days, accompanied by severe pain. He reported a similar episode of swelling and pain six months ago, which resolved following medication.

On intraoral examination, a soft, painful swelling was palpable in the anterior portion of the hard palate, specifically in relation to the 21 and 22 regions. Pain on percussion was also noted in the teeth associated with the 11, 21, and 22 regions. The patient denied any contributory medical history or trauma.

An Intraoral Periapical Radiograph (IOPA) was taken, which showed a well-defined radiolucency in the periapical region of teeth 11, 21, and 22, with an ovoid radiopaque tooth-like structure, superimposed over the root of tooth 21. The extent of the lesion was not completely visualised in IOPA [Table/Fig-1]. Due to the large size of the lesion,

an Orthopantomogram (OPG) was performed, revealing a unilocular radiolucency extending from the mesial aspect of the 12 region to the distal aspect of the 22 region and superiorly upto the floor of the nasal fossa, with the same ovoid radiopaque structure clearly visible within the radiolucent area in relation to the apical third of tooth 21, suggestive of a supernumerary tooth [Table/Fig-2]. The vitality of the pulp was assessed using both the cold test and the Electric Pulp Test (EPT). Tooth 22 did not elicit any response to either the cold stimulus or EPT, indicating a non-vital pulp, suggestive of pulpal necrosis. In contrast, teeth 21 and 11 demonstrated a delayed, lingering pain that persisted even after removal of the cold stimulus, along with a delayed yet positive response to the EPT. These findings were consistent with a diagnosis of symptomatic irreversible pulpitis, reflecting inflammation of the pulp that is beyond recovery and typically requires endodontic intervention. Based on the patient's history, clinical findings, and radiographic examination, the differential diagnosis of an infected periapical cyst was considered. Root canal treatment was planned for teeth 11, 21, and 22 under local anaesthesia. Access openings were performed on all three teeth, and serosanguinous fluid was observed draining from the openings. The access cavities were left open for one day to facilitate drainage.

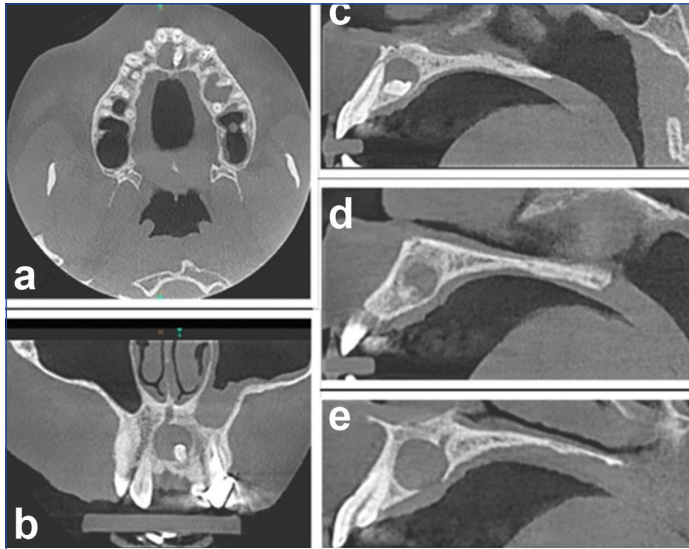


[Table/Fig-1]: Preoperative RVG showing radiolucency in the periapical region of 11 and 21 and radiodensity in the apical third of the 21 root.



[Table/Fig-2]: OPG showing radiolucency extending from the mesial aspect of 12 to the distal aspect of 22 and oval shaped radiopaque structure within the lesion.

The patient was then referred for a Cone-Beam Computed Tomography (CBCT) scan of the anterior maxilla, which revealed a well-defined osteolytic lesion in the anterior maxilla in the palatal aspect at the midline [Table/Fig-3a,b]. The lesion measured approximately 11.4×12.2×10.8 mm, and extended from the mesial aspect of the 12 region to the mesial aspect of the 23 region, involving the nasopalatine canal and the palatal cortex. An impacted supernumerary tooth was seen within the lesion, posterior to the middle third of the root of 21 [Table/Fig-3c]. The crown of the supernumerary tooth was directed posteriorly, while its root was directed anteriorly. Expansion of the palatal cortex was evident in 21 and 22 regions [Table/Fig-3d]. The palatal cortical bone showed thinning in the region of 21 with perforation of the palatal cortex in the midline and 11 region [Table/Fig-3e]. Based on the CBCT findings, a provisional diagnosis of an infected dentigerous cyst associated with an impacted supernumerary tooth was made.



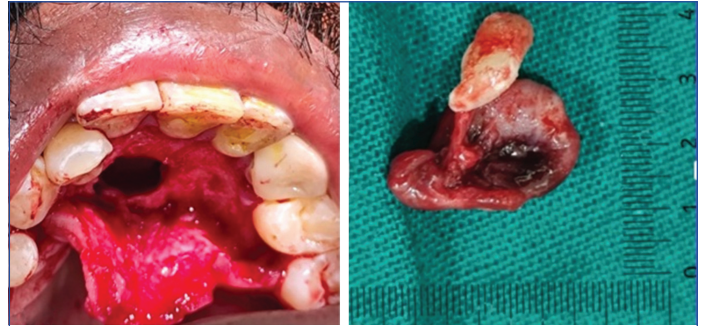
[Table/Fig-3]: CBCT images- (a) Axial section; (b) coronal section) showing an osteolytic lesion in the anterior maxilla in the palatal aspect at the midline. Sagittal sections; (c) presence of supernumerary tooth posterior to middle third of root 21; (d) interdental bone expansion in relation to 21,22 regions; (e) thinning of palatal cortex and perforation in the region of 21.

During the second visit, the root canals were irrigated, and a closed dressing was given. The patient was instructed to return after one week for further treatment. At the subsequent visit, Biomechanical Preparation (BMP) was done, and the root canals were obturated [Table/Fig-4].



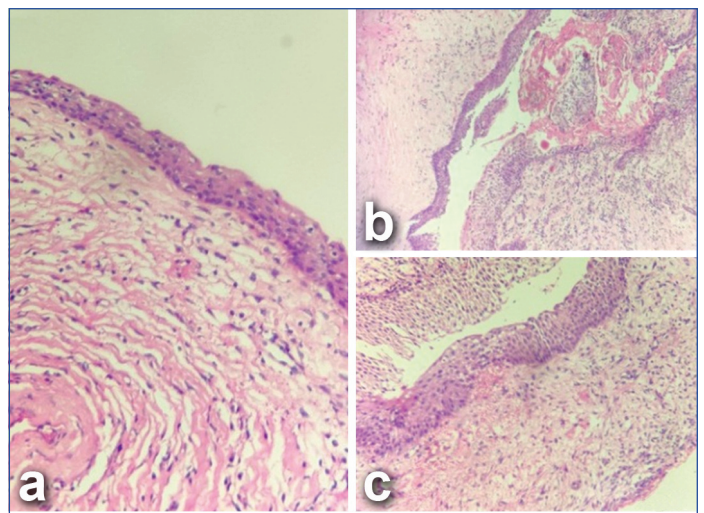
[Table/Fig-4]: RVG showing obturated teeth with apical seal.

In the following appointment, a surgical intervention of the cystic lesion in the anterior hard palate was carried out under strict aseptic protocol. Under local anaesthesia, a crevicular incision was made and a full-thickness palatal flap was elevated from 13 to 23 region [Table/Fig-5]. Upon reflection, the underlying cystic lining was exposed, revealing purulent contents consistent with an infected cystic lesion. The cyst was then enucleated along with the involved supernumerary teeth. Peripheral osteotomy was then carried out. After copious irrigation, the flap was repositioned and secured with braided silk sutures. The surgical specimen size was about 3×2×1.5 cm [Table/Fig-6]. The excised tissue specimens were sent for histopathological examination, fixed in 10% formalin.



[Table/Fig-5,6]: Flap elevation with cystic cavity exposed and cystic lining with extracted supernumerary tooth. (Images from left to right)

Microscopic examination revealed a cystic lining composed of 2-3 layers of non-keratinised stratified squamous epithelium without rete peg formation [Table/Fig-7a]. Focal epithelial discontinuities were present in areas adjacent to dense chronic inflammatory infiltrates in the fibrous connective tissue wall [Table/Fig-7b]. In one region, epithelial hyperplasia with columnar basal cells resembling ameloblast-like morphology was observed [Table/Fig-7c]. These histopathological features confirmed the diagnosis of an inflammatory dentigerous cyst.



[Table/Fig-7]: (Haematoxylin & Eosin staining): (a) 10x magnification- Cystic cavity lined by 2-3 layers of non-keratinised stratified squamous epithelium; (b) 10x magnification- Epithelial discontinuity and connective tissue capsule showing dense inflammatory infiltrate; (c) 40x magnification - Basal cell resembling ameloblast-like structure.

The postoperative healing was uneventful, and the patient was monitored periodically over six months [Table/Fig-8]. Clinical and radiographic evaluations revealed satisfactory healing with no signs of recurrence and evidence of bone regeneration at the surgical site.

DISCUSSION

A dentigerous cyst is the second most common developmental odontogenic cyst next to the periapical cyst, typically associated with the crown of an unerupted or embedded tooth [1]. These cysts



[Table/Fig-8]: Six-month follow-up showing bone regeneration.

most frequently involve mandibular third molars, maxillary canines, and mandibular premolars, and are generally asymptomatic unless they grow large enough to cause bone expansion or displacement of adjacent teeth [2].

Pathogenesis may involve intrafollicular as well as extrafollicular mechanisms. In the intrafollicular type, fluid accumulates between the reduced enamel epithelium and the enamel surface or within the enamel organ, leading to separation of the follicle. The cyst typically encloses the crown and is attached at the cemento-enamel junction [3,4]. Another widely accepted theory suggests that eruptive pressure from the developing tooth impairs venous return in pericoronal tissues, promoting transudation and increased hydrostatic pressure. This pressure facilitates fluid accumulation and detachment of the follicular epithelium, resulting in cyst formation. Inflammation or secondary infection may further accelerate cyst enlargement and clinical manifestation [5].

Dentigerous cysts associated with supernumerary teeth are relatively rare, accounting for approximately 5-6% of cases, with involvement of the anterior palatal region being particularly uncommon [6].

A supernumerary tooth is defined as an additional tooth that exceeds the normal complement of the dentition and may be located in any quadrant of the jaws. Although the exact etiology remains uncertain, it is widely accepted that both genetic and environmental factors contribute to their development. Supernumerary teeth are more commonly observed in the permanent dentition, with the majority presenting as a single additional tooth. Approximately 95% of these cases occur in the anterior maxilla, frequently manifesting as a mesiodens. They show a higher prevalence in males, particularly in the midline region, while females more commonly exhibit supernumerary teeth in the incisor area [7,8].

Morphologically, supernumerary teeth vary by dentition. In the primary dentition, they are usually conical or resemble normal teeth and are typically of the supplemental type. These usually erupt in proper alignment and may remain undetected. In the permanent dentition, they exhibit greater morphological variation, ranging from fully developed to rudimentary forms. The most common type is the conical mesiodens, with root formation comparable to or more advanced than adjacent teeth [1,2,9]. Tuberculate supernumerary teeth, which are larger and barrel-shaped with multiple cusps, often have delayed root development. They are most frequently

situated unerupted on the palatal aspect of the maxillary central incisors and are a frequent cause of impaction. Supernumerary teeth in the permanent dentition are often associated with various complications, including delayed eruption, impaction, displacement, rotation, crowding, diastemas, root resorption of adjacent teeth, and formation of dentigerous (odontogenic) cysts [9,10]. In this case, CBCT revealed an impacted, inverted conical-shaped mesiodens located on the palatal aspect of the anterior maxilla, associated with an infected dentigerous cyst, causing cortical expansion and palatal perforation. This finding is consistent with earlier reports, which have emphasised the role of CBCT as a superior diagnostic modality for accurately localising supernumerary teeth and assessing the extent of associated pathologies, particularly in cases where conventional radiographs are inconclusive [11,12].

Histopathologically, a dentigerous cyst is usually lined by a thin, non-keratinised stratified squamous epithelium that typically measures two to four cell layers in thickness. In non-inflamed lesions, this epithelial lining remains flat and uniform without the presence of rete ridges. It is generally accepted that the lining epithelium originates from the reduced enamel epithelium of the developing tooth follicle. The supporting connective tissue capsule is moderately collagenous and may include residual odontogenic epithelial islands [1-3]. When inflammation is absent, the cyst wall stroma is usually loose, fibrous, and relatively inactive [3]. However, in the presence of secondary inflammation, the epithelium often exhibits reactive hyperplasia with elongation of rete ridges, and the connective tissue becomes densely collagenised, often infiltrated with chronic inflammatory cells such as lymphocytes and plasma cells [13,14]. In the present case, most of the cystic lining displayed the typical thin, non-keratinised stratified squamous epithelium; however, focal areas revealed marked epithelial hyperplasia with prominent rete peg formation. The supporting connective tissue stroma exhibited dense collagenisation with a significant chronic inflammatory infiltrate, consistent with secondary inflammatory changes.

Chronic inflammatory stimuli can significantly modify the epithelial lining of dentigerous cysts, resulting not only in increased epithelial thickness but also in metaplastic alterations such as mucous cell differentiation or ciliated epithelium formation. Similar histopathological changes, including reactive epithelial hyperplasia and chronic inflammatory cell infiltration, have been reported in previous studies and are considered indicators of secondary infection and prolonged inflammation (Aldelaimi AA et al., 2024; Motahhary P et al., 2021) [15,16]. Although dysplastic or neoplastic transformation was not observed in the present case, the presence of marked inflammation highlights the clinical significance of complete surgical enucleation and the need for long-term radiographic follow-up to prevent recurrence or possible malignant transformation.

In the present case, IOPA and OPG revealed a well-defined radiolucency in the periapical regions of teeth 11, 21, and 22, closely resembling the radiographic appearance of a radicular cyst. Within this radiolucent area, a small radiopaque structure was observed adjacent to the middle third of the root of 21. Definitive identification of this radiopaque mass as an impacted supernumerary tooth and the extent of the lesion were achieved only through CBCT. Similar observations have been reported by Abbasi F et al 2023, who demonstrated that CBCT offers superior three-dimensional visualisation, enabling accurate localisation of supernumerary teeth and facilitating optimal surgical planning [17].

CONCLUSION(S)

The IOPA and OPG are fundamental imaging modalities for initial diagnosis and treatment planning in routine dental practice. However, CBCT provides superior diagnostic accuracy in the evaluation of impacted supernumerary teeth and associated cystic pathologies, particularly when conventional radiographs yield inconclusive findings. Early diagnosis and prompt surgical enucleation, along

with removal of the supernumerary tooth, are crucial to prevent complications such as cortical plate perforation, tooth displacement, and lesion recurrence. This case further emphasises the significance of an integrated, multidisciplinary approach in achieving optimal clinical and therapeutic outcomes.

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AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Jul 28, 2025
- Manual Googling: Sep 27, 2025
- iThenticate Software: Oct 04, 2025 (16%)

ETYMOLOGY: Author Origin

EMENDATIONS: 5

Date of Submission: **Jul 08, 2025**
Date of Peer Review: **Sep 15, 2025**
Date of Acceptance: **Oct 06, 2025**
Date of Publishing: **Dec 01, 2025**