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(CASE REPORT)

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Management of a dentigerous cyst in the right mandible: A case report with radiographic, histopathological and immunohistochemical insights

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Abstract

Introduction: Dentigerous cysts are developmental odontogenic cysts originating from the reduced enamel epithelium and characteristically enveloping the crowns of unerupted or impacted teeth. They represent the second most prevalent odontogenic cystic lesion of the jaws, with a marked predilection for the mandibular third molar region. Although frequently asymptomatic and detected incidentally during routine radiographic examination, progressive cystic enlargement may result in bone destruction, tooth displacement, and neurosensory disturbances.

Case description: This report presents the clinical, radiographic, surgical, histopathological and immunohistochemical features of a dentigerous cyst associated with an impacted right mandibular third molar in a 36-year-old female patient. The patient reported mild intraoral swelling accompanied by intermittent, non-specific pain. Panoramic and CBCT imaging revealed a well-defined unilocular radiolucency attached to the cemento-enamel junction of the impacted tooth. Surgical management consisted of complete enucleation of the cystic lesion with simultaneous extraction of the associated tooth.

Histopathological and immunohistochemical analyses confirmed the diagnosis, demonstrating thin, non-keratinized stratified squamous epithelial lining, CK19 positivity, low Ki-67 proliferation index, and absent p53 expression.

Conclusion: This case underscores the importance of radiographic surveillance of impacted teeth and confirms that surgical enucleation with tooth extraction remains a definitive and effective treatment modality for dentigerous cysts when the associated tooth lacks functional value. A diagnostic algorithm is proposed to guide clinicians in evaluation and management.

Keywords: Dentigerous cyst; Mandible; Impacted third molar; Enucleation; CBCT; Immunohistochemistry; Oral surgery

1. Introduction

Dentigerous cysts are developmental odontogenic cysts derived from the accumulation of fluid between the reduced enamel epithelium and the crown of an unerupted tooth, resulting in cyst formation attached at the cemento-enamel junction[1,2]. They account for approximately 20–24% of all odontogenic cysts, ranking second only to radicular cysts in frequency[3]. The mandibular third molar is the most affected tooth, followed by maxillary canines, mandibular premolars, and supernumerary teeth[4].

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The pathogenesis of dentigerous cysts is believed to involve pressure exerted by an erupting tooth on the follicle, leading to venous obstruction and transudation of serum across the capillary walls, ultimately causing separation of the follicle from the enamel surface[2,5]. Although most dentigerous cysts remain asymptomatic for extended periods, progressive enlargement may produce clinical manifestations such as jaw swelling, facial asymmetry, pain, delayed tooth eruption, displacement of adjacent teeth, cortical bone thinning, and, in rare cases, pathological fracture[6].

Radiographically, dentigerous cysts typically appear as well-circumscribed, unilocular radiolucencies associated with the crown of an unerupted tooth. A pericoronal radiolucency exceeding 3–4 mm in width is generally considered suggestive of cystic pathology rather than a normal dental follicle[1,7]. Advanced imaging modalities, including cone-beam computed tomography (CBCT), may provide additional information regarding lesion extent, cortical bone involvement, and proximity to vital anatomical structures [8].

Given their potential for local aggressiveness and rare but documented neoplastic transformation into lesions such as ameloblastoma, squamous cell carcinoma, or mucoepidermoid carcinoma, early diagnosis and appropriate management of dentigerous cysts are essential[9,10].

The present report describes a case of a dentigerous cyst associated with an impacted mandibular third molar in an adult patient, highlighting diagnostic considerations, CBCT evaluation, surgical management, histopathology, immunohistochemistry, and postoperative outcome.

2. Case Report

A 36-year-old woman was referred to the Department of Oral Surgery and Implantology at the University Dental Clinical Center “St. Pantelejmon” presenting with a gradually developing swelling in the right posterior region of the mandible. The swelling was associated with episodic, poorly defined discomfort that had persisted for several months. Her medical history was noncontributory, with no reported systemic diseases or regular medication use. The patient’s dental history revealed no prior surgical procedures or traumatic events involving the affected area.

Intraoral clinical examination disclosed a mild outward expansion of the buccal cortical plate in the region corresponding to the impacted right mandibular third molar. The overlying mucosa appeared healthy, maintaining normal color and texture, with no evidence of inflammation, ulceration, or suppuration. Gentle palpation elicited slight tenderness, although no fluctuant areas were detected. Sensory evaluation confirmed normal neurosensory function of both the inferior alveolar and lingual nerves, and clinical examination revealed no palpable cervical or submandibular lymph nodes.

Panoramic radiographic assessment demonstrated a well-circumscribed, unilocular radiolucent lesion with a clearly defined corticated border enveloping the crown of an unerupted right mandibular third molar. The lesion was seen to originate at the cemento-enamel junction and extended in an apical direction, a radiographic appearance characteristic of a dentigerous cyst (Fig. 1a). Adjacent teeth showed no signs of root resorption, and there was no radiographic evidence of cortical bone perforation.

Figure 1 Orthopantomogram showing a well-defined unilocular radiolucency associated with the crown of an impacted right mandibular third molar (#48)

2.1. Radiographic Assessment and CBCT Correlation

CBCT imaging is usually performed for detailed assessment. Sagittal and axial CBCT sections can confirm a unilocular radiolucent lesion enveloping the crown, with smooth cortical margins and mild buccolingual expansion. The inferior alveolar nerve canal was displaced but intact. Adjacent roots were unaffected, and no cortical perforation was noted.

CBCT facilitated accurate measurement of lesion dimensions, assessment of cortical bone integrity, and surgical planning, minimizing the risk of intraoperative complications and ensuring complete enucleation.

2.2. Surgical Procedure

Surgical intervention was performed under local anesthesia, achieving adequate analgesia and patient comfort throughout the procedure. After antiseptic preparation of the operative field, a full thickness mucoperiosteal flap was carefully reflected using a conventional triangular incision design in the right posterior mandibular region, allowing optimal visualization and access to the underlying structures. Controlled removal of the buccal cortical bone was subsequently carried out with a rotary surgical handpiece under continuous sterile saline irrigation to prevent thermal injury and to expose both the impacted tooth and the surrounding cystic cavity.

Once adequate access was established, meticulous blunt and sharp dissection was employed to separate the cystic lesion from the surrounding bone. The cystic capsule was enucleated in its entirety without rupture, together with removal of the associated impacted mandibular third molar, which was considered to have no functional or orthodontic relevance. Owing to the unfavorable distoangular orientation of the tooth, odontotomy was performed, with sectioning of the crown from the root component to facilitate controlled and minimally traumatic extraction. Particular attention was paid to the removal of the cystic lining, which was found to be adherent to the root surfaces; the lining was excised completely to reduce the likelihood of residual pathology and recurrence.

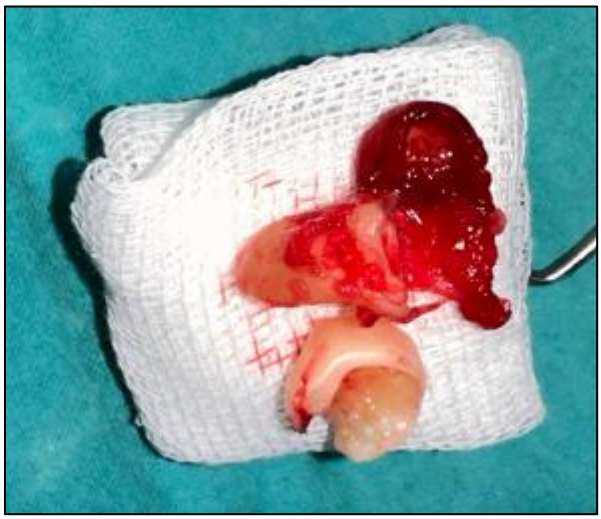

Figure 2 Extracted mandibular third molar with separated crown and attached cystic lining

Following lesion removal, the osseous cavity was thoroughly examined to ensure the absence of remaining cystic tissue or tooth fragments. The surgical site was then copiously irrigated with sterile saline, and careful hemostasis was achieved. The mucoperiosteal flap was repositioned to its original anatomical location and secured using interrupted sutures, providing tension-free primary closure and promoting uneventful postoperative healing.

Figure 3 Intraoral view of the surgical site following complete enucleation and consecutive closure

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НАОД: 1262136

Установа: Стоматолошки клиники - ОРАЛНА ХИРУРГИЈА
Адреса:
Град:
Лекар:
Амб.број:
Прим./Зат.:

Клиничка дијагноза: Cysta follicularis mandibulae lat.dex in obs
Вид на испратен материјал: Operative Material
Материјал опис :

ХИСТОПАТОЛОШКИ НАОД

CYSTIS FOLLICULARIS

K04.8 - K04.8

Макроскопски наод :
Доставениот оперативен материјал го сочинуваат 3 некоптивни фрагменти со неправилна форма, сивкасто до фокално жолтеникаво или ливидно пребоени, со пречник на најголемиот 6,4см + димензии на најголемиот 4,6x0,3x0,3см. За ПХА материјалот е вклалпен во 1 парафински блок и полусериски обработен.

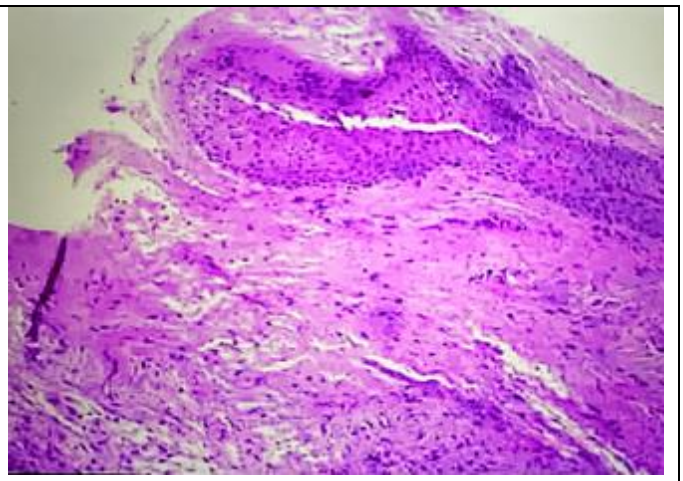
Микроскопски наод:
Микроскопската анализа на примероците покажа наод на фоликуларна циста чиј вид е граден од колагено сврано ткиво во дел обложен со некератинизирачки многуслоен плочест епител. Во ѕидот се наоѓа умерен хроничен воспалителен инфилтрат и групации од холестеролски кристали. Периферно се гледа сврано и оскудно масно ткиво, како и мали снопчиња од напречно пругаста мускулатура.

Наодот одговара за фоликуларна циста.

Наодот е електронски авторизиран од

стр : 1/2

4a



4b

Figure 4a Histopathological finding confirms the suspected dentigerous (follicular) cyst shown on **Fig. 4b**

2.3. Histopathological and immunohistochemical findings

Histopathological examination of the excised specimen revealed a cystic lesion lined by thin, non-keratinized stratified squamous epithelium, typically composed of two to four cell layers, supported by a fibrous connective tissue wall with minimal chronic inflammatory infiltrate. The epithelial lining was flat and uniform, lacking rete ridge formation, keratinization, or epithelial hyperplasia. No cellular atypia, dysplastic changes, or features suggestive of neoplastic transformation were observed, findings consistent with a dentigerous cyst[1,2].

To further characterize the biological behavior of the lesion and to exclude odontogenic neoplasia, an immunohistochemical evaluation was performed. The epithelial lining demonstrated positive immunoreactivity for cytokeratin (CK) 19, a marker commonly expressed in odontogenic epithelium and reduced enamel epithelium, supporting the odontogenic origin of the cyst. CK14 expression was confined to the basal and parabasal cell layers, consistent with non-keratinized stratified squamous epithelium.

Ki-67 immunohistochemical expression in the epithelial lining of a dentigerous cyst and its relevance to conservative treatment planning: (A) Low-power view (×100) demonstrates sparse Ki-67–positive nuclei within the cystic epithelial lining. (B) High-power view (×200) shows nuclear Ki-67 immunoreactivity predominantly confined to basal epithelial cells, corresponding to a low labeling index of approximately 5%. Immunohistochemical staining was performed using a monoclonal anti–Ki-67 antibody with diaminobenzidine (DAB) chromogen and hematoxylin counterstain. The low proliferative activity observed supports the biological rationale for initial decompression or marsupialization, allowing reduction in lesion size and facilitating conservative definitive surgical management while preserving adjacent anatomical structures. This low Ki-67 expression supports the benign and non-aggressive nature of the lesion and helps differentiate dentigerous cysts from more proliferative odontogenic entities such as odontogenic keratocysts and unicystic ameloblastomas.

Furthermore, p53 immunoreactivity was absent, indicating no accumulation of mutated tumor suppressor protein and arguing against dysplastic or malignant transformation.

Table 1 Immunohistochemical evaluation of the epithelial lining of a dentigerous cyst (World Health Organization – aligned terminology)

Marker	Expression Pattern	∗Labeling index / positivity	WHO – consistent diagnostic relevance
CK19	Diffuse cytoplasmic and membranous staining in epithelial lining	~90% of epithelial cells	Confirms odontogenic epithelial origin; typical for reduced enamel epithelium13,14
CK14	Basal and parabasal layers, cytoplasmic staining	~70% of basal/parabasal cells	Consistent with non-keratinized stratified squamous epithelium; supports benign nature13,14
Ki-67	Nuclear staining mainly in basal layer	~5% of epithelial cells	Low proliferative activity; helps differentiate from more aggressive odontogenic lesions13–15
p53	Negative	0%	Absence of p53 accumulation; no evidence of dysplasia or malignant transformation16

∗Labeling indices are expressed as percentages of positive cells per 100 counted cells

3. Discussion

Dentigerous cysts are generally regarded as benign lesions; however, their potential for progressive growth underscores the importance of early detection and intervention[6]. In adult patients, delayed diagnosis is common, as lesions may remain clinically silent until they reach considerable size. Routine radiographic evaluation of impacted teeth therefore plays a crucial role in early identification[7].

The differential diagnosis of pericoronal radiolucencies includes odontogenic keratocyst, unicystic ameloblastoma, enlarged dental follicle, and ameloblastic fibroma. Radiographic features alone may be insufficient to establish a

definitive diagnosis, making histopathological confirmation mandatory[8,11]. Routine radiographic evaluation, including panoramic imaging and CBCT, plays a pivotal role in detection and surgical planning[7,8,17].

Differential diagnosis includes odontogenic keratocyst, unicystic ameloblastoma, enlarged dental follicle, and ameloblastic fibroma, emphasizing the importance of histopathological and immunohistochemical confirmation[8,11,13–15].

Treatment strategies for dentigerous cysts include marsupialization, enucleation, or a combination of both. Marsupialization may be considered in younger patients to preserve developing teeth or reduce cyst size prior to definitive surgery. Nevertheless, complete enucleation with extraction of the associated tooth remains the treatment of choice in most adult patients, particularly when the impacted tooth lacks functional or orthodontic value[2,4,12].

In the present case, complete enucleation resulted in uneventful healing and satisfactory bone regeneration, with no clinical or radiographic evidence of recurrence during follow-up. This outcome is consistent with existing literature reporting low recurrence rates following thorough surgical removal[6,12].

Immunohistochemical analysis has become an important adjunct in the evaluation of odontogenic cysts, particularly in cases where radiographic or histological features overlap with those of odontogenic tumors. Dentigerous cysts typically exhibit strong CK19 expression, reflecting their origin from reduced enamel epithelium, and a low Ki-67 labeling index, indicative of limited proliferative activity[13,14]. In contrast, odontogenic keratocysts and ameloblastomas demonstrate higher proliferative indices and distinct cytokeratin profiles, which may correlate with their more aggressive biological behavior[15]. The absence of p53 expression in the present case further supports the benign nature of the lesion and excludes early malignant transformation, which, although rare, has been reported in longstanding dentigerous cysts[10,16].

A recent study has reported a significant positive correlation between Ki-67 and p53 expression, with higher proliferative activity associated with increased p53 levels ($r = 0.68$, $p < 0.001$)[17,18].

Mustansir-Ul-Hassnain et al. reported that decompression, when used as a pre-treatment, significantly decreases the proliferative activity of the cystic epithelial lining, as indicated by reduced Ki-67 expression[19]. This reduction in cellular proliferation allows for better surgical planning and can minimize the size and extent of the incisions required during subsequent surgical intervention.

CBCT adds value by delineating lesion boundaries, cortical bone integrity, and proximity to nerves, reducing operative complications and facilitating minimally invasive, targeted surgical approaches[17-20].

3.1. Diagnostic Algorithm for Dentigerous Cysts

To guide clinicians in the assessment and management of suspected dentigerous cysts, the following diagnostic algorithm is proposed (Table 2). It integrates clinical, radiographic, and histopathological evaluation steps, including optional CBCT and immunohistochemistry, to ensure accurate diagnosis and appropriate treatment planning.

Table 2 Diagnostic algorithm for suspected dentigerous cysts

Step	Assessment	Notes / Purpose
1	Clinical examination	Evaluate swelling, pain, mucosal changes, neurosensory deficits
2	Panoramic radiography	Identify pericoronal radiolucency, attachment to CEJ, unilocular vs. multilocular pattern
3	CBCT imaging (optional but recommended)	Assess lesion volume, cortical expansion/perforation, proximity to nerves or adjacent teeth
4	Differential diagnosis	Odontogenic keratocyst, unicystic ameloblastoma, enlarged dental follicle, ameloblastic fibroma
5	Surgical intervention	Enucleation with or without extraction of the impacted tooth; marsupialization for large lesions or in young patients
6	Histopathological examination	Confirm dentigerous cyst; evaluate epithelial lining, connective tissue wall, inflammation, dysplasia

7	Immunohistochemistry (optional)	CK19, CK14 for odontogenic origin; Ki-67 for proliferative index; p53 to rule out dysplasia/malignancy
8	Postoperative follow-up	Radiographic and clinical monitoring for recurrence

4. Conclusion

Dentigerous cysts associated with impacted mandibular third molars may present with minimal or non-specific subtle symptoms. Accurate diagnosis, supported by histopathological examination, is essential to differentiate these lesions from other odontogenic pathologies. Routine radiographic evaluation, including CBCT, enhances diagnostic accuracy and surgical planning. Complete surgical enucleation with extraction of the involved tooth remains a reliable and definitive treatment approach, offering excellent prognosis and minimal risk of recurrence when performed appropriately. A structured diagnostic algorithm can assist clinicians in evaluation and management, optimizing patient care and prognosis.

Compliance with ethical standards

This case report was conducted in accordance with the Declaration of Helsinki, and written informed consent was obtained from the patient for publication of this report and any accompanying images.

Disclosure of conflict of interest

Authors declare no conflict of interest related to this study.

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