

# Histopathological Features of Dentigerous Cyst : A Review Article

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## Abstract

**Introduction:** Cyst is a pathological cavity that is filled with fluid or semi-fluid, limited by the epithelium, or not and can cause intraoral and extraoral enlargement which can clinically resemble a benign tumor (Neville et al, 2002). Cysts are classified into 3 major groups, namely cysts on the jaw, cysts associated with the maxillary antrum, and soft tissue cysts on the face, and neck. Odontogenic cysts are the most common form of cystic lesions affecting the maxillofacial region. The exact histopathology of these cysts will still be clearly established, but the most likely etiology is the developmental origin of the dental follicles. Dentigerous cysts are almost always associated with unerupted, visibly adhered crowns of teeth. to cemento-enamel junction. In addition, it can also be found in relation to the presence of supernumerary teeth, or primary teeth that are not erupted. The purpose of this text is to determine the histopathological features to assist in the diagnosis of dentigerous cysts of the oral cavity [1-4].

**Discussion:** The histopathological examination of the cyst varies, depending on whether the cyst is inflamed or not. In non-inflammatory cysts, the fibrous tissue walls are loosely composed and consist of a glycosaminoglycan base substance. Islets and woven remains of inactive odontogenic epithelium are present on the walls of the fibrous tissue. The epithelial boundary consists of 2-4 layers of cuboidal epithelial cells and the space between the tissue and the epithelium is flat. In inflamed cysts, fibrous walls are more collagen and accompanied by chronic inflammatory cells. The epithelial border shows varying amounts of hyperplasia with a protruding rete and a squamous appearance. Keratinized surfaces are often seen (Figure 1). Odontogenic cyst is one of the most common benign lesions in the oral cavity, one of which is dentigerous cyst. Much effort has been made to understand the pathogenesis of dentigerous cysts. Several studies have investigated the participation of immune and inflammatory cells in the formation and growth of these lesions. Mast cells are one of the defense cells in the immune system that have a metachromatic cytoplasm [5]. The participation of mast cells in the body's defense system both humoral and cellular is as effector cells in innate immunity and in response to allergic, chemical and biological factors such as microorganisms and parasites, as well as a source of histamine, serotonin, and other vasoactive amines, cells. it can control vascular tone and permeability.

**Conclusion:** The histopathological features of the dentigerous cyst can vary, based on whether the cyst is inflamed or not. The epithelial boundary consists of 2-4 flat layers of nonkeratinous cells, the epithelium and the space between the connective tissue is flat.

**Keywords:** Genetic; tooth decay; sugar consumption; metabolism; microorganism; immune system

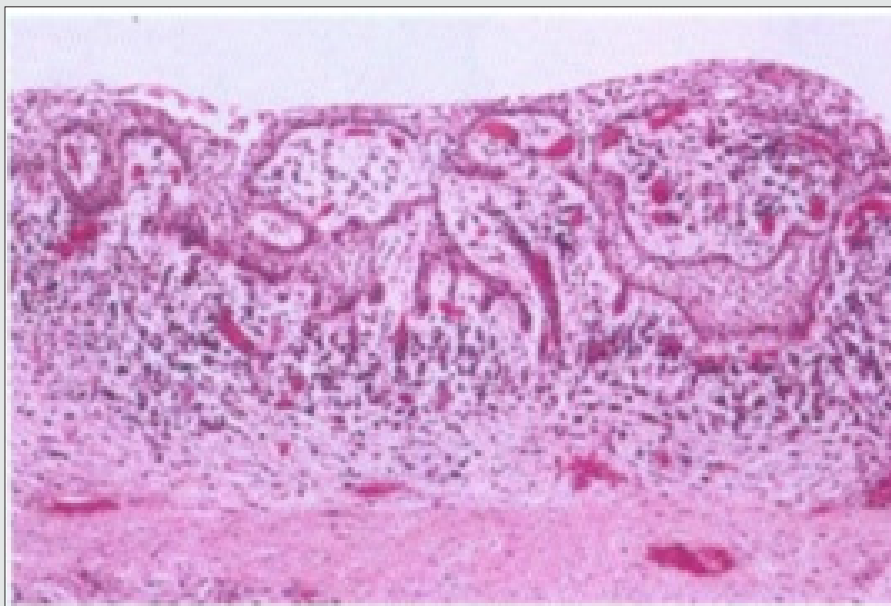
## Introduction

Cyst is a pathological cavity that is filled with fluid or semi-fluid, limited by the epithelium, or not and can cause intraoral and extraoral enlargement which can clinically resemble a benign tumor

(Neville et al, 2002). Cysts are classified into 3 major groups, namely cysts on the jaw, cysts associated with the maxillary antrum, and soft tissue cysts on the face, face and neck. Odontogenic cysts are

the most common form of cystic lesions affecting the maxillofacial region [1]. Dentigerous cysts can occur at any age, but most cases of these cysts occur at the age of approximately 20 years. Males are more frequently affected than females and are mostly associated with impacted mandibular third molars, first and second premolars and canines. Dentigerous cysts are usually asymptomatic and are mostly diagnosed by routine radiographs. Patients can provide a history of slowly swelling in the region around the cyst, followed by pain in secondary infected cases [2]. The exact histopathology

of these cysts will still be clearly established, but the most likely etiology is the developmental origin of the dental follicles. Dentigerous cysts are almost always associated with unerupted, visibly adhered crowns of teeth, to cemento-enamel junction. In addition, it can also be found in relation to the presence of supernumerary teeth, or primary teeth that are not erupted. The purpose of this text is to determine the histopathological features to assist in the diagnosis of dentigerous cysts of the oral cavity [3].



**Figure 1:** Inflamed dentigerous cyst showing a thinner epithelial wall with hyperplastic rete ridge [4].

## Discussion

### Histopathology and Immunopathology Examination

The histopathological examination of the cyst varies, depending on whether the cyst is inflamed or not. In non-inflammatory cysts, the fibrous tissue walls are loosely composed and consist of a glycosaminoglycan base substance. Islets and woven remains of inactive odontogenic epithelium are present on the walls of the fibrous tissue. The epithelial boundary consists of 2-4 layers of cuboidal epithelial cells and the space between the tissue and the epithelium is flat. In inflamed cysts, fibrous walls are more collagen and accompanied by chronic inflammatory cells. The epithelial border shows varying amounts of hyperplasia with a protruding rete and a squamous appearance. Keratinized surfaces are often seen [4]. Odontogenic cyst is one of the most common benign lesions in the oral cavity, one of which is dentigerous cyst. Much effort has been made to understand the pathogenesis of dentigerous cysts. Several studies have investigated the participation of immune and inflammatory cells in the formation and growth of these lesions. Mast cells are one of the defense cells in the immune system that

have a metachromatic cytoplasm<sup>5</sup>. The participation of mast cells in the body's defense system both humoral and cellular is as effector cells in innate immunity and in response to allergic, chemical and biological factors such as microorganisms and parasites, as well as a source of histamine, serotonin, and other vasoactive amines, cells. it can control vascular tone and permeability [5]. Mast cells are also a source of heparin and proteolytic enzymes that participate in connective tissue degradation and are involved in stimulating the production of prostaglandins which are considered important in bone resorption. With respect to various roles, mast cells are thought to play a role in the pathogenesis and growth of odontogenic cysts. The release of many mediators in mast cell degranulation, plays an important role in the pathogenesis of odontogenic cysts. The hydrostatic pressure of the luminal fluid is important in cyst enlargement and mast cell activity by increasing the osmotic pressure of the fluid in three ways:

- By releasing heparin into the luminal fluid.
- By releasing hydrolytic enzymes which can degrade the capsular components of the extracellular matrix.

- c) The action of histamine on smooth muscle contraction and vascular permeability promotes the transudation of serum proteins and subsequently into the luminal fluid. The main components of mast cell granules are glycosaminoglycans. The glycosaminoglycan content of capsular connective tissue cysts, heparin is an important component of non-keratinizing cysts (radicular: 31.4%; dentigerous: 22.2% of total glycosaminoglycans) [6-8].

### Pathobiology examination

Dentigerous cysts are cysts that form around the unerupted crown of a tooth. These cysts begin to form when fluid accumulates in the epithelial layers of the reduced enamel or between the epithelium and the unerupted tooth crown. This cyst is attached to the cemento-enamel junction to the follicular tissue that covers the unerupted dental crown [9]. There are two theories regarding the formation of dentigerous cysts. The first theory states that cysts are caused by fluid accumulation between the reduced enamel epithelium and the crown of the tooth. Fluid pressure promotes the proliferation of reduced enamel epithelium into the cyst attached to the cemento-enamel junction and the crown of the tooth. The second theory states that the cyst begins with the destruction of the stellate reticulum, forming fluid between the inner and outer enamel epithelium. This fluid pressure encourages the proliferation of the outer enamel epithelium leaving the tooth adhesion at the cemento-enamel junction, then the inner enamel epithelium is pressed onto the crown surface. When fully formed, the crown will rotate into the lumen, and the roots extend to the outside of the cyst. In each theory, fluid causes cystic proliferation due to hyperosmolar content produced by cellular breakdown and cell products, causing an osmotic gradient to pump fluid into the lumen of the cyst [10]. Pathobiology is a science that studies the occurrence of deviant biological changes in the body:

### Molecular

The occurrence of PTCH gene mutation, it can be said that the evidence of PTCH gene expression in dentigerous cyst lining indicates a malfunction of the relevant signaling pathway. The PTCH gene pairs transmembrane proteins that act against Hedgehog protein cues, controlling cell, pattern, and growth in many tissues, including teeth [11].

### Network

A cyst is a pathological cavity, covered by epithelium, which contains a fluid, solid or semi-solid material. Cysts are chronic, asymptomatic, and slow growing lesions. In many cases, cysts are detected in routine radiographic examinations. Odontogenic cyst is a pathological cavity filled with fluid, lined with epithelium and collagen tissue, which originates from the odontogenic epithelium 1-3. which compose dentin follicles due to dentition and the remaining cells from Malassez (cell rests of Malassez) [12].

### Cellular

Dentigerous cysts occur when the stellate reticulum is damaged, forming fluid between the inner and outer enamel epithelium. This fluid pressure promotes proliferation of the outer enamel epithelium leaving the tooth at the cemento-enamel junction; then the enamel epithelium is pressed against the surface of the crown. When fully formed, the crown will rotate into the lumen, and the roots extend to the outside of the cyst. In each theory, fluid causes cystic proliferation due to hyperosmolar content produced by cellular breakdown and cell products, causing an osmotic gradient to pump fluid into the lumen of the cyst [3].

### Organs

Dentigerous cysts occurred with a frequency of 1,44 in 100 unerupted teeth. The most common were the mandibular third molars, maxillary canines, and mandibular premolars. Impacted canines, when associated with dentigerous cysts during the eruption period, undergo displacement and can lead to root resorption of adjacent teeth. Incisors in 12% of cases resulted in root resorption caused by canines associated with dentigerous cysts [13]. Radicular cysts and dentigerous cysts that are small (less than 2 cm) can usually be enucleated easily, along with the extraction of the tooth associated with the cyst. If enucleation poses a bad risk to the surrounding structures then externalization / penetration can be used as an alternative approach to reduce the size of the cyst, followed by enucleation. Marsupialization can pose a risk of developing in situ ameloblastoma or microinvasive ameloblastoma. The prognosis is excellent and there is no chance of recurrence after enucleation. However, residual cysts can develop if the lesions are not completely enucleated [12,14,15]. In uninfamed dentigerous cysts, the connective fibrous tissue walls are loosely arranged and contain a large glycosaminoglycan base substance. Islets or webbing of inactive odontogenic epithelial remains are present on the walls of the fibrous tissue. In inflamed dentigerous cysts, the fibrous tissue walls are more collagenous, with infiltration of various chronic inflammatory cells. The epithelial border shows varying amounts of hyperplasia with the development of the retia (the connective tissue for blood flow or nerves) and the squamous appearance is more pronounced [12,14].

### Conclusion

The histopathological features of the dentigerous cyst can vary, based on whether the cyst is inflamed or not. The epithelial boundary consists of 2-4 flat layers of nonkeratinous cells, the epithelium and the space between the connective tissue is flat.

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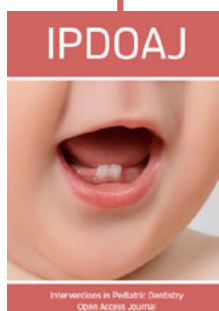
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