Impacted Tooth: A Cause of Odontogenic Lesion in the Jawbones

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Abstract

The dentigerous cyst is the commonest developmental odontogenic cyst encountered in the jawbones accounting for about one-fourth of all reported cases. As with other cysts, they present as asymptomatic lesions that are either detected on routine radiographs or when they cause swelling leading to facial asymmetry. Since the cyst is associated with an impacted tooth, the common teeth involved are impacted mandibular third molars or maxillary canines. This paper isan overview of the impacted tooth, which can be a cause of odontogenic lesion in the jawbones

Keywords: *Impacted tooth, odontogenic cyst, supernumerary tooth, unilocular radiolucency.*

Introduction

The term 'Dentigerous cyst' was coined by Paget in 1853.[1] Dentigerous cysts (DC) are the second most common developmental odontogenic cysts after the radicular cyst. A dentigerous cyst is defined as an odontogenic cyst that envelopes the crown of an impacted tooth.[2] It is almost always associated with impacted, unerupted, or embedded tooth, and may also be involved with a supernumerary tooth. They're usually unicystic but bilateral and multiple dentigerous cysts may be found associated with several syndromes.[2] They're most commonly associated with the mandibular third molars and maxillary canines, followed by maxillary molars and Mandibular premolars.[3]

These cysts are asymptomatic in most cases unless they are secondarily infected. Dentigerous cysts are usually detected on routine radiographic check-up, and are purported when-

- "The pericoronal radiolucency measures around 2.5 mm or larger in any dimension.[4]
- "The follicular space is more than five millimeters."
- "There is any associated tooth displacement or alarming expansion of bone found."

Also, Browne had pointed out that the literal meaning of the word 'dentigerous' means 'tooth-bearing' which is justified by its radiographic appearance as a dentigerous cyst is seen as a well-circumscribed unilocular radiolucency symmetrically surrounding the tooth, often with a sclerotic outline.[5] Several lesions first appear to fulfill the criteria for the diagnosis of the dentigerous cyst but later demonstrate features of something else like unicystic ameloblastoma, thus making the diagnosis of the lesion an important aspect.

A cyst is described by Kramer as, 'a pathological cavity having fluid, semifluid or gaseous contents and which is not created by the accumulation of pus'[1]. These are more commonly found in the orofacial region, and the cysts of jaws that develop from the tissues involved in tooth development are called the Odontogenic cysts. These cysts arise from the cell rests of odontogenic epithelium. These can be inflammatory or developmental, as given by Pindborg and Kramer in 1971. A dentigerous cyst is the one in which a crown or more rarely a part of the crown, projects into the cystic cavity. Various theories have been put forward as regards the origin of a dentigerous cyst. The strongest assertion is that the cyst initiates from the reduced enamel epithelium(REE) since the epithelial lining of the cyst is seen to be adjoined to the neck of the tooth, by the agglomeration of fluid between the reduced enamel epithelium and the enamel surface.[1]

Clinical Features: Dentigerous cystsare almost always involved with a normal permanent tooth that is impacted or unerupted, and rarely a deciduous tooth. Dentigerous cysts may be found anywhere in the jaws but are more frequently found in the angle of the mandible, canine region of the maxilla, and molar region of the maxilla. Dentigerous cyst is usually seen to be clinically present as an enlargement of the buccal cortical plate of the maxilla or the mandible.[6] Most lesions are said to be found in the second and third decade with a predominance among males.[2] It is highly likely that dentigerous cyst can become an aggressive lesion and its continued enlargement results in the asymmetry of the face, expansion of the mandible or maxilla, teeth displaced from their positions, and resorbed roots of adjacent teeth[7]. In case it is associated with maxillary canines, it leads to an expansion in that area, resembling sinus and skin infections. Unless infected secondarily, dentigerous cyst patients do not experience any pain,and on aspiration, yellow-colored fluid is obtained.[7]

Radiographic Features: As seen on a radiograph, dentigerous cysts typically have a well-defined border which may be absent in the case of infections. The internal structure is completely radiolucent except the crown of the tooth. Radiologic examination of a dentigerous cyst is the most important aspect in the diagnosis of this type of cyst as they give us a proper idea of the dimension and extent of the pathology. It is also important to keep in mind that we have to be able to distinguish between a merely enlarged dental follicle -an ectomesenchymal tissue that surrounds the tooth germ- which can be quite arbitrary unlike the smooth, well-defined borders of a dentigerous cyst. Also, the normal follicular space is seen to be around three to four millimeters whereas a dentigerous cyst is suspected when the follicular space exceeds more than five millimeters.[2]

According to the situation and form in radiographs, three variations of dentigerous cysts are seen. First is the central type in which the cyst is seensymmetrically enveloping the tooth. Here the pressure is directly applied on the erupting tooth thus preventing its eruption. It is the most common variety and the tooth appears like a candle flame. Second is the lateral type in which the cyst envelopes on the side of the tooth and is seen in the mandibular third molar region. This occurs when the follicle is dilated on one side. The third is the circumferential type which is very rarely seen. In this the follicle expands in such a manner it appears to enclose the entire tooth giving it an appearance of a lantern in the radiograph. However, it is wise to do a histological examination of the tissue associated with the affected tooth as we cannot dismiss the absence of any pathology based on just the radiographic methods as the absence of radiographic pathology may not necessarily mean the absence of disease.[8]

Histological Features: Microscopically we see that the cyst is composed of a thin wall of connective tissue with a thin layer of the stratified squamous epithelium lining the lumen. The dentigerous cyst has no characteristic microscopic features that can help differentiate them from other types of odontogenic cysts. The connective tissue is sometimes thickened and composed of loose connective tissue leading to misdiagnosis as an odontogenic fibroma or an odontogenic myxoma.[2] The connective tissue wall of normal dental follicle and dentigerous cysts has islands of odontogenic epithelium which can be sparse, but when present in significant amounts it again leads to its misdiagnosis as ameloblastoma. In the inflamed cysts there is the presence of hyaline bodies called Rushton bodies present inside the lining epithelium. They are of unknown origin and significance.

Dentigerous cyst is a common cyst but it has a few differential diagnoses which need to be kept in mind while diagnosing. Some of these are- Hyperplastic dental follicle, Odontogenic keratocyst, Ameloblastoma (unicystic), Calcifying odontogenic cysts, and Adenomatoid odontogenic tumor.

Table 1. Differential diagnosis of dentigerous cyst based on radiologic features.[9]

Lesion	Location	Periphery	Internal Structure	Effect on Surrounding Structures
Dentigerous cyst	Mandibular and Maxillary molar region, Maxillary canine region. Epicenter just above the crown	Well defined cortex unless infected	Completely radiolucent with the crown of the involved tooth	Apically displaced teeth, resorption of roots of adjacent teeth, inferior displacement of the inferior alveolar canal

Lesion	Location	Periphery	Internal Structure	Effect on Surrounding Structures
Ameloblastoma	Molar-ramus region of the mandible	Well defined cortex similar to a dentigerous cyst	Unilocular radiolucency, soap bubble appearance.[10]	Apical displacement of involved teeth
Calcifying odontogenic cysts	Incisor and canine region of maxilla and mandible	Maybe well-circumscribed or ill-defined and irregular	Completely radiolucent	Resorption of roots
Odontogenic keratocyst	Ramus-third molar area, anterior mandible, maxillary molar, and cuspid area	Well-defined peripheral, scalloped border	Unilocular radiolucency may sometimes contain the crown of the tooth	Displacement of adjacent teeth is more common followed by resorption of roots
Calcifying epithelial odontogenic tumor	Prevalence in the mandibular molar region is more than the bicuspid region	Appears either as diffuse or well-circumscribed	Appears as a unilocular radiolucency, sometimes seen as a combined pattern or radiolucency and radiopacity	Cortical bony plates are extended and weakened; both buccally and lingually
Adenomatoid odontogenic tumor	Mostly associated with maxillary canines	Well-demarcated smooth corticated border	Juxtacoronal radiolucency that is almost always unilocular sometimes extends beyond the cemento-enamel junction	Divergence of roots and displacement of teeth, maxillary sinus, and orbital invasion

The diagnosis of dentigerous cyst includes x-ray imaging, both periapical and panoramic. Another efficient method is the MRI-Magnetic Resonance Imaging as it helps distinguish cysts and tumors, but is very expensive thus limiting its usage.[11] The latest diagnosing technique is the CBCT-Cone Beam Computed Tomography that provides three-dimensional images with minimal distortion and significantly lower doses of radiation thus ensuring an accurate diagnosis.[12]

The dentigerous cyst gives rise to several potential complications apart from the possibility of recurrence. These include ameloblastoma, epidermoid, and mucoepidermoid carcinoma. Ameloblastoma and epidermoid carcinoma may develop from the epithelial lining or the odontogenic epithelial cell rests. The disposition of dentigerous cyst in the form of ameloblastoma is more profound than other odontogenic cysts. Mucoepidermoid carcinoma is principally a salivary gland tumor that develops from the epithelium of dentigerous cyst containing mucus-secreting cells.

The management of dentigerous cyst includes marsupialization and enucleation. The classic approach involves the enucleation of the cyst along with the removal of affected teeth. As this approach is too aggressive, more conservative approaches need to be incorporated such as Marsupialization, etc.[13,14] Marsupialization is the treatment of choice as it allows the eruption of the impacted tooth by deroofing the cyst along with adjoining bone and mucoperiosteum.[15]

Conclusion

Impacted teeth, especially mandibular third molars and maxillary canines are associated with dentigerous cyst and their evaluation using radiographs is important to investigate the correct method of enucleation, though they are least likely to recur.

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