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ORIGINAL ARTICLE

FOLLICLE VS DENTIGEROUS CYST: DILEMMA REVISITED

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ABSTRACT:
The crowns of unerupted teeth are normally surrounded by a soft tissue remnant known as the dental follicle. Radiographically, dental follicle appears as a thin pericoronal radiolucency considered normal by some authors when it is less than 3mm thick and by others when it is no thicker than 2.5mm. Literature has revealed that the dental follicle can be the origin of several types of diseases during or after odontogenesis. Hamartomas, odontogenic tumors and odontogenic cysts like dentigerous cysts are common ones. Histomorphologically dentigerous cyst originating from the ectomesenchymal odontogenic tissue, is markedly similar to dental follicular and dental papillary tissue. Furthermore, it is assumed that a small pericoronal radiolucency associated with an impacted tooth; which is less than 2.5 mm may represent a normal or enlarged dental follicle. The objective of the present study was to carry out a comparative radiographic, histological and surgical analysis of follicular tissue, with the aim of detecting differentiating features in a dental follicle and a small dentigerous cyst.
Key words: Dental follicle, Dentigerous cyst, Reduced enamel epithelium

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INTRODUCTION

The crowns of unerupted teeth are normally surrounded by a soft tissue remnant known as the dental follicle.[1] Dental follicles and papillas are the immature tissues that compose the ectomesenchymal portion of tooth germs that is derived from the migration of neural crest cells.[2,3] It is composed of fibrous connective tissue and frequently contains epithelial residues of odontogenesis, which could be the starting point of pathology.[4,5]

Radiographically, dental follicle appears as a thin pericoronal radiolucency considered normal by some authors when it is less than 3mm thick[3,6] and by others when it is no thicker than 2.5mm.[7] Recent studies have reported pathological changes in dental follicle of up to 2.5mm[8,9,10] with frequency varying from 23% to 58.5%.[11] This data is limited since the follicular tissue is discarded following extraction and not surrendered for microscopic examination.

Literature has revealed that the dental follicle can be the origin of several types of diseases during or after odontogenesis. Hamartomas, odontogenic tumors and odontogenic cysts like dentigerous cysts are common amongst that reported.[12]

Dentigerous cyst is a lesion frequently associated with unerupted / impacted teeth. It is the second most common odontogenic cyst, and accounts for approximately 15 to 20 per cent of jaw cysts.[13] It develops by accumulation of fluid between the reduced enamel epithelium, which lines the inner surface of the fibrous dental follicle, and the crown. Dentigerous cysts may grow to a large size before they are identified. Most are diagnosed upon investigation of a tooth that has failed to erupt, or as an incidental radiographic finding, as they are usually not painful unless secondarily infected.[1,13] Radiographically, it typically appears as a well-circumscribed, unilocular, usually symmetric radiolucency around the crown of an impacted tooth. The size of the radiolucency must be larger than that of a normal dental follicle, estimates for which vary considerably.[14]

Histomorphologically dentigerous cyst originating from the ectomesenchymal odontogenic tissue, is markedly similar to dental follicular and dental papillary tissue.[3,15]

Furthermore, it is assumed that a small pericoronal radiolucency associated with an impacted tooth; which is less than 2.5 mm may represent a normal or enlarged dental follicle. However, scientific evidence supporting this assumption is limited and there is no internationally accepted consensus on the clinical

criteria to differentiate between normal and pathological conditions based on radiographic features.[16]

Alternatively small pericoronal radiolucency may represent a pathological entity such as a small dentigerous cyst, which because of the potential complications requires an appropriate interpretation and management.

The objective of the present study was to carry out a comparative radiographic, histological and surgical analysis of follicular tissue, with the aim of detecting differentiating features in a dental follicle and a small dentigerous cyst taking into consideration 20 such cases which posed a diagnostic dilemma.

MATERIALS & METHOD

The study sample comprised of 20 patients, all in the 2nd and 3rd decade of life, who presented with an asymptomatic impacted tooth with a pericoronal radiolucency of < 3mm. These teeth were indicated for extraction for orthodontic or preventive purposes and included 16 third molars and 4 canines. The study was approved by the ethical committee and an informed consent was obtained from all treated patients. The widest range of the pericoronal radiolucency was measured in periapical radiographs, which was determined from half of the mesial, distal, and occlusal surfaces; the widest region was selected[17], which in these 20 cases was < 3mm.

All the teeth were extracted by means of a routine technique and care was taken to preserve the follicle. The surgeon was advised to look for pericoronal bone cavitation, attachment of follicular tissue along cemento enamel (CE) junction and luminal cystic contents.

The follicular specimens were fixed in 10% neutral buffered formalin, dehydrated in alcohol, cleared in xylene and embedded in paraffin. Following these, 4 µm thick sections were obtained and stained with haematoxylin & eosin for histologic evaluation. Microscopic examination of the epithelial and mesenchymatic components of all the specimens was performed by two trained pathologists. The follicular tissue was evaluated for presence/absence of epithelium, it's type, thickness & continuity and metaplastic/hyperplastic changes. The mesenchyme was observed to determine its nature i.e dense/ loose and presence or absence of odontogenic islands.

RESULTS

The 40 follicular tissues corresponded to 40 patients, 26 males and 14 females. Mean age was 19.3 years with an age range from 15-26 years. According to localization, 18 cases (45%) were associated with lower third molars, 14 (35%) with upper third molars and 8 (20%) with canines (4 upper and 4 lower). Radiographically all 40 cases had a pericoronal radiolucency of < 3mm.

Histomorphologic evaluation revealed epithelial lining in 36 (90%) cases with reduced enamel epithelial lining being the majority i.e 26 (65%) cases. Squamous epithelium, hyperplastic squamous epithelium and mucous metaplasia were found in 15%, 5% and 5% cases respectively. Epithelial lining was thick & continuous in 8 (20%) cases and thin & fragmented in 28 (70%) cases. Mesenchymal component was dense in 32 (80%) cases. Odontogenic rests in the form of strands and nests were seen in 22 (55%) cases. Surgical findings showed 8 (20%) cases having a fluid filled cystic cavity with an attachment at CE junction, while the remaining 32 cases had the follicle closely opposed to the crown of the tooth. (Table 1)

Correlating with the histologic and surgical findings a definitive diagnosis of dentigerous cyst was made in 8 cases.

Table 1: Histological and surgical findings of 20 follicular tissues

Epithelium	n(%)	Mesenchyme	n(%)
Reduced enamel epithelium	26 (65)	Dense connective tissue	32 (80)
Squamous epithelium	6 (15)	Loose connective tissue	8 (20)
Hyperplastic squamous epithelium	2 (5)	Odontogenic rests	22 (55)
Metaplasia (mucous/squamous)	2 (5)		
Absent	4 (10)	Surgical findings	
Thick & continuous	8 (20)	Closely opposed	32 (80)
Thin & fragmented	28 (70)	Fluid filled cavity attached at CE junction	8 (20)

DISCUSSION

Dental follicle and dental papilla are normal developmental structures of odontogenesis and are most frequently misdiagnosed entities. Such odontogenic tissues surrounding impacted teeth have the potential to differentiate in a wide variety of tissue types, including cystic and neoplastic tissue. The dentigerous cyst is the most frequent odontogenic lesion associated with unerupted teeth, followed by keratocyst, odontomas and ameloblastoma.

A large pericoronal radilolucency can easily be diagnosed as a pathology, but a small pericoronal radiolucency masquerades itself from a normalcy to a pathology posing a dilemma. In 1965 Stanley et al.[18] demonstrated that in unerupted teeth the reduced enamel epithelium predominated in patients up to 22 years of age. The reduced enamel epithelium (REE) is then transformed into a stratified squamous epithelium (SSE) with the normal aging of the follicle. This information resulted in confusion and, sometimes, in the misdiagnosis of small dentigerous cysts.[3,12,19] However, in 1987, radiographic and microscopic criteria were excluded from the diagnosis of small dentigerous cysts.[20] It was stated that the diagnosis depended on clinical and/or surgical criteria such as the presence of bone cavitation and luminal cystic contents. Recent reports have supported this conclusion, emphasizing the fact that the microscopic features of pericoronal follicles and dentigerous cysts are identical, with no possibility of differentiation.[12]

In the present study, 8 cases showed a fluid filled cavity at the time of surgical exploration supporting its importance in predicting pathoses which is deemed cystic. Other findings seen histomorphologically in the epithelium such as the type of lining, continuity and its variation; and in the mesenchyme and odontogenic rests could be seen quite evenly in all tissue specimens and hence its reliability in reaching at a diagnosis is questionable.

Solely depending on pericoronal radiolucency to differentiate between normal and abnormal is inaccurate because similar enigmatic situations can arise in other conditions. Not uncommonly, dental follicles exhibit significant thickening of their walls that can create detectable pericoronal radiolucencies without cyst formation. On the other hand, significant pericoronal pathosis such as odontogenic keratocyst and calcifying odontogenic cyst has been discovered on histopathologic examination of follicular tissue that was not associated with detectable radiographic enlargement.

A true cyst is a sac like structure that is lined by epithelium and surrounds a pathologic cavity. Widely accepted criteria for separation between dental follicle and dentigerous cyst do not exist; this remains an area of controversy. The associated opinions are diverse.

It is important to know the actual incidence of dentigerous cysts to recommend a prudent management therapy for unerupted teeth. The lack of criteria for the diagnosis of small dentigerous cysts distorts the statistical values, increasing existing doubts. Mourshed[21] found a 1.44% incidence of dentigerous cysts in a radiographic examination of unerupted teeth. Knights et al.[22] in a microscopic study, found dentigerous cysts in 44.70% of unerupted teeth. On the other hand, Kim and Ellis[3] found that the most common histopathological mistake was to define pericoronal follicles as dentigerous cysts because of in adequate interpretation of the lining epithelium. Eisenberg[23] emphasized the importance of interpreting the radiographic and clinical data when dealing with osseous pathology. Likewise, Sciubba[19] criticized the results obtained by Knights et al.[22] because they were based only on microscopic studies. He pointed out the lack of criteria for decision when one depends on only one method of diagnosis. In a letter to the editor, Knights et al.[22] replied that they considered the transformation of the REE into SSE as pathological. That contradicts Stanley; Diehl[24] for whom the metaplasia of the REE occurs with the aging process, followed by a decreasing incidence of cysts and tumors. Inspite of these conclusions, the literature continues to report misdiagnoses of dentigerous cyst.[12]

In 1995, Daley; Wysocki[14] proposed that the surgical criteria of bone cavitation and luminal cystic contents were the only trust worthy criteria to distinguish between dentigerous cyst and follicles with radiolucent areas larger than 4 mm. This work reinforced the conclusions already mentioned in 1987.[12] According to Shear,[13] the definition of a cyst no longer includes the presence of a lining. Literature supports the belief that clinical and/or surgical criteria are necessary to confirm a diagnosis of cyst in small pericoronal space enlargements and our study was in accordance with this finding

According to Eisenberg[23], the subject is of interest only for academic discussion since the surgical treatment is the same for follicles and small dentigerous cysts, despite the fact that some insurance carriers favor the diagnosis of dentigerous cyst for an arbitrary reimbursement.

The clinician and/or surgeon should observe the presence or absence of bone cavitation and its luminal cystic contents which will differentiate the pericoronal follicle from the dentigerous cyst. The material must be thoroughly examined microscopically. The pathologist, when interpreting clinical, surgical and radiographic data, will confirm or refute the diagnosis.

The fact that in the present study, only 8 cases were diagnosed as dentigerous cysts is certainly worth considering. This fact alone provides sufficient evidence that regular radiographic follow up is necessary so as to be able to surgically intervene when pathology arises and the importance of a combined team effort of the radiologist, pathologist and the surgeon on arriving at a correct diagnosis.

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