Pericoronal Radiolucencies with Significant Pathology: Clinico-histopathologic Evaluation

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Background: The purpose of the study was to correlate the provisional diagnosis of pericoronal radiolucencies associated with impacted, embedded, or unerupted teeth with the histopathologic diagnosis, and also to emphasize the importance of early detection for better diagnosis and management.

Methods: This is a retrospective study involving 18 cases of pericoronal radiolucencies associated with unerupted, embedded, or impacted teeth whose data during 1-year period were retrieved, and were reviewed for clinical, radiological, and histopathologic data. Also, comparison and correlation of clinico-histopathologic diagnosis was made.

Results: Of the 18 cases, 11 were provisionally diagnosed as dentigerous cyst and the remaining were diagnosed as ameloblastoma, odontogenic keratocyst, adenomatoid odontogenic tumor, and calcifying epithelial odontogenic cyst. Histopathologic diagnosis of the 18 cases showed varied results, with only 10% correlating with the provisional diagnosis.

Conclusion: Although many pathological processes may present radiographically as pericoronal radiolucencies associated with unerupted teeth, the most common is the dentigerous cyst. Hence, it is crucial for the clinician to fully investigate all teeth that fail to erupt at the expected time, and promptly initiate appropriate assessment and management of suspected cystic lesions.
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Key words: embedded, erupted, impacted, pericoronal

At a Glance Commentary

Scientific background of the subject

The width of the pericoronal radiolucencies with associated tooth is of utmost important in identifying dental follicle pathologies. This article focuses on those teeth which fail to erupt, get embedded or impacted into the oral cavity, and present a challenge to the clinicians. Asymptomatic presentation and accidental finding of these lesions present diagnostic dilemmas between a physiologic and the pathologic process.

What this study adds to the field

Head and neck pathologies present a diagnostic dilemma among the clinicians, pathologists, and surgeons. The study highlights the importance of early detection of the pericoronal pathosis and the mutual work of the oral radiologists, surgeons, and the pathologists.

The crowns of unerupted teeth are normally surrounded by a soft tissue remnant known as the dental follicle. Radiographically, the follicle appears as a homogeneous radiolucent space around the tooth with a thin outer radiopaque border.[1] Since cystic change can occur in these follicles, it is important to identify any developing pathology at an early stage. Pericoronal radiolucency is the most common finding during routine radiographic examination associated with impacted, embedded, and unerupted tooth.

The pathologic processes associated with the pericoronal follicle can be identified early by radiographs that show an enlargement of the pericoronal space. Although

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other forms of pathology may present radiographically as pericoronal radiolucencies associated with unerupted teeth, the most common is the dentigerous cyst (DC).[2] Exact measurements such as 2.0 mm, 2.5 mm, and 5.0 mm in width have been used as radiographic parameters for the diagnosis of DCs since 1961.[3-6]

Impacted teeth are a common finding seen in dental practice among patients. Approximately one in every five mandibular and maxillary third molars is impacted. Also, 37% of mandibular and 15% of maxillary impacted third molars have some type of radiolucency around their crowns.[3,7] The decision to remove an impacted tooth is less challenging when signs and symptoms of pathosis are present, but it is made more demanding when the patient is asymptomatic.

The purpose of this study was to conduct a retrospective survey of histopathologic diagnoses of all pericoronal tissues with pericoronal radiolucency during a year, which would thereby provide an overview on the clinicopathological significance of pericoronal lesions.

METHODS

The retrospective study was carried out on the archives from the Department of Oral Pathology at Vishnu Dental College, Bhimavaram, West Godavari, Andhra Pradesh, during a 1-year period. The data were retrieved considering the pericoronal radiolucencies associated with unerupted, embedded, or impacted tooth. The clinical data including demographics, signs and symptoms, and radiographic data based on intraoral periapical radiographs, occlusal radiographs, and orthopantomograph were analyzed. The histopathologic diagnosis under hemotoxylin and eosin staining was also confirmed.

A total of 18 cases who fulfilled the criteria of pericoronal radiolucency were included in the study. The data of 18 cases involved symptomatic and asymptomatic cases diagnosed both clinically and radiographically. Symptomatic cases presented with missing tooth clinically and impacted radiographically with swelling, pain, discomfort, and displacement of involved tooth and roots of the adjacent teeth. Asymptomatic cases were accidental findings during routine radiographs, but some of the cases were associated with displacement of the involved tooth and the roots of adjacent teeth radiographically without any clinical symptoms.

RESULTS

Of the 18 cases, 12 were males and 6 were females, with the age ranging from 14 to 72 years, and the mean age was 43 years. The lesion was more prevalent in the mandible (10 cases) than in the maxilla (8 cases), and was present in a ratio of 5:4. Clinical symptoms were associated with 16 cases, whereas 2 cases were asymptomatic. Radiographically, small to large radiolucency was seen in all the cases with the exception of a few cases where the occlusal radiograph showed cortical expansion of the buccal and lingual bones [Figures 1 and 2]. All the cases were tabulated based on their clinical or provisional diagnosis and histopathologic diagnosis, and the overall data were analyzed statistically.

The 18 cases that showed pericoronal radiolucency were provisionally diagnosed by the clinicians as DC (11 cases), ameloblastoma (AME; 5 cases), calcifying epithelial odontogenic cyst (CEOC; 1 case), and odontogenic keratocyst (OKC; 1 case).

Of the 11 cases of provisionally diagnosed DC, only 1 was confirmed histopathologically whereas the remaining 10 showed, (7) OKCs [Figure 3] and (3) adenomatoid odontogenic tumor [Figure 4]) histopathologically. Of the five cases of provisionally diagnosed AME, three were found to be DC [Figure 5] and two were adenomatoid odontogenic tumors on histopathology. None of the cases showed AME on histopathology.

One case of CEOC and OKC each was histopathologically confirmed as adenomatoid odontogenic tumor (AOT) [Figure 6].

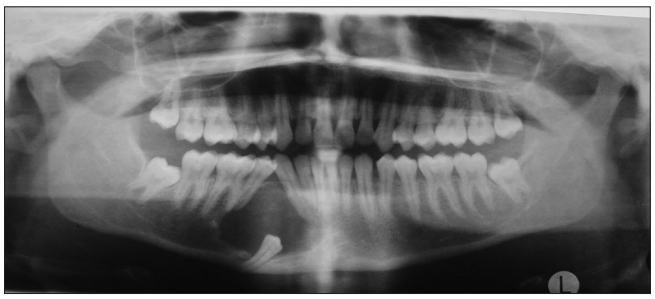

Figure 1: Orthopantomogram showing impacted tooth with pericoronal radiolucency.

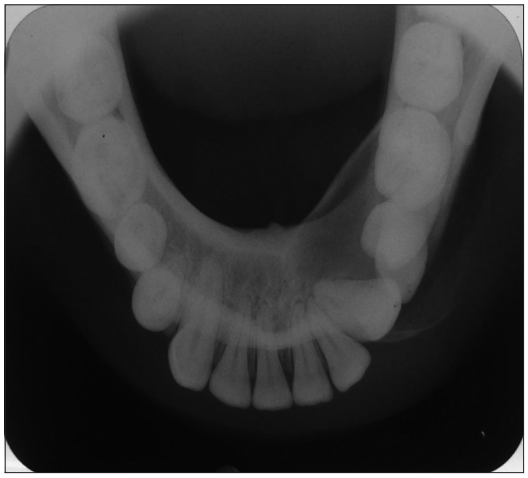

Figure 2: Occlusal radiograph showing bicortical expansion.

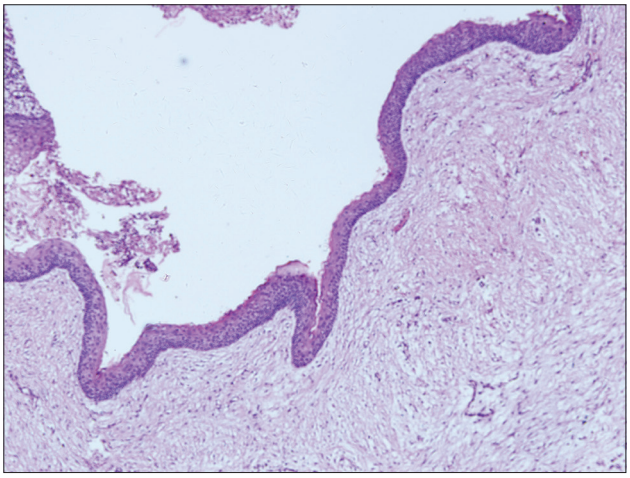

Figure 3: Odontogenic Keratocyst showing parakeratinized epithelium with palisaded appearance of the basal layer.

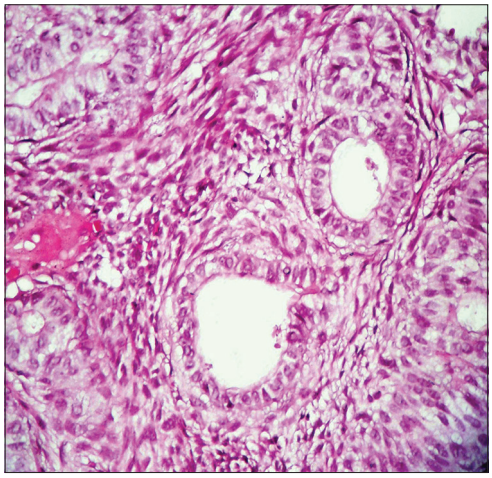

Figure 4: Adenomatoid odontogenic tumor showing pseudoduct-like structure and tumor droplets.

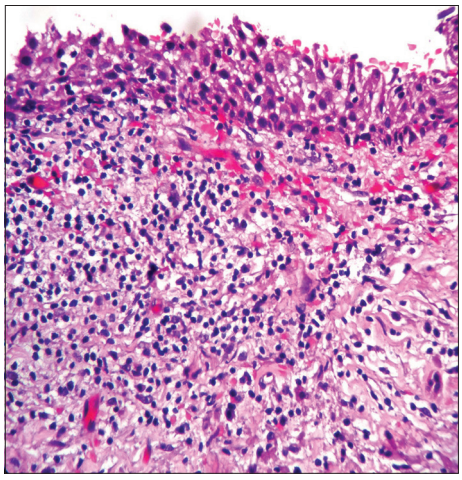

Figure 5: Dentigerous cyst with non-keratinized reduced enamel epithelium with chronic inflammatory cells in the connective tissue.

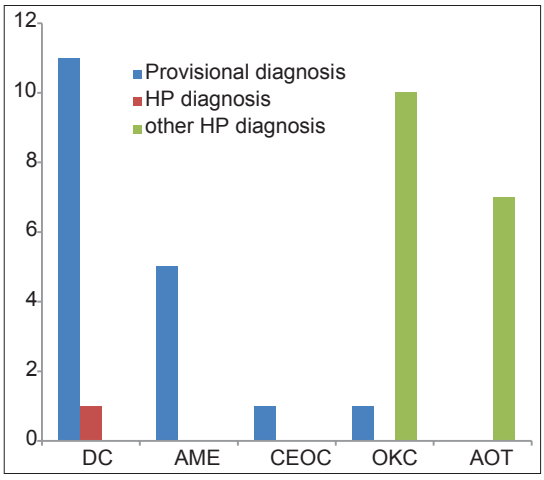

Figure 6: Graphical presentation of provisional and histopathologic diagnosis. Abbreviations: DC: dentigerous cyst; AME: ameloblastoma; CEOC: calcifying epithelial odontogenic cyst; OKC: odontogenic keratocyst; AOT: adenomatoid odontogenic tumor.

DISCUSSION

Most previous studies relied on radiographic analysis of the dental follicle to identify the presence of pathology.[8-10] Radiographic studies have reported cyst development in impacted third molars to occur at rates between 1% and 1.6% and epidemiological studies have reported the rates as between 0.0002% and 2.31%.[10-13] However, radiographic and clinical analysis of dental follicles may not always agree with histopathologic findings,[14-18] and the absence of symptoms does not necessarily imply the absence of pathology.[18] Miller and Bean suggested that disease may be present in minute follicular spaces, whereas areas of enlarged radiolucency may be histologically normal, making biopsy imperative.[19]

It is not possible to determine which radiographically normal dental follicle will progress into clinically detectable lesions. During the histologic examination, there can be high incidence of microscopic disease. Hence, an attempt was made to study pericoronal radiolucency associated lesions that were treated surgically and submitted for histopathologic examination.

A true cyst is a sac-like structure that is lined by epithelium and surrounds a pathologic cavity. Widely accepted criteria for distinguishing between dental follicle and DC do not exist; this remains an area of controversy. The associated opinions are diverse.[20] In the present study, 11 of the cases were diagnosed as DC both clinically and radiographically; but when observed under the microscope, only one case matched with the diagnosis of DC histopathologically whereas the other cases turned out to be OKC and adenomatoid odontogenic tumors.

In line with the studies suggesting that pathological change occurs more frequently after age 20 and is par-

ticularly high among individuals aged 20-30,[21-23] our study does not correlate with the previous study, as the youngest patient recorded in our study is of 14 years and the oldest patient is of 72 years. Previous reports by various authors recommended age as an indication for surgical removal of impacted, unerupted, and embedded tooth, as the risk of surgical morbidity increases with age.[24] On the other hand, the incidence of pathological changes was observed among patients of all age groups in this study, conflicting that the likelihood of cystic change is independent of tooth development.

De Paula *et al.* suggested that chronic inflammation may cause chronic irritation and stimulates the proliferation of epithelial cells.[25] Edamatsu *et al*. suggested a possible direct correlation between severity of inflammation and proliferation, and they theorized that inflammatory changes could reorder the cell turnover of dental follicle epithelial components.[26] The inflammatory component observed histologically in our study was correlated with the clinical and radiological features where most of our cases presented with symptoms like swelling, pain, discomfort, and displacement of involved tooth and roots of the adjacent teeth, thereby suggesting secondary infection. Accidentally observed asymptomatic cases showed no inflammatory component on histopathology.

The differential diagnosis of pericoronal radiolucencies should include AME, OKC, and other odontogenic tumors such as adenomatoid odontogenic tumor and ameloblastic fibroma. Distinction should be made between the widening of the follicular space that normally accompanies eruption and the early stages of cyst formation. This can undoubtedly present a diagnostic dilemma when relying solely on radiographic features. Farah and Savage listed some of the radiographic features for the early detection of the pericoronal radiolucencies, which include:[18]

- Follicular radiolucency greater than 2.5 cm in diameter
- Unerupted tooth with an enlarged follicular space which is not in its normal eruption position
- Unerupted tooth with an enlarged follicular space and complete root formation
- Inferior border of the follicular space is visible across the neck of the tooth.

As it is common to find an unerupted tooth as the only initial presenting symptom of a cyst, it is important to undertake radiographic examinations of all such teeth that are well past their expected eruption date. The nature of the causative tooth influences the type of surgical treatment required for the developing cyst pericoronally. If the cyst is associated with supernumerary or wisdom tooth, complete enucleation of the cyst along with extraction of tooth may be the first treatment choice. However, when preservation of the teeth is desirable and in a young patient where the lesion is isolated, marsupialization is the treatment of choice.[27]

Conclusion

However, the present study shows a wide variety of pathologically significant pericoronal lesions with varied provisional and histopathologic diagnosis. Data from this study serve to increase the index of suspicion of oral radiologists and surgeons when diagnosing and treating patients with impacted teeth. We also highlight that the collective effect of oral radiologists, oral surgeons, and oral pathologists will favor the early detection and management of such lesions.

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