

PARADENTAL CYST : A CLINICOPATHOLOGICAL REAPPRAISAL

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ABSTRACT

The paradental cyst is an odontogenic cyst occurring near the cervical margin of the lateral aspect of a root as a consequence of an inflammatory process in a periodontal pocket. A distinctive form of the paradental cyst occurs on the buccal and distal aspects of erupted mandibular molars, most commonly the third molars, where there is an associated history of pericoronitis. Similar cysts, almost all of which occur on the buccal surfaces of the mandibular first molars in children around 6-8 years of age, have been described as the mandibular infected buccal cyst. Radiographically, they presented as well-defined radiolucencies superimposed over the roots of the affected teeth. The histological

features of the inflammatory paradental cyst are the same as those of the radicular cyst. A proper diagnosis of the paradental cyst requires complete clinical, radiographic and histological data. In earlier reports by the World Health Organisation on the Histological Typing of Odontogenic Tumours (1971) radicular cyst was the only inflammatory cyst classified. Reports on paradental cysts and lesion of similar occurrence over the past twenty years eventually led to the recognition of this cyst as a separate entity and it has now been included in the recent report by the World Health Organisation on Histological Typing of Odontogenic Tumours (1992). In the latter, this cyst was referred to as paradental (inflammatory collateral, mandibular infected buccal)cyst. This article reviews the recent literature and nomenclatures of the paradental cyst.

INTRODUCTION

Odontogenic cysts are pathologic entities with well-described clinical, radiographic and histologic characteristics. The diagnosis of these lesions is therefore, usually not considered to cause any difficulties. However, in the last twenty-five years, several odontogenic cysts of presumable inflammatory origin have been described that seem to have been overlooked previously. These cysts do not fall into any of the specific entities described in the 1971 WHO classification of odontogenic cysts¹. Such lesions have been described previously under various terms namely inflammatory collateral cyst^{2,3}, inflammatory lateral periodontal cyst⁴, paradental cyst⁵ and mandibular infected buccal cyst⁶.

These cysts were first described by Main under the term "inflammatory collateral cyst"^{2,3}. They occurred in seven of eight cases in association with partly erupted lower third molars affected by

pericoronitis. Microscopically, the cysts had features similar to those of the radicular cyst.

The clinicopathologic features were described in detail by Craig⁵ when he reported the first significant series consisting of 49 cases. He coined the term "paradental cyst" to explain these lesions. All the lesions were found on the buccal and distal aspects of partly erupted mandibular third molars with a history of pericoronitis. Microscopically, the cystic cavity was lined with non-keratinised stratified squamous epithelium and the fibrous wall of the cyst was almost heavily infiltrated by inflammatory cells.

Main⁴ in 1985 suggested the term "inflammatory lateral periodontal cyst" for this group of cyst. However, it was argued that the use of this term should be discouraged because it did not refer to any specific entity and might be confused with the developmental lateral periodontal cyst^{7,8}.

In 1983, Stoneman and Worth⁶ described a new radiographic entity of inflammatory jaw cysts referred to as "mandibular infected buccal cyst" or "buccal bifurcation cyst". These lesions occurred in most cases on the buccal surfaces of the mandibular molars, usually the first molars, in children aged between 4 and 8 years. The cysts were usually clinically infected though the involved teeth were vital⁶. The radiographic appearance was identical to the paradental cyst with the exception that buccal periostitis was usually seen on an occlusal radiograph⁶.

The existence of the mandibular infected buccal cyst as a distinct clinical and histological entity was not universally accepted until 1992. However, prior to this, some authors have already considered paradental cyst and mandibular infected buccal cysts to be the same entity^{7,9,10,11} as both of them have been reported to appear shortly after the affected tooth has appeared in the mouth and have similar radiographic and histologic appearance. El-Magboul, Duggal and Pedlar¹² believed the term "mandibular infected buccal cyst" provides a clinical description and not a diagnosis of the condition. They suggested that it should be classified as a subtype of the paradental cyst affecting young children.

Until the publication of the second edition of the WHO'S Classification of Odontogenic Tumours, there were ongoing controversies in the literature as to whether the mandibular infected buccal cyst

was a type of paradental cyst¹². The WHO publication in 1992 recognised both nomenclatures, but stressed that the term mandibular infected buccal cyst should apply to paradental cysts associated with the first and second permanent molars¹³.

In view of these events, in the second edition of the World Health Organisation's (WHO) classification of odontogenic cysts (1992), such cysts were eventually recognised as a separate entity. This new entity was termed "Paradental cyst (Inflammatory Collateral, Mandibular Infected Buccal cyst).

The WHO's (1992) definition for paradental cyst was a cyst occurring near to the cervical margin of the lateral aspect of a root as a consequence of an inflammatory process in a periodontal pocket¹³. The size of the cyst varies from 1 to 2 cm. It arises from odontogenic epithelium in the superficial part of the periodontal ligament in relation to partly, newly or fully erupted molar with a vital pulp.

A distinctive form of the paradental cyst occurs on the buccal and distal aspects of erupted mandibular molars, most commonly the third molars, where there is also an associated history of pericoronitis¹³. Occasionally it occurred at the mesial aspect of the tooth¹⁴.

Similar cysts have been described where almost all of which occurred on the buccal¹³ and distal¹² surface of the partially or newly erupted mandibular first molars in children aged 6 to 8 years. These cysts have been termed as the "mandibular infected buccal cyst".

Most paradental or mandibular infected buccal cysts were unilateral. However, bilateral paradental cysts had also been observed. Bilateral paradental cysts in relation to the mandibular first, second and third molars have been reported^{9,15}.

AETIOLOGY

While there is little doubt that the paradental cyst arises as a result of a chronic inflammatory stimulus causing proliferation of crevicular and/or odontogenic epithelium, the exact histogenesis remains obscure. There appears to be at least three possible explanations for the cystic formation.

Craig⁵ believed that the development of these cysts was initiated by a pericoronitis at the time of tooth eruption. The epithelial cells rests of Malassez and the reduced enamel epithelium are considered the most probable origins of cyst epithelium. Cyst development may follow hyperplasia and cystic degeneration of the reduced enamel epithelium of the root in response to a chronic and intermittent inflammatory stimuli⁵. Craig⁵ suggested that an extension of the reduced enamel epithelium over a buccal enamel projection may predispose a patient to the development of a cyst; this could explain the frequent buccal location of the cyst. Several investigators have shown that a buccally situated developmental enamel projection may predispose to pocketing involving the bifurcation¹³. It must be borne in mind, though, that this relationship is not shown for the mandibular infected buccal cyst¹². It has been proposed that the fact that the buccal aspect of the mandibular molar is first to perforate the oral epithelium might explain why the lesion develops in that area and continues to grow thereafter⁶.

Ackermann et al¹⁵ also favoured Craig's view. In addition, they suggested that cyst formation occurs as a result of unilateral expansion of the dental follicle secondary to inflammatory destruction of periodontium and alveolar bone¹⁵. This was supported by the frequent radiographic observation of a ciliated follicular space distal to the crowns of partially erupted mandibular third molars, the location of the cyst, the attachment of the cysts to the teeth at the cemento-enamel junction and the continuity between cyst lining and reduced enamel epithelium.

A second possible histogenesis of the paradental cyst is proliferation of the cell rests of Malassez following gingival extension of inflammation as a result of the pericoronitis or infection³. This theory, does not entirely explain the predilection for these cysts arising on the buccal root surface. Moreover, microscopic examination showed the epithelial rests on the wall of each cyst to be small, uniform and apparently inactive^{5, 14}. Thus, this mechanism is unlikely, even though cannot be entirely excluded.

A third possibility is that the cyst originates from crevicular epithelium. It has been observed that there is a continuity between the cyst lining and crevicular epithelium. This occur following

localised destruction of the periodontium¹⁵. The localised destruction causes formation of a deep pocket, which then dilates and becomes cystic as a result of loose nature of the tissues in the third molar area and obstruction to the opening of the pocket. Proliferation of the crevicular epithelium then occurs as a secondary event¹⁵.

PREVALENCE

Vedtofte and Praetorius⁹ in 1989 examine the clinical, radiographic and histologic features of inflammatory paradental cyst of all the first, second and third molars. Their study showed that the cysts have almost equal sex distribution (female : male =14:13). The age of occurrence ranged from 6 to 34 years; with an average age of 18.7 years. 27 cysts were located in the mandibular molar region and two cases were in the maxilla. The most frequent location of the cyst was the mandibular third molar (52%). The cysts associated with these teeth were found in patients with an average age of 24.4 years; a finding that is similar to those of Craig's⁵ and Ackermann et al's¹⁵ studies. The cysts that were located next to the mandibular first or second molars were found in patients with an average age of 8 years and 13.3 years respectively.

CLINICAL FEATURES

The patients often had symptoms of infection. In patients with cyst associated with the mandibular third molar, there was a history of pericoronitis^{9, 13}. The most common symptoms among patients with a first or second molar involved were pain, swelling and discharge from the periodontal pocket^{11, 12}. Enlarged lymph nodes could also be palpated¹¹. In most cases, mandibular infected buccal cyst is diagnosed at the time of the eruption of the tooth or soon after, because the cyst is often accompanied by symptoms of inflammation¹¹. This explains the slightly older age of those patients with cyst adjacent to the second mandibular molar (13.3 years)⁹ compared with patients whose cyst was associated with the first mandibular molar (8 years)⁹. Moreover, it also explains the older age of those patients with cysts adjacent to the third molar, most of whom are in their third decades of life^{9, 14, 15}.

HISTOLOGICAL FEATURES

The histological features of the inflammatory paradental cysts are the same as those of the radicular cyst¹³. All cysts were lined by a non-keratinized hyperplastic stratified squamous epithelium⁹ (Figure 1). The hyperplastic stratified squamous epithelium may also present as arcades¹¹.



Fig. 1. A photomicrographic appearance of a paradental cyst exhibiting a non-keratinized stratified squamous epithelium and underlying granulation tissue with an abundance of chronic inflammatory cells. (Haematoxylin & eosin stain. Original magnification : 50x).

The wall of each cyst was composed of fibrous connective tissue containing an extensive acute and chronic inflammatory cell infiltrate¹⁴. Foci of haemosiderin pigment⁹, cholesterol clefts⁹, dystrophic calcification¹⁴ and giant cell hyaline angiopathy¹⁴ have been described. This hyaline change involving blood vessel walls is indicative of a long standing inflammatory process such as recurrent pericoronitis¹⁴. In addition, inactive, small and uniform rests of odontogenic epithelium could also be seen. The inflammatory cells consisted of neutrophilic leukocytes, eosinophilic leukocytes, plasma cells and lymphocytes¹¹. Sometimes, multinucleated giant cells are present. The presence of Actinomyces colonies as a separate island of material in the cyst biopsy specimen had been reported¹¹.

RADIOLOGICAL FEATURES

Radiographically, they presented as well defined radiolucencies superimposed over the roots of the affected teeth¹³. These radiolucencies could be found predominantly distal to the involved teeth but with variable buccal extension⁹. The radiolucencies may mimic periapical pathology; however, under close inspection, the periodontal ligament space is intact¹⁴. There is no relationship to the crown¹⁴. Cysts involving the first or second molars can cause displacement of the tooth distal to the cysts⁹.

OTHER DIAGNOSES

The paradental cyst was not properly diagnosed in the past. Clinically, it has been considered as occluded periodontal pocket¹⁴, pericoronitis⁹, marginal periodontitis⁹, primordial cyst⁹, traumatic cyst⁹, lateral periodontal cyst⁹, Craig's cyst⁹, mandibular buccal cyst⁹, and follicular cyst⁹.

The histologic features, on the other hand, cannot be distinguished from other inflammatory odontogenic cyst¹³. Therefore, it can even be diagnosed histologically as radicular cyst¹¹. Other common histologic differential diagnosis include odontogenic cyst⁹, dentigerous cyst¹⁵, inflammatory lateral periodontal cyst⁹, eosinophilic granuloma, traumatic bone cyst and periostitis ossificans⁷.

Radiographically, the paradental cyst presents as a well delineated radiolucency associated with the roots of the affected tooth. Fowler and Brannon¹⁴ considered that this radiographic presentation as a radicular rather than a coronal radiolucency as the most characteristic features of the paradental cyst. Even so, several radiographic differential diagnosis had been suggested; this includes the lateral periodontal cyst⁷, lateral radicular cyst, severe localised periostitis, odontogenic keratocyst, squamous odontogenic tumour and histiocytosis X¹³.

In conclusion, the diagnosis of the paradental cyst requires correlation of the clinical and histologic features with the unique radiographic feature of the cyst; and not to be diagnosed solely on any of those features alone.

TREATMENT

The lesion is treated by enucleation. Removal of the third molar with cyst is usually done⁹ (Figure 2). The first and second molars involved were shown to be able to be retained without recurrences^{9, 11} even though previous advocated treatment was removal of these teeth as well⁶. A common observation during surgery is that the apices of the teeth were not in continuity with the cyst cavity⁹. The cyst are attached to the cemento-enamel junction and the coronal third of the tooth¹⁵. Where extracted teeth were available for examination, these cysts were usually associated with a developmental enamel projection or ridge extending into the buccal bifurcation¹⁴. Recurrence is not common. Vedtofte⁹ reported an occurrence in which the incomplete removal at the initial operation was thought to be the cause.

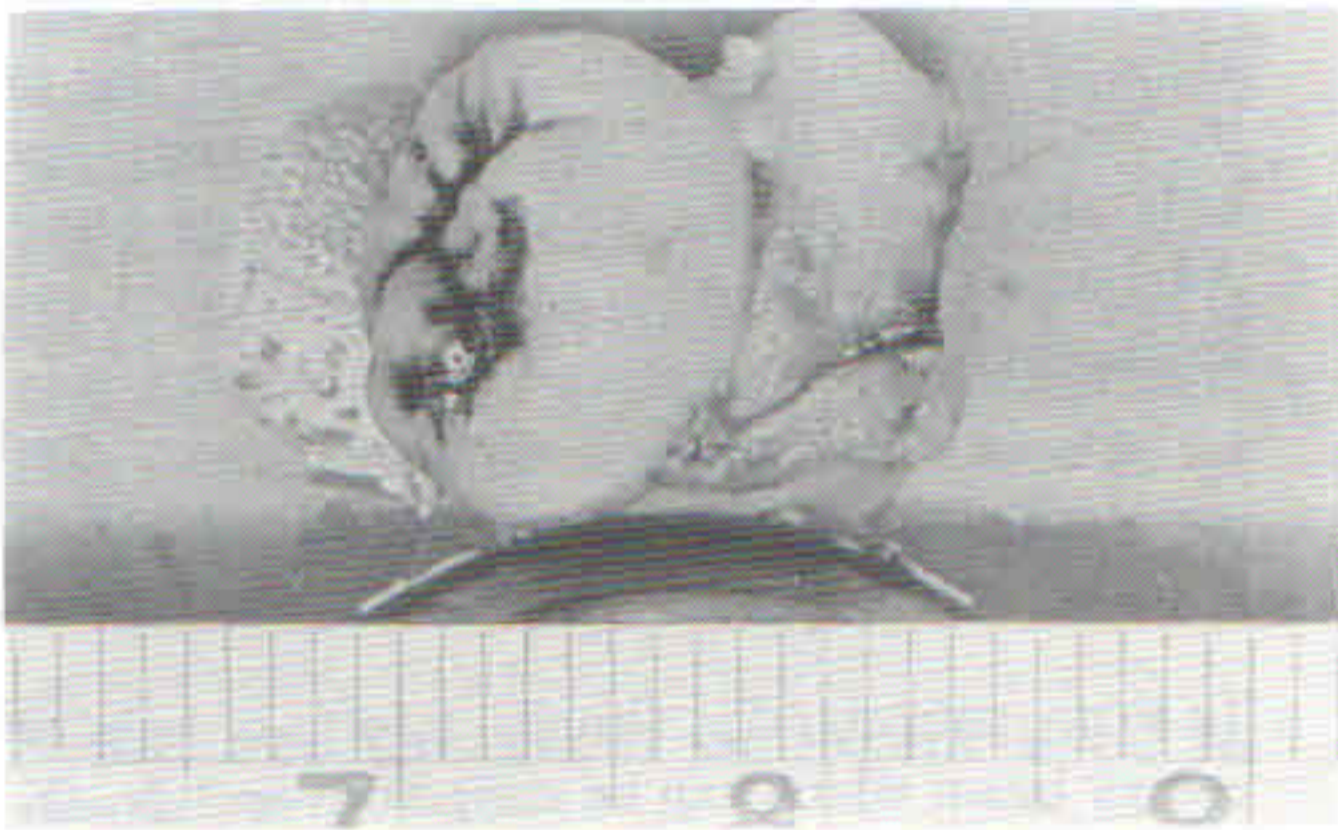


Fig. 2. The gross appearance of a paradental cyst which appeared as a soft tissue sac attached to the cemento-enamel junction of a third molar.

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