

A CLINICOPATHOLOGIC STUDY OF 184 DENTIGEROUS CYSTS

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Abstract : The dentigerous cyst has been recognized as having its developmental origin in the tooth follicle. The aim of this article is to report clinicopathologic features of 184 dentigerous cysts and study the influence of inflammatory for cyst formation. The dentigerous cysts occurred mostly in males under 20 years old in the mandibular premolar region where all of them were intensely inflamed from deciduous molars. In the mandibular third molar region the cysts were often found in young and adult subjects but were significantly less infected than those in the mandibular premolar region. These results suggested that periapical inflammation from preceded teeth had a role in dentigerous cyst formation in the mandibular premolar region, implying different mechanisms of dentigerous cyst formation in respective regions of the jaw.

Key words: dentigerous cyst, follicular cyst, mandibular premolar, mandibular third molar, inflammation

INTRODUCTION

The dentigerous cyst is developed around the crown of an unerupted tooth of either the regular or the supernumerary dentition. The cyst is expanded by accumulation of fluid between the reduced enamel epithelium and the crown, or between the layers of the reduced enamel epithelium¹⁾. The frequency of dentigerous cyst formation has been reported as 1.44 per 100 erupted teeth²⁾. Most authors favor a developmental origin from the dental follicle but there is one report that these cysts arise as a result of periapical inflammation from any source³⁾. However, little is known about the precise mechanisms of dentigerous cyst formation.

The aim of this study was to investigate the clinicopathologic features of 184 dentigerous cysts, especially referring to the relation between the cyst-associated tooth and the degree of inflammatory infiltration into the surrounding dental follicle epithelium.

MATERIALS AND METHODS

The sample for this study consisted of 184 dentigerous cysts, which included two cases of bilateral cysts at the maxillary canine region, were collected from patients treated in the Department of Oral and Maxillofacial Surgery, Nara Medical University, between 1981 and 1999. The records were evaluated for the following data : age, sex, site and these were summarized as the number and percentage of dentigerous cyst formation with adjacent permanent teeth, and age-incidence distribution of the patients. Histologically, the degree of

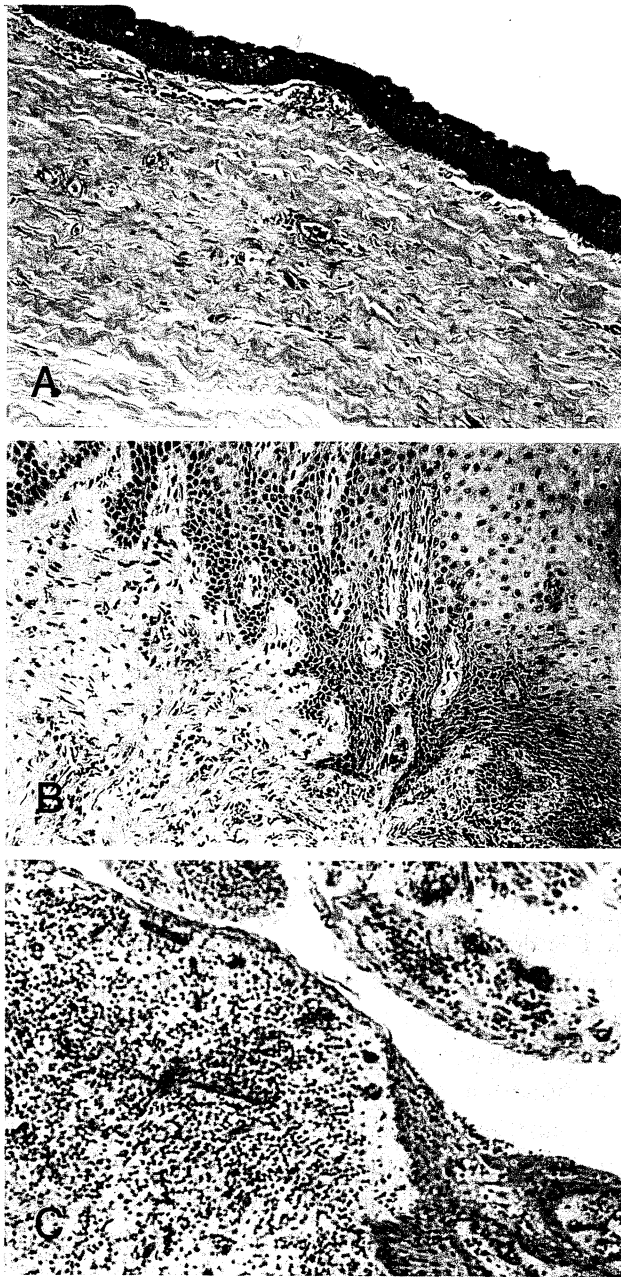


Fig. 1. Photomicrographs illustrate the inflammatory cellular infiltration into the epithelium of a dentigerous cyst.

A : slight (grade 1)

B : moderate (grade 2)

C : severe (grade 3)

(Hematoxiline and eosine stain, Magnifiacation, x200)

infiltration of inflammatory cells (polymorphonuclear leukocytes, lymphocytes and plasma cells) into the surrounding dental follicle was examined using sections of 136 dentigerous cysts stained with hematoxyline and eosin (Fig. 1). Three oral pathologists judged the degree of cellular infiltration with a light microscope in a single area of subepithelium of dentigerous cyst ($200 \times$ field) representative of the highest inflammatory cell infiltration as follows : Grade 1 (slight) : Inflammatory cells were scattered in single field; Grade 2 (moderate) : between Grade 1 and Grade 3; Grade 3 (severe) : Inflammatory cells were identified densely in single field⁴). Some of the data were statistically examined with chi-square test plus Bonferroni correction ($p < 0.05$).

RESULTS

Of 184 dentigerous cysts, 118 occurred in males (64.1%) and 66 in females (35.9%). The highest frequency among the patients showed in the second decade (10-19 years old) and the further frequencies decreased progressively (Fig. 2). One hundred twenty-nine cysts (70.1%) were in the mandible and 55 (29.9%) in the maxilla. The cysts were identified as well-circumscribed and unilocular radiolucency (Fig. 3, 4). Age distribution of the patients showed that most of the cysts occurred in the age groups of 0-9 and 9-19 years old significantly rather than in other age groups ($p < 0.05$). The case numbers and associated teeth with dentigerous cysts were shown in Table 1. Most of the cysts were seen in the mandibular region, particularly the mandibular premolar (55/129) and third molar (48/129) with significant difference between those and the maxillary regions ($p < 0.05$). All cysts in the mandibular premolar were seen below a preceded deciduous tooth which received dental treatment due to pulp or periapical inflammation. In the groups of young and young adult subjects (0-9 and 10-19 years old), the cysts were found mainly in the mandibular premolar, while in other age groups except for the children's group (0-9 years old), the were in the mandibular third molar (Fig. 5). Histological findings reveal they were lined entirely by

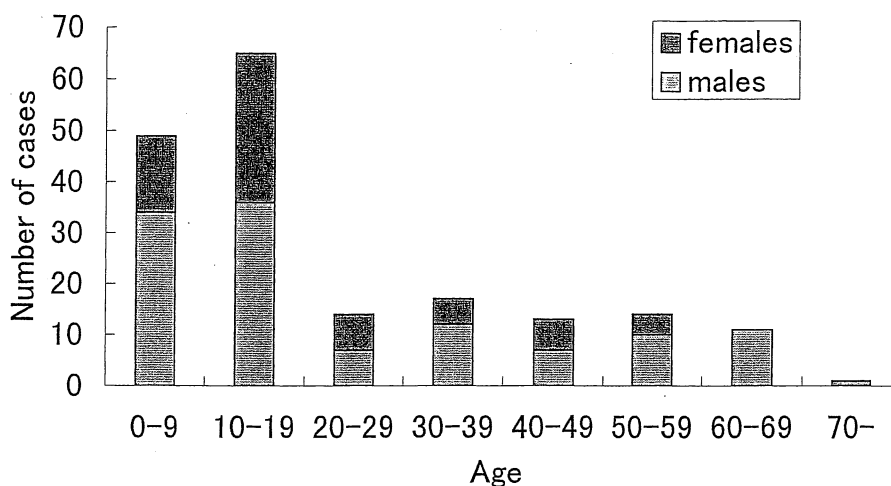


Fig. 2. Histogram of the frequency of dentigerous cyst in age



Fig. 3. Orthopantomography of a dentigerous cyst associated with the mandibular third molar



Fig. 4. Orthopantomography of a dentigerous cyst associated with the mandibular premolar

Table 1. Number of dentigerous cyst associated with teeth

		No. of subjects	%
Maxillary	canine	10	5.4
	premolar	9	4.9
	3rd molar	9	4.9
	supernumer	16	8.7
	others	11	6.1
Mandibular	premolar	55	29.8
	3rd molar	48	26.1
	others	26	14.1
Total		184	100

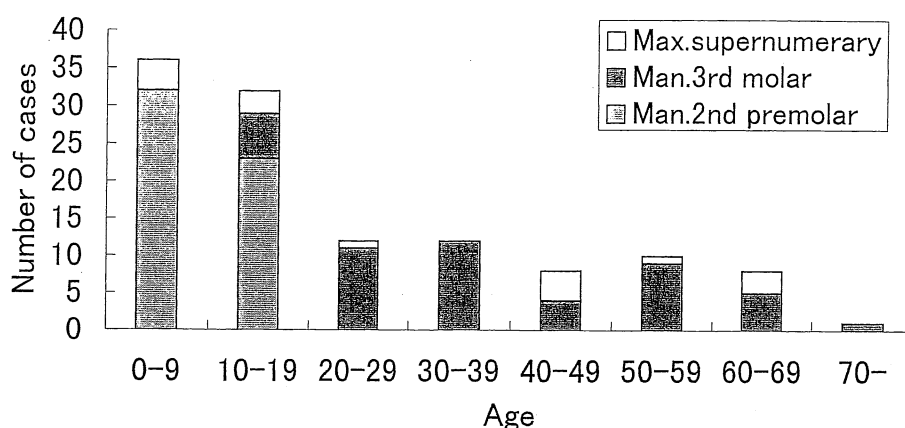


Fig. 5. Age distribution and associated tooth with dentigerous cyst

Table 2. Inflammation grade in dentigerous cysts

		Inflammation grade			Total
		1	2	3	
Maxillary	premolar ^a	8	2	3	13
	3rd molar	1	5	1	7
	supernumer	4	7	1	12
	others	5	2	1	8
Mandibular	premolar ^{a,b}	7	19	21	47
	3rd molar ^b	12	23	7	43
	others	4	1	2	7
Total		41	59	36	136

a, b : Similar symbols indicate statistical significance between each groups ($p < 0.05$)

hyperplastic nonkeratinizing stratified squamous epithelium of varying thickness that frequently shows anastomosing rete ridge (Fig. 1). The degree of inflammatory cells associated with the teeth is shown in Table 2. The degree of infiltration of inflammatory cells demonstrated a tendency that severe inflammation was found in the mandibular regions rather than the maxillary regions. Moreover, the cysts in the mandibular premolar showed a significant higher degree than those in the maxillary premolar as well as the mandibular third molar ($p < 0.05$).

DISCUSSION

Dentigerous cyst is developed from intra or extra follicle surrounding as a direct enlargement of the follicle surrounding the crown of an impacted, embedded, unerupted tooth. One explanation of dentigerous cystogenesis has been that it may originate initially by proliferation and cystic transformation of islands of epithelium in the connective tissue wall of the dental follicle or even outside the follicle and that this epithelium then unites with lining follicular epithelium, forming a solitary cystic cavity around the tooth crown⁵. The most common sites of the cyst are the mandibular and maxillary third molar and maxillary

cuspid areas, since these are the frequently impacted teeth resulting from inadequate space for the eruption⁶). The impaction of mandibular third molars is probably influenced by space between the second molar and ascending ramus, limited or adverse skeletal growth and increased crown size in impacted versus normally erupted teeth⁷). Indeed in the mandibular third molar which has no preceded tooth, cyst formation is less related with the influence of inflammation overlaying the tooth, consisting of the above mechanisms of cyst formation. Another explanation of cyst formation in the mandibular third molars is that microcyst development may occur within or under enamel epithelium either prior to or following enamel maturation and the subsequent hemodynamic mechanisms of enlargement of the lesion⁸).

In the mandibular premolar region the dentigerous cyst was strongly related with inflammation and different from other regions. Bloch-Jorgensen⁹) reported 22 cases of dentigerous cysts that he had collected over a 5-year period. He stated that in each cases a deciduous tooth or the remnants was found in direct contact with the cyst cavity and that the related deciduous tooth always was diseased. Different from the third molar region, the influence and nature of the preceded deciduous teeth should be taken into account for the origin of dentigerous cyst in the premolar region. There are some reports that cyst formation in the second premolar region could be related with inflammation at the overlaying deciduous molars. Azaz and Shtezzer¹⁰) suggested that the persistent and periapical inflammation of a deciduous tooth could cause chronic irritation to the follicle of the second premolar. The cyst walls typically showed linings that consisted of hyperplastic stratified squamous epithelium that exhibited intense inflammation¹¹). There are three hypotheses in the formation with inflammation ; 1. Developmental dentigerous cyst is formed from dental follicle and complicated with secondary inflammation. 2. Successor erupts into radicular cyst and results in dentigerous cyst that is extrafollicular origin. 3. Periapical inflammation from a nonvital deciduous tooth or other source spreads to involved follicle of permanent successor³). They can explain the critical time of cyst development when the inflammation spreads into the follicle that developed from extrafollicular epithelial remnants. There is a possibility that regardless of developmental origin periapical inflammation stimulates dentigerous cyst formation especially in the mandibular premolar region.

We have shown that more cyst formation occurred in the mandible, especially the mandibular premolar where more severe inflammation was seen, rather than in the maxilla. There is no evidence to explain the regional difference. The fact that most cysts were formed in young growing patients might suggest histological difference and growth patterns of maxilla and mandible.

The present study shows the different roles of inflammation for cyst formation associated with between the mandibular premolar region and the mandibular third molar region. It is suggested inflammation would be closely related to cyst formation in the mandibular premolar region.

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