

# A Twenty-year Survey of Pathologic Reports of Two Common Types of Chronic Periapical Lesions in Shiraz Dental School

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## Abstract

**Background and aims.** Accurate differential diagnosis between radicular cysts and periapical granulomas cannot be made from radiographs alone. Histological prevalence studies, therefore, assume special importance and may aid the clinician in making judgments regarding therapy. The incidence of radicular cysts has ranged with wide discrepancies in data. The purpose of this study was to evaluate recorded pathologic reports of two common types of chronic periapical lesion in Shiraz Dental School.

**Materials and methods.** In this study, biopsy reports of 227 specimens of chronic periapical lesions were reviewed. The following information was extracted from each report: patient's gender, age, tooth associated with the lesion and the pathological diagnosis. Probable significant differences in the occurrence of lesions between different ages and genders were analyzed using chi-square test.

**Results.** 15.9% of the lesions were granulomas, and 84.1% were cysts. A slight difference in the occurrence of the lesions was found between males and females with no statistical significance ( $P > 0.005$ ). The highest incidence of both lesions was in the third decade of life. No significant differences were found in age distribution of the lesions. The most common location for two lesions was the maxillary anterior teeth.

**Conclusion.** Histological differentiation between cysts and granulomas is not always accurate and serial sectioning of excisional biopsies is more valuable than randomized sectioning of curetted biopsies.

**Key words:** Chronic periapical lesion, cyst, granuloma.

## Introduction

Pathologic changes can occur in the periradicular tissue, which has an almost unlimited source of undifferentiated cells that participate in inflammation as well as repair. Inflammation of the periodontium caused by irritants of endodontic origin may be termed apical periodontitis. Chronic apical periodontitis is a long-standing inflammation of the periodontium that is characterized by the presence of a granulomatous tissue. The lesion may be epithelialized or nonepithelialized. Periradicular lesions have been classified on the basis of their clinical signs and symptoms and duration of lesions.

Histologically, chronic apical periodontitis is classified either as granuloma or cyst. A periradicular granuloma consists of granulomatous tissue. The apical (radicular) cyst has a central cavity filled with an eosinophilic fluid or semi-solid material and is lined by stratified squamous epithelium. The origin of epithelium is the remnants of Hertwig's epithelial sheath seen as the cell rests of Malassez.<sup>1</sup> Periapical true cyst is an apical inflammatory cyst with a distinct pathologic cavity that is completely enclosed in an epithelial lining without any communication to the root canal exits. Periapical pocket cyst

**Table 1. The incidence of periapical cysts in different studies**

Study	No. of cases	Cyst (%)	Granuloma (%)
Baumann et al (1956) <sup>3</sup>	121	26	74
Sommer et al (1956) <sup>4</sup>	170	6	84
Wais (1958) <sup>5</sup>	170	6.4	83
Patterson et al (1964) <sup>6</sup>	510	14	84
Linenberg et al (1964) <sup>7</sup>	110	9	80
Bhaskar (1966) <sup>8</sup>	2308	42	48
Lalonde and Luebke (1968) <sup>9</sup>	800	44	45
Morse et al (1973) <sup>10</sup>	40	22.5	77.5
Block et al (1976) <sup>11</sup>	230	6	94
Simon (1980) <sup>12</sup>	35	17	54
Spatafore et al (1990) <sup>13</sup>	1659	42	52
Nobuhara and del Rio (1993) <sup>14</sup>	150	22	59
Mass et al (1995) <sup>15</sup>	49	73	26
Ramachandran Nair et al (1996) <sup>16</sup>	256	15	50

(bay cyst) is an inflammatory cyst containing a saclike epithelial lined cavity that is open to and continuous with the root canal.<sup>2</sup>

The reported incidence of these lesions is inconsistent. Variation may be due to sampling methods and the histological criteria used for diagnosis. Many lesions are combination of types and contain granulomatous inflammation, cysts and areas of scarring but do not include abscesses which would not be recovered intact during surgery.<sup>1</sup> The reported incidence of cysts among apical periodontitis lesions varies from 6% to 73 % (Table 1).<sup>3-16</sup>

The objective of this study was to study in detail the type, incidence, distribution and frequency of two common types of chronic periapical lesions (granulomas and radicular cysts) among human periapical lesions obtained from biopsy reports in Department of Oral Pathology at Shiraz Dental School.

### Materials and methods

In this retrospective study, all biopsy reports with periapical cyst or granuloma diagnosis over a twenty-year period (1985–2005) were retrieved from the records of the Department of Oral Pathology at Shiraz University of Medical Sciences Faculty of Dentistry.

The collected data included age, gender, tooth associated with the lesion and the pathological diagnosis. Data such as the cause of surgery, presurgical endodontic condition, diagnostic radiograph and the size of lesions were not accessible and could not

be retrieved. The lesions were classified into two categories, namely granuloma and cystic lesions.

Chi-square test was used to analyze the probable significant differences in the occurrence of lesions between different ages and genders data.

### Results

From the total of 227 periapical biopsy reports obtained, 36 cases (15.9%) were periapical granuloma and 191 cases (84.1%) were periapical cysts (Table 2). Patients' age ranged from 7 to 75 years old with a mean of 30.23 years.

No significant differences were found in age distribution of the lesions. The highest incidence of both lesions was in the third decade of life.

The studied records comprised of 129 (56.8%) males and 98 (43.2%) females. There were no significant differences in the occurrence of both lesions between two genders ( $P > 0.005$ ).

These lesions occurred in maxilla approximately two times as frequent as the mandi-

**Table 2. Frequency of lesions from the studied records in the present study**

Lesion	Number (percentage)
Periapical granuloma	36 (15.9)
Redicular cyst	191 (84.1)
Total	227 (100)

ble. The highest distribution of both lesions were found in maxillary anterior teeth followed by maxillary and mandibular posterior teeth, and finally in mandibular anterior teeth.

### Discussion

The chronic periradicular lesions are classified on the basis of their clinical signs and symptoms and duration of the lesion. The best diagnostic method for differentiation of cysts and granulomas are histopathologic methods but the entire lesion is usually not retrieved for biopsy; only fragments are obtained during curettage.<sup>1</sup> In biopsy reports assessed in the present study, histopathological sections from biopsy specimens were used.

There are two long-standing hypotheses regarding the formation of a cyst cavity; the "nutritional deficiency theory" and the "abscess cavity theory." Because of the inherent nature of epithelial cells to cover exposed connective tissue surfaces, Ramachandran Nair et al<sup>16</sup> postulated that it may be possible that apical cyst formation is a genetically programmed event.

Several techniques introduced for differentiating cysts from granulomas according to their radiographic appearance are based on size and possession of a radiopaque cortex. A number of studies were carried out to determine the reliability of radiographs for differentiation of periapical cysts and granulomas. These studies indicate a considerable correlation between increased size of radiographic lesions and the incidence of cysts.<sup>7,11,17,18</sup> On the other hand, Sommer et al<sup>4</sup> failed to show such a correlation. In addition, Bhaskar<sup>8</sup> in a major study of the incidence of periapical lesions also observed a lack of correlation between lesion size and incidence of cysts.

Another method for differentiating the two lesions is the use of an x-ray contrast medium injected into the periapical lesion through prepared root canals, which, in case of cysts, assumes a round smooth bordered and dense appearance.<sup>18</sup>

Polyacrylamide gel electrophoresis is another method for diagnosis of radicular cysts and granulomas. Root canal fluids are aspirated from teeth with radiographic evidence of periapical pathosis. Analysis of the root

canal fluids with an albumin patterns is found in all of the cases diagnosed histologically as being granulomas. In cases that are diagnosed histologically as cysts, there is a much more intense albumin pattern and other patterns in the globulin regions.

The histopathologic structure of the apical cysts in relation to the root canal of the affected teeth is of particular importance. Simon<sup>12</sup> described the morphologic aspect and clinical relevance of certain types of periapical cysts and discovered two distinct categories of radicular cysts, namely those containing cavities completely enclosed in epithelial lining or true cysts and those containing epithelium lined cavities that are open to the root canals as bay cysts.

There is continuing controversy regarding the potential for inflammatory apical cysts to heal after non-surgical endodontic therapy. Ramachandran Nair et al<sup>16</sup> examined 256 periapical lesions and found that 9% of them were apical true cysts and 6% were apical pocket cysts.

In this study, biopsy reports of 227 specimens of chronic periapical lesions were reviewed and it was found that 15.9% of the lesions were granulomas, and 84.1% were cysts. A very slight difference was found between males and females which was not statistically significant.

No significant differences were found in age distribution of the lesions among age groups; however, the highest occurrence of the two lesions was found to be in the third decade of life. The most common location for both cysts and granulomas was the maxillary anterior teeth.

There is a large discrepancy between the reported incidences of cysts. The reported incidence of radicular cysts among human periapical lesion varies from 6% to 73% (Table 1). Langeland et al<sup>19</sup> attributes this variation to the investigator's definition of a cyst, the histological criteria used, and the characteristics of the population sample. It is important to note that the illustrations provided by Bhaskar<sup>8</sup> and several other investigators are only high power views of small segments of epithelial lesions and the low power magnifications are not available.

In most of the previous studies, the incidence of radicular cysts is less than that of granuloma. In present study, however, 84.1% of chronic lesions were cysts. In al-

most all of the previous studies several parameters remain constant; all studies were performed using curetted biopsy material with serial sectioning in pathologic processing. In the records assessed in the present study, the specimens were extracted with randomized sectioning that can cause pathological misdiagnosis of periapical epitheliated granuloma as cyst. Most of granulomas contain an epithelial portion that can lead to misdiagnosis. An accurate histopathologic diagnosis of radicular cyst is possible only through serial sectioning of the lesion removed with excisional biopsy and if a strip of epithelium is seen as a lining of a cavity. In viewing random or a limited number of serial sections from an incisional biopsy or fragmented lesions, a portion of the specimens can show the appearance of epithelial lined cavities that might not really exist. If epitheliated granulomas which could give the impression of a cyst are excluded from the cases diagnosed as cysts in our study, the percentage of cysts could, similar to other studies, be lower.

Another reason for high percentage of cysts in present study is that usually large, chronic lesions recalcitrant to endodontic therapy are referred to the department of maxillofacial surgery for treatment. These lesions are subsequently sent to the department of oral pathology after surgery. Therefore, this can be assumed the reason why in the archive records evaluated, most of chronic periapical lesions were cysts.

Therefore, it can be concluded that histological differentiation between cysts and granuloma is not always accurate and serial sectioning of excisional biopsies is more valuable than randomized sectioning of curetted biopsies.

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