

# A comparison of clinical, histological and radiographic findings in periapical radiolucid lesions

Viviane **MATSUDA**<sup>1</sup>

Ana Carolina N. **KADOWAKI**<sup>1</sup>

Simony Hidee Hamoy **KATAOKA**<sup>2</sup>

Celso Luiz **CALDEIRA**<sup>3</sup>

## ABSTRACT

**Objective:** Pulpal inflammation and necrosis can eventually cause periradicular diseases or apical pathologies, which are clinical and radiographically suggestive of an inflammatory sequel. Thus, the objective of this study is to compare the degree of agreement between the diagnosis of teeth with periapical lesions and histopathological analysis. **Methodology:** Fifty nine patients with surgical indication (teeth with lesions) were selected. In the radiographic analysis the appearance was observed, the size of the lesion was measured and a diagnosis hypothesis was suggested. Histological sections

were examined under the microscope and the specimens classified as granuloma, cyst or chronic abscess. **Results:** The results showed 40.7% of concordance between the clinical-radiographic and histological diagnosis. According to histological analysis, 35.6% of the cases were granuloma, the cystic lesions corresponded to 59.03% and 5.09% were chronic abscesses. **Conclusion:** Thus, through only clinical and radiographic examination is not possible to confirm the diagnosis of lesions, because even images considered as cysts can be resulted from abscesses or granuloma, whereas the opposite may also occur.

**Keywords:** Radiography. Diagnosis. Oral pathology.

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<sup>1</sup>Endodontics Specialist, Dental School of São Paulo University.

<sup>2</sup>Doctorate student in Endodontics, Dental School of São Paulo University.

<sup>3</sup>PhD, Professor of Endodontics, Dental School of São Paulo University.

Contact address: Simony Hidee Hamoy Kataoka  
Av. Prof. Lineu Prestes 2227, Cidade Universitária  
05.508-000 - São Paulo/SP - Brazil  
E-mail: simonykataoka@usp.br

## Introduction

Apical radiolucent lesions may include keratocyst, nasopalatin cyst, residual cyst, apical dysplasia, granulomatous inflammation and a variety of neoplasms.<sup>1</sup> Pulpal inflammation and necrosis, eventually cause changes in apical or periradicular space, which, in the absence of histological examinations, are clinical and radiographically suggestive of inflammatory sequel and may be present in the form of abscess (acute or chronic), granuloma or cyst.

The apical periodontitis is a chronic inflammation that leads to destruction of periradicular tissues and is caused by etiological agents of endodontic origin, most frequently microorganisms.<sup>2</sup> However, the bacterial profiles of the endodontic microbiota vary from individual to individual and this indicates that the apical periodontist has a heterogeneous etiology, where a single specie can not be considered the primary pathogen and multiple combinations are the causes of bacterial diseases.<sup>3</sup>

Chronic abscess is a circumscribed purulent collection without painful symptoms according to patients' reports and is detected by radiographic examination in the absence of a fistula.<sup>4</sup> Granuloma is found in the dental apex and it is rounded in shape, with regular margins well defined. Barbosa<sup>1</sup> studied the apical pathologies due to endodontic failures, through clinical, radiographic and histopathologic exams of 150 periapical lesions, and showed that the higher incidence was of granulomas (63.3%) while only 16.7% were of cysts.

The cystic formation is not well explained and the most accepted theory so far is the osmotic pressure, which can be divided into three stages. During the first phase the proliferation of epithelial cells rests (cells of Malassez) occur, in the second phase the cavity begins to be surrounded by epithelium and during the third phase there is cystic growth.<sup>6</sup>

There are two distinct categories of periapical cysts: (1) The cavity is completely enclosed by epithelium (true cyst) and (2) the cystic cavity is surrounded by epithelium, but opened to the light of the root canal (bay cyst). The reported prevalence of cysts among apical lesions varies from 6 to 55%, and histopathological studies with more strict criteria showed that the prevalence is below 20%.<sup>7,8</sup> In addition, the cystic lesions have been cited as a factor

binding to the responses of endodontic treatment, as more than half of these lesions are true cysts and the rest are bay cysts.<sup>9</sup>

Traditionally, the diagnosis of periapical lesions is based on clinical and radiographic analysis. In the study conducted by Moraes et al,<sup>6</sup> 180 cases were analyzed and the concordance between the radiographic and the histopathological diagnosis occurred only in 66.6% of cases. For Mortensen et al,<sup>7</sup> lesions larger than 15 mm can be safely classified as cysts. However, according to Trope et al<sup>16</sup> and White et al,<sup>18</sup> preliminary diagnosis of the cyst may be present when the lesion diameter is greater than 20 mm, and other factor used as a differential diagnosis is the presence of a radiopaque lamina surrounding the cystic lesion.<sup>14</sup>

These reports have contributed to the idea that the considerable size of periapical lesions are usually well defined and should preferably be treated surgically. Hepworth and Friedmann<sup>4</sup> analyzed the use of endodontic retreatment and surgical treatment in cases of large cystic lesions, and the average success was 66% and 95%, respectively. Furthermore, Rahbaran et al<sup>12</sup> suggested that the size of the lesion has no significant influence on the treatment success.

The purpose of this study was to determine the concordance between the diagnoses of teeth with periapical lesions in different diameters, obtained by clinical and radiographic examinations, with the analysis of histopathological lesions.

## Material and methods

Patients were selected at the Department of Surgery of the Faculty of Dentistry, at University of São Paulo (FOUSP). They were informed about the proposed study and, subsequently, their consent to participate was obtained. Indications for extraction were based on the surgical protocol of the surgery discipline. The study group included patients of both genders and different ages who had surgical indication (extraction) of teeth with periapical lesions, with a total of 59 samples for histological analysis.

## Radiographic Study

After the clinical examination a thorough radiographic was performed. It was observed whether the lesion had a cystic appearance, if it was diffuse or circumscribed and if it presented an external resorption,

thus allowing to obtain a diagnose. Each patient had the diagnosis written on an appropriate sheet. The lesion size was measured and the mean height by width was obtained in millimeters. The presence or absence of a radiopaque layer around the lesion was not taken into account during the measurement. The specimens were classified according to previously established criteria for identification, such as: A (<1 mm), B (= 1 mm or 2 mm) and C (>2 mm).

## Histological Studies

The extraction was performed and the tooth (accompanied or not by periapical lesion) was immediately immersed in 10% formol solution, and then placed in fixation solution for 24 hours. The histopathological analysis were performed at the Laboratory of Oral Pathology (FOUSP). The teeth which had lesions were subjected to decalcification and then the steps for obtaining histological sections of tissue were carried out: Dehydration, diafanization, inclusion in paraffin, sections (4 µm - 5 µm of soft tissue and 7 µm of hard tissue), deparafinization and systematic staining with hematoxylin and eosin. Histological sections were examined by microscopy and the results were given in consensus by two pathologists.

The specimens were classified according to previously established criteria for identification, such as granuloma (G), cyst (C) or chronic abscess (AB).

## Results

The comparison between clinical diagnoses and histopathologically confirmed cases are described in Table 1. From 28 cases histopathologically diagnosed as periapical granuloma, 75% had the same clinical diagnosis, while the accordance between periapical

cyst diagnosis was 66% and 37.5% for chronic abscess. The overall agreement between the two diagnoses was 59.3%.

Table 2 shows the aspect of lesions in different sizes, determined by radiographic exams, and the classification of the lesions according to clinical and histopathological diagnoses. The results show that according to histopathological diagnoses, 35.6% of the lesions were periapical granulomas, from which 23.7% were in pure form and 11.9% were mixed (granuloma with epithelium cells). The cystic lesions corresponded to 59.3%, while 5.09% were chronic abscesses. According to the clinical diagnoses, on the other hand, 47.5% of the cases were granulomas, 39% were cysts and 13.5% were abscesses.

## Discussion

The literature shows significant differences regarding to histopathological results of periapical lesions,

**Table 1.** Comparison of clinical diagnosis with specific histopathological diagnosis.

Clinical Diagnosis	Specific Histopatological Diagnosis (n=59)		
	Periapical granuloma (n=21)	Periapical cyst (n=35)	Chronic abscess (n=3)
Periapical granuloma	28	-	-
Periapical cyst	-	23	-
Chronic Abscess	-	-	8

**Table 2.** Relationship between lesion size, radiographic exam, clinical and histopathological diagnosis.

Lesion size	Radiographic exam		Clinical diagnosis			Histopathological diagnosis		
	cystic aspect	no cystic aspect	G	C	AB	G	C	AB
A (n=0)	-	-	-	-	-	-	-	-
B (n=19)	1	18	12	2	5	7	11	1
C (n=40)	21	19	16	21	3	14	24	2
% biopsy specimens (n=59)						35.59%	59.32%	5.09%
A (<1 mm); B (between 1 and 2 mm); C (>2 mm); G (granuloma); C (cyst); AB (abscess)								

the prevalence of granulomas ranging from 9% to 87%<sup>17,18</sup> and cysts of 6% to 55%.<sup>7</sup> In this study, from the 59 cases examined with HE, 20.3% were apical cysts, 11.9% were granulomas and 8.5% were chronic abscesses. These discrepancies with the results found by other authors may be due to different criteria used on the histological exams. For example, Ricucci et al<sup>13</sup> established the diagnosis based on the presence of a cyst cavity completely or partially surrounded by epithelium. According to his data, from 21 epithelial lesions, only 16 were classified as cystic.

Previous studies attempted to compare radiographic findings of periapical lesions with histological analysis and some authors stated that the preliminary clinical diagnosis of cyst can be done when the lesion is greater than 15 mm / 20 mm.<sup>11,12,13</sup> In contrast, our proposal was to investigate the number of agreement in diagnoses of teeth with periapical lesions of very small sizes (around 1 to 2 mm), which are certainly more difficult to be accurately diagnosed applying only clinical and radiographic exams.

No apical lesions with diameter less than 1 mm were found in the present study. Injuries with affined diameters larger than 2 mm were more easily diagnosed as a cyst compared to smaller lesions, with only 7.5% of error in diagnosis, but this relatively low average may have occurred because of the number

of lesions with diameters larger than 2 mm (n = 40). Carrillo et al<sup>2</sup> found differences in radiographic size between granulomas and cysts and that the averages were higher in both epithelized granuloma and cysts. Therefore, the authors emphasize that it is not possible to base the differentiation only in radiographies.

The radiographic interpretation of periapical lesions is seen as an inaccurate, but Ricucci et al<sup>13</sup> stated that there is a tendency that the cysts are probably found in groups with a radiopaque layer around the lesion. For Carrillo et al,<sup>2</sup> from 70 cases reported, only 9 had the blade and just 2 were confirmed histologically as cysts. These results are consistent with ours; as from the 35 cystic lesions only 22 had radiopacity limiting the lesion.

These findings provide evidence to rebut the statements that it is possible to have an accurate diagnosis by radiographic size, or that the presence of a radiopaque lamina is the basis for a diagnosis of periapical pathology.

## Conclusions

This study indicates that only through clinical and radiographic examination is not possible to confirm the diagnosis of lesions, because even images considered as cysts can be resulted from abscesses or granuloma, whereas the opposite may also occur.

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