

### **Diagnoses Immature Lesions Of Clinical And Histopathological Endodontic Origin**

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#### **Abstract**

The purpose of this study was to assess the concordance between the clinical diagnosis of these lesions and the histopathological diagnoses and to analyze their clinical and pathological features.

#### **Materials and methods**

Clinical data were obtained, and tissue samples were reevaluated. The overall agreement between the clinical and histological diagnoses was tested utilizing the Cohen kappa.

#### **Conclusion**

The findings of this study indicate that clinical/radiographic examinations are not able to preoperatively determine whether a periapical lesion is a cyst or a granuloma and highlights the importance of developing a reliable nonsurgical diagnostic method to differentiate periapical lesions. <sup>a</sup> 2020 Association for Dental Sciences of the Republic of China. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

#### **Introduction**

The classification of these inflammatory lesions is based on histopathological features, which include periapical Granuloma, cysts, abscesses and scars.<sup>3</sup> Nair et al. reported that there are two distinct types of radicular cysts: the true cysts, cavities completely enclosed in epithelial lining and pocket cysts, those containing epithelium lined cavities which opens into the root canals. Precise differentiation between these types of cysts requires serial sectioning of whole lesions including the root apex, which is not always possible in the clinical sitting.<sup>4</sup>

There have been controversies regarding the probability of a cyst healing after nonsurgical root canal treatment, as it are almost impossible to confirm the diagnosis of a cyst without a surgical intervention.<sup>6</sup> Consequently, there has been a great desire to have reliable nonsurgical means to preoperatively determine whether a periapical lesion is a cyst or a granuloma. This has led to many studies develop nonsurgical diagnostic methods.

That study was not reliable for several reasons: the possible contamination of the aspirate by mucosal epithelial cells, the presence of odontogenic rest cells in granulomas, and the small sample size. Cunningham and

Penick used a contrast medium to determine the presence of a cyst or a granuloma.<sup>8</sup> The investigators did not find a correlation between the postinjection radiographic image and the histological diagnosis.

Reported that CBCT can distinguish periapical granulomas from cysts.<sup>10</sup> Meanwhile, Rosenberg et al. (2010) reported that CBCT was an unreliable diagnostic tool.<sup>11</sup>

The standard means of differentiating radicular cysts from granulomas is surgical biopsy and subsequent histopathological evaluation.<sup>12</sup> The evaluation of the ability of the clinical assessment to correctly diagnose periapical lesions may be useful in preoperatively determining whether a periapical lesion is a cyst or a granuloma and may help to conduct future studies that properly assess the response of radicular cysts to nonsurgical root canal therapy. Therefore, the aim of this study was to assess the concordance between the clinical diagnosis of periapical lesions of endodontic origin and the histopathological diagnoses and to analyze the clinical and pathological features of these lesions.

### **Materials and methods**

The inclusion criteria of the cases were as follows: 1- periapical lesions associated with a permanent tooth (except the third molar); and 2- intact periapical lesions that were obtained during endodontic surgery or from extracted and endodontically treated teeth. Hematoxylin and eosin (H&E) slides were retrieved.

The diagnosis of the retrieved cases was confirmed or modified by two independent pathologists, and a consensus diagnosis was reached in all cases. The diagnosis of the cases was made according to the following criteria. Periapical granuloma was diagnosed based on the histological findings of soft connective tissue that was morphologically consistent with granulation

tissue in addition to the presence of inflammatory cell infiltrate.

A scar was defined as dense fibrous connective tissue, and an abscess was defined as a collection of pus. Clinical data, including endodontic status, age, gender, location, tooth type and clinical diagnosis, were obtained from the pathology request forms. In cases submitted with more than one clinical diagnosis (7.3% of cases), the first diagnosis was considered to represent the clinically preferred diagnosis. All patient information was confidential, and the research protocol was reviewed and approved by the Institutional Review Board of [location masked for blind review] (Research project no. [Masked for blind review]). All the data obtained from this study were tabulated and analyzed using frequency distributions by SPSS (Chicago, IL, USA). To determine the interrater reliability between the two pathologists, we calculated the Cohen kappa (k). Moreover, the overall agreement between the clinical and histological diagnoses of periapical granuloma and periapical cysts was also tested using the Cohen kappa.

### **Results**

A total of 250 periapical biopsy specimens from 250 patients were included in this study, corresponding to around 16% of the biopsy volume for the 12-year period. The mean patient age was 35.8 years (SD Z 13.03), with a slight female predilection (53.3%) (Table 1). The periapical lesions occurred more frequently in the maxilla and accounted for 59.9% of the patients. The most frequent region for periapical lesions was the anterior region (39.4%) followed by the molar region (36%), and the most commonly involved tooth was the first molar (30.3%)

Histologically, the 317 periapical lesions consisted of 138 periapical granuloma, 173 periapical cysts, and six periapical scars. Interrater reliability test indicated that

agreement between the two pathologists was strong ( $k Z 0.895$ ). The comparison between clinical and histologically confirmed diagnoses is shown in Table 3. From 138 cases histopathologically diagnosed as periapical granuloma, 55.8% had the correct clinical diagnosis, while the agreement between periapical cyst diagnoses was 51.4% and no agreement for periapical scars. Generally there was weak overall agreement between the clinical and histological diagnoses of periapical granuloma and periapical cysts ( $k Z 0.059$ ).

### **Discussion**

The variations of these results and those found by previous reports may be due to the different histological criteria used in the diagnosis or may be due to the inherent bias of the samples analyzed. As some clinical practices recommend obtaining a periapical biopsy only in cases of failed endodontic treatment or when there are large radiolucent lesions, these clinical factors may affect the profile of the sample.

A review of the literature shows a general correlation between the prevalence of periapical lesions and the maxillary jaw,<sup>3,18,19</sup> which is in agreement with the present study, as it showed that almost 60% of the cases occurred in the maxilla. This could be attributed to the fact that maxillary teeth are more prone to trauma or are more often treated for esthetic reasons.

Distinguishing radicular cysts from granulomas does not directly affect prognosis in clinical settings.<sup>20</sup> However, from a scientific research perspective, there is a great need to have this information to be able to evaluate the response of nonsurgical endodontic interventions. Few studies have attempted to compare the clinical diagnoses of inflammatory periapical lesions with the histological findings. Diegues et al. evaluated the correlation between the clinical diagnosis of periapical inflammatory lesions and the histopathological results.<sup>21</sup> Out of 191 cases, only

113 had matched clinical and histopathological diagnoses. Another similar study found that the overall agreement between the clinical and histopathological diagnoses was 59%.<sup>22</sup> Another study compared the clinical and radiographic features with a histological diagnosis of 19 periapical lesions.<sup>23</sup>

The current study found that 55.8% of periapical granulomas had the correct clinical diagnosis, while the agreement between periapical cyst diagnoses was 51.4%, and there was no agreement for periapical scars. These percentages are similar to those found by the aforementioned reports; however, in this study, a larger number of cases was studied when compared to that in other studies.<sup>21e23</sup> Furthermore, the overall agreement between the clinical and histological diagnoses of periapical granulomas and periapical cysts was tested using both the percent agreement and Cohen kappa, which was in contrast to previous reports that tested the agreement with only the percent agreement. It is recommended to calculate both the percent agreement and Cohen kappa when measuring agreement among data to overcome the limitations of each method.<sup>24</sup> In the current study, there was weak overall agreement between the clinical and histological diagnoses of periapical granulomas and periapical cysts ( $k Z 0.059$ ). The reason for the discrepancies between the clinical and pathological diagnoses and the weak agreement could be attributed to the similar radiographic appearances of the lesions and the fact that it is almost impossible to radiographically differentiate cystic and solid lesions. Although there are some clinical indicators such as size/chronicity of the lesions that could be utilized to distinguish the periapical lesions,<sup>25</sup> however they are not accurate. In conclusion, the findings of this study indicate that clinical/radiographic examinations are not able to preoperatively determine whether a periapical lesion is a cyst or a granuloma and

highlights the importance of developing a reliable nonsurgical diagnostic method to differentiate periapical lesions.

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