Evaluation of concordance between clinical and histopathological diagnoses in periapical lesions of endodontic origin

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Abstract

Background: To evaluate concordance between clinical and hostopathological diagnoses in periapical lesions.

Materials & Methods: This study included a total of 100 biopsy samples taken from periapical regions, which accounted for approximately 16% of biopsies conducted over a 12-year period. The average age of the participants was 40.52 years. All gathered data were organized and statistically analyzed using SPSS software.

Results: The most frequent region for periapical lesions was the anterior region (40%) followed by the molar region (35%). Histologically, the collection of 100 periapical lesions comprised 40 cases of periapical granuloma and 60 cases of periapical cysts.

Conclusion: Clinical and radiographic assessments lack the capability to predict whether a periapical lesion is a cyst or a granuloma before surgery.

Keywords: periapical lesion, granuloma, histopathology.

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Introduction

Periapical radiolucent lesions are one of the most common radiographic findings in dental practice. Most of these lesions are the sequelae of pulpal inflammation and necrosis. [1,2] The classification of these inflammatory lesions is based on histopathological features, which include periapical granulomas, cysts, abscesses and scars. [3] 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. [4] The initial management for most of these inflammatory periapical lesions is usually nonsurgical endodontic treatment. [5] There have been controversies regarding the probability of a cyst healing after nonsurgical root canal treatment, as it is almost impossible to confirm the diagnosis of a cyst without a surgical intervention. [6]

The oral cavity is a complex area in the located in the head and neck regions and home to a diverse range of cysts, benign, and malignant salivary gland tumors, as well as odontogenic and nonodontogenic neoplasms. [7] Both the diagnosis and treatment of oral cavity lesions are known as integral parts of oral health care. [8] Moreover, it is well understood that early detection and treatment of these lesions would greatly lead to the improvement of patients' survival rates and quality of life. [9] Although each oral lesion has different characteristics and clinical features aiding in diagnosis, clinical diagnosis errors occur due to the similarities in clinical presentations, lack of precise definitions for these characteristics, incompatibility of the signs and symptoms in patients, and the presence of multiple manifestations for a lesion. [10] Therefore, in order to minimize misdiagnoses and to achieve more accurate ones, it is necessary to consider the patients' chief complaints, medical and dental histories' records, clinical manifestations, imaging diagnostic techniques, and various tests like laboratory tests that include biopsies with microscopic evaluations and blood tests. [11] Histopathologic examination, which is known as the gold standard in diagnostic oral pathology, is used to confirm the clinical diagnosis. [12] This art of clinical diagnosis is also supplemented with laboratory investigations in order to validate the provisional impression of the clinician and to finally arrive at a definitive diagnosis. Regardless of the outcome of the physical examination, histopathology and advanced diagnostic techniques remain the gold standard of diagnosis; even though, not all oral lesions warrant further histopathological investigation, as a sizeable number of dental conditions can be diagnosed based on detailed information obtained from clinical features and/ or radiological presentations. Clinical oral examination (COE) remains a principal strategy and valuable means of detecting subtle alterations in the oral hard and soft tissues coupled with clinician's discretion in requesting appropriate investigations for arriving at an accurate diagnosis. Despite this, limitations of clinical oral examination in detecting dysplastic lesions, intra-bony lesions, cancers and recurrent mucosal lesions have been fully documented in scientific literature. [13,14] Hence, this study was done to evaluate concordance between clinical and hostopathological diagnoses in periapical lesions.

Materials & Methods:

This study included a total of 100 biopsy samples taken from periapical regions, which accounted for approximately 16% of biopsies conducted over a 12-year period. The average age of the participants was 40.52 years. The selection criteria for cases were: 1) periapical lesions linked to permanent teeth (excluding the third molar); and 2) intact periapical lesions acquired

during endodontic surgery or from teeth that had been extracted and undergone endodontic treatment. Hematoxylin and eosin (H&E) slides were retrieved and examined. The diagnosis of each case was reviewed and possibly modified by two independent pathologists, with a unanimous diagnosis achieved for all cases. The diagnosis process was guided by specific criteria. Essential clinical information, such as endodontic condition, age, gender, location, tooth type, and clinical diagnosis, was extracted from the pathology request forms. All gathered data were organized and statistically analyzed using SPSS software.

Results:

The most frequent region for periapical lesions was the anterior region (40%) followed by the molar region (35%). Histologically, the collection of 100 periapical lesions comprised 40 cases of periapical granuloma and 60 cases of periapical cysts. Among the 40 cases that were histopathologically identified as periapical granuloma, 62.5% aligned with the accurate clinical diagnosis, whereas the agreement rate for periapical cyst diagnoses stood at 50%. In general, there existed a weak overall concordance between the clinical and histological diagnoses for both periapical granulomas and periapical cysts ($k = 0.059$).

Table 1: Distribution of periapical biopsy specimens according to jaw, and region

		Periapical granuloma n (%)	Periapical cyst n (%)
Jaw	Maxilla	25 (62.5)	35(58.3)
	Mandible	15 (37.5)	25(41.7)
Region	Anterior region	16 (40)	24(40)
	Premolar region	8 (20)	7(11.7)
	Molar region	14 (35)	24(40)
	More than one region +	2 (5%)	5(8.3)

Table 2: comparison of clinical and histopathological diagnoses

Clinical diagnosis	Histopathological diagnosis	
	Periapical granuloma N= 40	Periapical cyst N=60
Periapical granuloma	25	15
Periapical cyst	10	30
Pariapical abscess	3	5
Others	2	10

Discussion:

It is a complex and challenging process to treat endodontically treated teeth with unrelenting periapical lesions. The occurrence of unnoticed extra root canals, canal blockage, perforations,

ledge formation, broken instrument, and unrectifiable post in the canals can make difficulties for retreatment procedures. Despite the fact that root canal retreatment can give effective outcomes, sometimes lesions do not repair; in such cases surgical treatment such as periapical surgery and further extraction are the only options left. [15,16] Hence, this study was done to evaluate concordance between clinical and hostopathological diagnoses in periapical lesions.

In the present study, the most frequent region for periapical lesions was the anterior region (40%) followed by the molar region (35%). Histologically, the collection of 100 periapical lesions comprised 40 cases of periapical granuloma and 60 cases of periapical cysts. A study by Alotaibi O et al, was to assess the concordance between the clinical diagnosis of these lesions and the histopathological diagnoses and to analyze their clinical and pathological features. Biopsies of periapical lesions of endodontic origin diagnosed in the histopathology laboratory between 2006 and 2017 were retrieved from the database and used to conduct this retrospective review. Clinical data were obtained, and tissue samples were re-evaluated. The overall agreement between the clinical and histological diagnoses was tested utilizing the Cohen kappa (k). A total of 317 periapical biopsy specimens were included in this study which consisted of 137 periapical granulomas, 174 periapical cysts, and six periapical scars. Generally there was weak overall agreement between the clinical and histological diagnoses of periapical granuloma and periapical cysts (Cohen kappa, $k = 0.059$). 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. [17]

In the present study, among the 40 cases that were histopathologically identified as periapical granuloma, 62.5% aligned with the accurate clinical diagnosis, whereas the agreement rate for periapical cyst diagnoses stood at 50%. In general, there existed a weak overall concordance between the clinical and histological diagnoses for both periapical granulomas and periapical cysts ($k = 0.059$). Another study by Farzinnia G et al, aimed to evaluate the concordance of the clinical and histopathological diagnoses of all oral and maxillofacial biopsy specimens in a 12-year duration. Archive files and clinical findings related to 3001 patients who had been referred to the Department of Oral Pathology during a 12-year period were reviewed. The recorded information in files included age, sex, lesion's location, clinical and histopathological diagnoses, and specialty of dentists. Out of 3001 cases included and reviewed in this study, 2167 cases (72.2%) were consistent between clinical and histopathologic diagnoses. Age, sex, and clinician's specialty were indicated to have no significant effect on diagnosis (p values = 0.520, 0.310, 0.281, respectively), but location and type of lesion affected that (p values = 0.040 and 0.022, respectively). In regard to location, the highest concordance of clinical and histopathologic diagnoses was observed in mouth floor lesions, and the lowest one was in gingival mucosa. In terms of lesion category, the highest and the lowest concordance rates belonged to white and red lesions and pigmented lesions, respectively. The results show that the consistency of clinical and histopathological diagnoses was three times more than their inconsistency, and the accuracy of the clinicians was largely acceptable. [18] Soyele OO et al, good concordance between clinical

impression and histopathological diagnosis is thus a very crucial diagnostic oral pathology tool in low- and middle-income countries (LMICs). Frequency of oral lesions and rates of accurate clinical diagnoses were evaluated for lesional sites and clinician's qualification/specialization. In 592 biopsied cases, the mean age was 36.1years with higher female predilection (54.4%). Odontogenic tumors (OTs) were the most prevalent category of lesions (25.3%, n=149), followed by reactive lesions (12%, n=71). Absolute concordance was recorded for 54.6% (k=0.5) of the cases; with highest concordance observed in fibro-osseous lesions (65.6%, k=0.43), and least in pulp/periapical lesions (3.5%). Concordance was higher in females (59.5%, k=0.53) than males (48.3%, k=0.44). Oral medicine specialists had the highest concordance index (62.5%, k=0.59). The findings in this research indicate that, on a general note, the degree of concordance between clinical and histopathological diagnosis is poor. Hence, improvement in diagnostic skills (irrespective of clinical specialty) is important to improve treatment outcomes, particularly in LMICs. Continuous personnel training and utilization of advanced diagnostic techniques can potentially help bridge the diagnostic gaps. [19] 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. [20] 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, however they are not accurate. [21]

Conclusion:

Clinical and radiographic assessments lack the capability to predict whether a periapical lesion is a cyst or a granuloma before surgery. This underscores the significance of establishing a dependable non-surgical diagnostic approach for distinguishing between these types of periapical lesions.

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