ORIGINAL ARTICLE

DIAGNOSTIC ACCURACY OF CLINICO-RADIOLOGICAL AND HISTOLOGICAL EXAMINATION IN CHRONIC PERI-APICAL PATHOLOGIES

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ABSTRACT

Objective of this study was to determine the diagnostic accuracy of clinico-radiological and histological examination in chronic peri-apical pathologies.

Observational cross sectional study was carried out in the histopathology laboratory of Khyber Teaching Hospital (KTH). Peri-apical Tissue samples from 100 patients with chronic inflammatory peri-apical pathologies diagnosed clinico-radiologically were collected after extraction of affected teeth. These samples were subsequently processed and stained with eosin and hemotoxylin staining for histological assessment. The patients' age and gender distribution along with the relationship of clinico-radiological and histological diagnosis of these pathologies were analyzed by applying chi square test. Statistical significance was set at ≤ 0.05.

The clinical and radiological diagnosis of 15% of cases concluded by various dentists was incorrect. Of those, 14% diagnosed previously as peri-apical granulomas were actually radicular cysts while 1% were apical scars ($p < 0.05$).

Histological examination of chronic peri-apical pathologies must be performed along with clinico-radiological examination in order to reach accurate diagnosis.

Key Words: *chronic inflammatory peri-apical pathologies, apical granuloma, radicular cyst.*

INTRODUCTION

Peri-apical pathologies are among the most common odontogenic pathologies in human teeth.[1] The condition is usually illustrated as apical periodontitis. Apical periodontitis is a consequence of endodontic infection and manifests itself as the host defense reaction to microbial challenge originating from the root canal system to the peri-apical tissue.[1] It is analyzed as an active encounter between microbial factors and host defenses at the interface between infected radicular pulp and periodontal ligament which can frequently lead to local inflammation, resorption of hard tissues, damage of other peri-apical tissues, and ultimate development of a variety of histological types of apical periodontitis, usually referred to as peri-apical pathologies.[1] The preliminary diagnosis of chronic peri-apical pathologies is made on the basis of clinical symptoms and radiographs, which is a reliable diagnostic tool, a more definite diagnosis requires histological assessment.[2] These typical inflammatory peri-apical lesions are common and encompass primarily the peri-apical periodontium, with no preponderance of race, sex or age.[3] It is the most frequent peri-radicular pathology and involves $\approx$ 40 percent of all peri-apical radiolucent pathologies.[3] In about 90 percent of the cases, a well-defined radiolucency at the apical area of an untreated asymptomatic tooth with a non-vital or diseased pulp is either a dental granuloma or a radicular cyst.[3] They are intermediary units which mean transition among various pathological states. The most common pathology among them is the peri-apical granuloma, comprised by a mass of chronic inflammatory tissue, in which isolated nests of epithelium can be found. The radicular cyst is distinguished by the occurrence of a cavity, partially or wholly lined by epithelium. Scar tissue is a reparative response by the body, producing fibrous connective tissue.[3]

A definite clinical and radiological diagnosis of these osteolytic pathologies is sometimes difficult to

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make due to undefined and ambiguous structural and evolutionary disparities of a peri-apical granuloma. Hence a histological assessment not only adds to but is becoming a prerequisite for definite diagnosis.[2]

On thorough literature search no study found that have compared clinico- radiological diagnosis with histo-pathological diagnosis. Therefore, the main crux of this study is to comparatively evaluate accuracy level of clinical, radiographic and histological examination results, in order to highlight the possible pitfalls leading to incorrect diagnosis.

METHODOLOGY

Biopsy specimens diagnosed by dentists were collected from Khyber College of Dentistry. Study design was cross sectional analytical and consecutive convenience sampling technique was applied. Hundred biopsy specimens from 100 patients met our selection criteria and were included for further analysis.

These specimens were then processed in the Histopathology Laboratory Khyber Teaching Hospital via tissue Fixation, embedding, sectioning, staining and the imaging was performed in the Institute Basic Medical Sciences Peshawar using light microscope.

The data was evaluated and analyzed by applying descriptive statistics. Statistical comparison was made between clinico-radiological and histological diagnosis groups by using chi square test ≤ 0.05 for statistical significance. Sensitivity and specificity of clinico-radiographic vs histological diagnosis were calculated. Statistical Package for Social Sciences (SPSS version 16, Chicago, USA) was used for all analysis.

RESULTS

The clinical and radiological diagnosis showed that 92 out of 100 cases were peri-apical granulomas while 8 cases were diagnosed as radicular cysts. On the other hand, corresponding numbers for histological examination were 77 (peri-apical granulomas) and 14 (radicular cysts) while 1 patient showed an apical scar (Table 1). Chi square test values (χ^2 = 30.83, p value = <0.01) of this study shows that there is significant difference between clinic-radiological and histological diagnosis (Table 1).

The age range was 14-50 years, with a mean value of 32.25 ±6.725 years. Maximum number of patients presented in age group from 26 to 30 years (37%) followed by age group from 36 to 40 (22%) which is followed by age group 31 to 35 (19%). i.e. 78% of patient population presented in 3rd and 4th decades of life.

Gender distribution of the study showed that 65% patients were male (n= 65), while the remaining 35% were female (n=35), with a male to female ratio of 1.9:1.

93.90% sensitivity, 21.05% specificity 83.70% Positive Prediction value and 44.44% Negative Prediction valve were found for clinic-radiograph diagnosis Vs Histological diagnosis.

TABLE 1: RELATIONSHIP OF HISTOLOGICAL DIAGNOSIS WITH CLINICORADIOLOGICAL DIAGNOSIS OF CHRONICPERI-APICAL INFLAMMATORY LESIONS. (P= 0.000)

Clinico-radiological Diagnosis	Histological Diagnosis			Total
	Peri-apical Granuloma	Radicular Cyst	Peri-apical Scar	
Peri-apical Granuloma	77	14	1	92
Radicular Cyst	0	8	0	8
Total	77	22	1	100

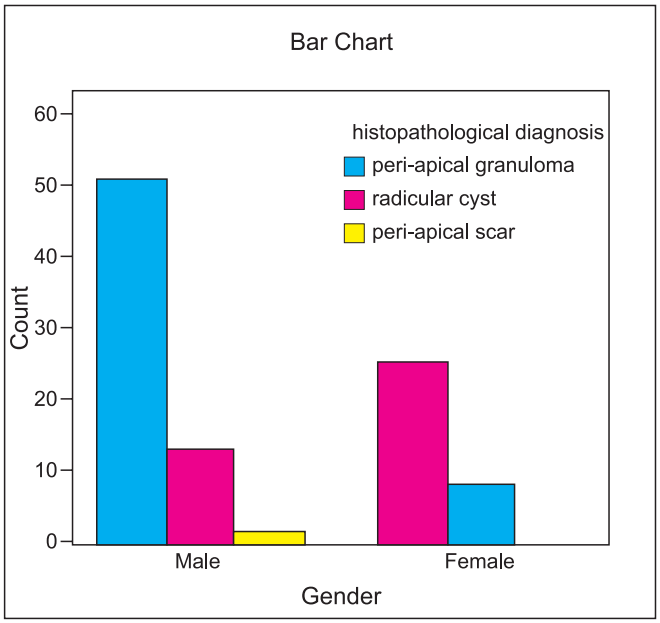

Figure 1: Bar chart shows frequencies of each peri-apical pathology in male and female on the basis of histopathological diagnosis.

DISCUSSION

This study was designed to compare the clinico-radiological diagnosis with histological assessment in 100 patients with of chronic inflammatory peri-apical pathologies using eosin and hemotoxylin staining for histological examination.

We have shown that the 92% peri-apical granulomas and 8% radicular cysts diagnosed clinically and radiologically, turn out to be 77% peri-apical granulomas, 22% radicular cysts and 1% apical scar after histological examination.

Lia and his collegues[4] studied 164 chronic inflammatory peri-apical pathologies and examined them clinically and radiologically, in which 71 (43.29%) were identified as chronic apical periodontitis, 59 (35.98%) as inflammatory cysts and 34 (20.73%) had no characterization. When histological assessments were carried out, 90 cases (54.88%) were identified as inflammatory cysts, 74 (45.12%) as chronic apical periodontitis, and 2 presented a minor repair pattern4, which is in significant disagreement to our findings. The ratio of radicular cyst in their study is higher while the ratio of peri-apical granuloma is lesser than our findings. This may be because of difference in their tissue collection, tissue processing and histological criteria which lead to different results. Another study on similar grounds show that 65.7% of lesions were granulomas, 25.7% apical scars and 8.6% radicular cysts.[5] These incidences of peri-apical granuloma and apical scar are comparatively higher than our report while that of radicular cyst is lower than our report. This difference may be because of difference in their tissue collection, tissue processing and histological criteria.

Becconsall-Ryan[6] after histological examination, reported (59.7%) peri-apical granulomas, which were the largest group followed by radicular cysts (29.2%). These lesions were previously diagnosed clinically and radiologicaly as 48.3% of peri-apical granulomas and 36% of radicular cysts. This study also shows difference between clinico-radiological diagnosis and histological diagnosis. The differences of their results to present study could be due to the difference in sample size, absence of apical scar and demographic changes in their clinical study.

In another study schulz found 70% peri-apical granulomas, 23% radicular cysts and 5% abscesses, 1% apical scar and 1% keratocysts in 125 samples.[7] This study show somewhat similar results to the present study like radicular cyst and apical scar. Other differences may be due to the reason that keratocysts and peri-apical abscesses were not included in our study.

In another study Liapatas[8] after histological diagnosis reported 55% peri-apical granulomas, 37.7% radicular cysts and 6.66% apical scar tissues. The differences in percentages of lapastas results and our study could be due to the lack of dental awareness and low socioeconomic status in our population leading to less frequent reporting of patients to the dental hospitals.

Spatafore[9] reported 52% of the lesions were granulomas, 42% cysts, 2% peri-apical scars, and 4% other disorders in their study. The difference of results could be due to the demographic and culture differences and different sample collection techniques.

Lin[10] carried histological assessment of 252 chronic inflammatory peri-apical pathologies of which 128 (50.8%) were peri-apical granulomas, 117 (46.4%) were radicular cysts, and 7 (2.8%) were peri-apical scars. The reasons of difference in results of their study with our study may be due to change in study design, duration of study and number of patients involved.

Radics T[11] reported results which are different to present study because of higher percentage of radicular cyst (65.2%) than the percentage ofperi-apical granuloma (32.1%). The difference of this study to the present study could be due to demographic changes and difference in span of study.

Chronic inflammatory periapical pathologies vary over a wide age range. In the present study the age ranges from 14-50 years. The mean age of the patients was 32.25 years ±6.72. The most common age group was 26-30 years (37%) followed by 36-40 years (22%), showing that periapical inflammatory lesions are more commonly present in 3rd and 4th decades of life. The youngest patient was a 14 year female while the oldest one was 50 years old male.

Regarding gender distribution in present study 65% patients were male (n= 65) and 35% female (n= 35). The male to female ratio was being 1.9:1. Omoregie FO[12] in their study had reported same results with a male to female ratio of 2: 1 and most commonly present between the third and fourth decades of life.

Other studies have reported that female are more commonly affected then the males. Philippi[13] had reported in their study that periapical inflammatory lesions were more frequent in female patients (52.2%). Most of the patients affected by these lesions were between 26 and 45 years old (54.5%), followed by patients older than 45 (23.3%) and younger than 26 (22.2%). In another study Lin HP[10] had reported that these lesions occurred more frequently in female patients (160) than in the males (92) with a mean age 43.6 years; range, 9-81 years in their fourth to fifth decades. Male to female ratio is 1: 1.7.

The third and 4th decades of human life are the busiest decades in life and thus people in these decades are busy in their higher education and in their business. Males in these decades are mostly busy in earning bread and butter for houses and females are mostly married and are busy in management of their home's affairs as house wives. Thus people in these decades have no time to visit dentists and they usually take analgesics and antibiotics for pain and fever which allows sufficient time for these lesions to develop. Lack of dental awareness and low socioeconomic status in our population leading to patients visiting the dental hospitals only in an emergency could be the possible reason. The relatively high number of male to female is due to the fact that male are engaged more in outdoor activities while the female are confined to indoor activities. As this area "Pukhtoons" abundant are therefore female are less expose to doctors and community that is why their ratio in this study is less than the males.

CONCLUSION

Chronic peri-apical pathologies are misdiagnosed due to their intermediary nature and a diverse clinical and radiological signwhich results in inadequate and deficient treatment. Thus dentist should not only rely on clinico-radiological diagnosis and histological examinations should therefore be considered for accurate diagnosis and appropriate treatment for these pathologies.

CLINICAL RELEVANCE

It has been shown in this study that the histological examination for chronic peri-apical inflammatory lesions is of utmost importance and should be consider for the definite diagnosis and appropriate treatment.

DISCLAIMER

It is certified that the abstract/paper has not been previously presented or published in any conference.

CONFLICT OF INTEREST

There is no conflict of interest regarding financial, personal, or professional that could be construed to have influenced the work.

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