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PERIAPICAL LESIONS OF THE JAWS: A REVIEW OF 104 CASES IN IBADAN

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ABSTRACT

Background: **Periapical lesions (PLs) occur as a result of pulpal inflammation and may rarely be seen in the absence of pulpal diseases. They are the most common pathological lesions affecting the alveolar bone.**

Objective: **This study aims to describe the clinicopathological features of PLs of the jaws with emphasis on the two most common types.**

Methods: Histopathology records of PLs diagnosed from January 1990 to December 2012 at the Department of Oral Pathology, University College Hospital Ibadan, were examined and categorized into periapical cysts (PCs); periapical granuloma (PGs) and others. Clinical data and histopathological features of these PLs were reviewed and analyzed.

Results: **One hundred and four lesions met the criteria for this study and consisted of PGs with 71 (68.3%) cases and PCs with 31 (29.8%) cases and one case each of apical scar and pleomorphic adenoma. Age range of cases was 9 to 80 years (mean=35.6 ± 15.8years) with a peak at age group of 20-29 years. Females were more frequently affected with 51.9% of cases. PLs were most frequently diagnosed in the anterior maxillary region with 58 (56.9%) cases, while the most frequently involved tooth was the left maxillary central incisor with 23 (22.1%) cases.**

Conclusion: **Findings in this study are consistent with those of previous studies. It is important for all periapical pathological specimens to be submitted for histological examination to establish an accurate diagnosis and aid in the identification of sinister lesions that may present in the Periradicular region of teeth.**

Keywords: Periapical, Cyst, Granuloma, Histopathology, Jaw

INTRODUCTION

Periapical lesions (PLs) are among the most frequently occurring pathological lesions of the alveolar bone.[1-3] They occur in relation to the tissues around the apex of a tooth root, the periodontal membrane and the alveolar bone.[1,4,5] They are usually the sequelae of pulpal inflammation or necrosis with inflammatory mediators spreading through the apical foramen to initiate a periapical lesion.[1,6] Nevertheless, PLs may also be seen in rare instances unrelated to pulpal inflammation and present as a neoplasm.[7]

Subsequent to pulpal necrosis, there is colonization and proliferation of microorganisms within the root canal system with the release of bacteria toxins and inflammatory mediators into the periapical region.[6,8] These irritants initiate an inflammatory reaction in the periradicular tissues leading to the activation and proliferation of quiescent epithelial cell rests that form masses [9] which slowly enlarge and resorb periapical bone and can be visualized radiographically[1]. The ensuing proliferative activity of these masses is influenced by the release of inflammatory mediators (interleukin 1,6; prostaglandins; epidermal growth factor) by the host periapical tissues[9] either leading to the formation of periapical granulomas which are usually composed of soft tissue attachments, or the formation of periapical cysts that may have a semisolid or liquefied cystic area when centrally located cells of the epithelial mass lose their blood supply, undergo liquefactive necrosis and become lined by non keratinized stratified squamous epithelium.[7,9,10] (Figure 1). These features are usually seen irrespective of a previous endodontic therapy or if the tooth was extracted with the lesion undiagnosed or inadequately treated.[4]

Different pathological conditions may present as periapical radiolucencies,[3,4] however, undefined radiographic features commonly seen in both granulomas and cysts may pose some difficulty in making an accurate diagnosis.[11,12] (Figure 2). Histologically, PLs of endodontic origin consist mainly

of inflammatory cysts, granulomas, abscesses or apical scar tissue.[3] Periapical cysts (PCs) (Figure 3) and periapical granulomas (PGs) account for over 90% of periapical radiolucencies.[13] Clinico-radiographic features are inadequate to diagnose these lesions making histological examination essential.[3]

Presently, there are a few reports on PLs in our environment in which varying parameters were studied. Sede and Omoregie [14] compared the histopathological types of PLs obtained from periapical surgery involving anterior maxillary teeth with clinico-radiologic findings and treatment outcomes, while Gbolahan *et al.* [15] and Omoregie *et al.* [16] examined the incidence of PLs from extracted teeth. However, there is a dearth of studies on specimen recovered from both periapical surgery and extracted teeth. Therefore, this study aims to describe the clinicopathological features of PLs of the jaws with emphasis on the two most common types diagnosed at the Oral Pathology Department, University College Hospital Ibadan.

MATERIALS AND METHODS

This was a retrospective study in which the records and files of the Oral Pathology Department, University College Hospital, Ibadan, were examined and data of all biopsies of the periapical regions of the jaws over a 22 year period from January 1990 to December 2012 were extracted. For the purpose of this study, they were defined as specimens obtained from the periapical region of diseased teeth either following apical surgery or tooth extraction submitted by endodontists, oral surgeons, and periodontists. The haematoxylin and eosin (H&E) stained slides of the cases were obtained and reviewed by two experienced Oral Pathologists. They were categorised into three groups; periapical cyst, periapical granuloma and others (which consisted of PLs, other than PCs and PGs). The presence of a cavity, partially or wholly lined by epithelium was diagnostic for a periapical cyst, while the presence of granulation tissue in which isolated nests of epithelium may be found, was diagnostic for periapical granuloma.[17] Demographic data such as age, gender and site of lesion was also retrieved from patients' medical record. Site of lesion was sub classified into anterior and posterior parts (the portion of the jaws anterior to the canines were considered anterior, while those posterior to the canines were referred to as posterior). Also, patients aged $\leq$15 years were categorized as children, while those aged $\geq$16 years were categorized as adults.[18] Cases were analysed according to age, gender, site of the lesions and histopathological subtype using SPSS for windows (version 20.0; SPSS Inc. Chicago, IL). Level of statistical significance was set at $p \leq 0.05$.

RESULTS

A total of 1877 oral biopsies were reviewed over the study period of which 108 were PLs constituting 5.75% of all the biopsies. However, four of these were excluded from further analysis due to incomplete data.

Table 1: Histological diagnosis of PLs of the jaws

Histological diagnosis	Gender M	F	Frequency	%
Periapical cyst	20	11	31	29.8
Periapical granuloma	29	42	71	68.3
*Others	1	1	2	1.9
Total	**50**	**54**	**104**	**100.0**

** Apical scar and Pleomorphic Adenoma*

Table 2: Age group and gender distribution of PLs of the jaws

Age group	Gender M	F	Frequency	%
0-9	0	1	1	0.96
10-19	7	7	14	13.46
20-29	11	16	27	25.96
30-39	15	8	23	22.11
40-49	9	8	17	16.34
50-59	4	10	14	13.46
60-69	3	3	6	5.76
70-79	1	0	1	0.96
80-89	0	1	1	0.96
Total	**50**	**54**	**104**	**100.00**

PG was the most frequently diagnosed lesion with 71 (68.3%) cases, while PC constituted 31 (29.8%) cases (Table 1). One case each of apical scar tissue and pleomorphic adenoma made up the third group both constituting 1.9%. PLs lesions occurred in both the young and old within an age range of nine to 80 years (mean=35.6 $\pm$ 15.8years) and a peak at age of 20-29

Table 3: Site distribution of two most common PLs of the jaws

Site of lesion	Frequency	%
Anterior maxilla	58	56.9
Anterior mandible	4	3.9
Right posterior maxilla	4	3.9
Left posterior maxilla	7	6.9
Right posterior mandible	10	9.8
Left posterior mandible	19	18.6
Total	**102**	**100.0**

years (Table 2). However, PLs occurred infrequently in patients' ≤15 years old with only nine (8.8%) cases compared to those ≥ 16 years old who constituted 95 (91.2%) cases. There was no statistically significant difference in the age distribution of PLs (χ^2 = 40.335, df = 50, p = 0.837) as there was no difference observed in the occurrence of PLs in children and adults (χ^2 = 0.040, df = 1, p = 0.841). Similarly, there was no statistically significant difference in the mean age of both genders. (t= - 0.066, df= 102, p= 0.948).

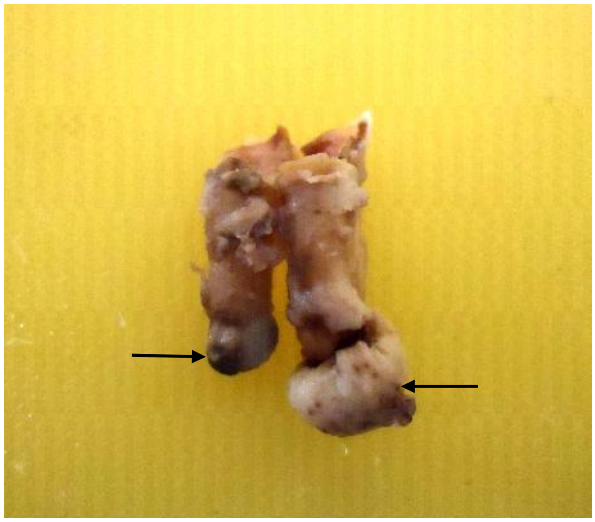

Figure 1: Grossly carious lower molar tooth of an eleven year old female with attached periapical lesion

Also, PLs was significantly more common in females with 51.9% of cases (χ^2 = 4.844, df = 1, p = 0.028). Table 3 shows the site distribution of the two common histological types of PLs of the jaws. Anterior maxillary lesions were the most common with 58 (56.9%) cases followed by 19 (18.6%) in the left posterior mandibular segment, and 10 (9.8%) in the right posterior mandibular segment. There was a statistically significant difference in the site distribution of PLs. (χ^2 = 12.441, df = 5, p = 0.029). The commonest PLs seen in the anterior maxillary segment was PG (36/58) and was also the most frequently diagnosed PLs in the left posterior mandibular segment with 14/19 cases. The most frequently affected tooth is the upper left central incisor (UL1) with 23/102 cases while PG was the most commonly associated PLs with the UL1 (15/23).

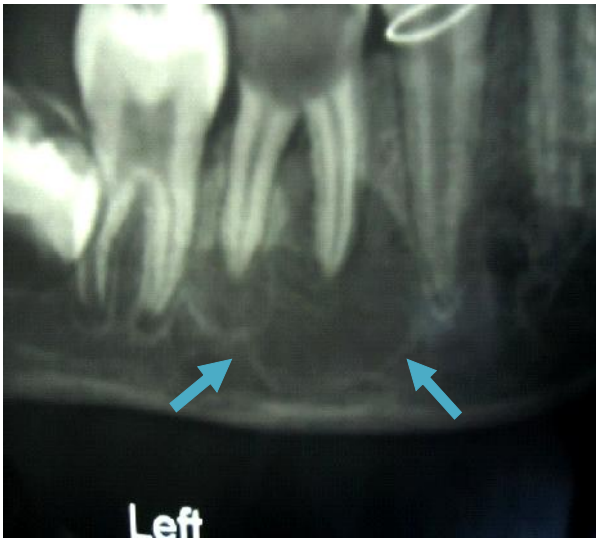

Figure 2: Extraoral radiographic view of same patient showing periapical lesion

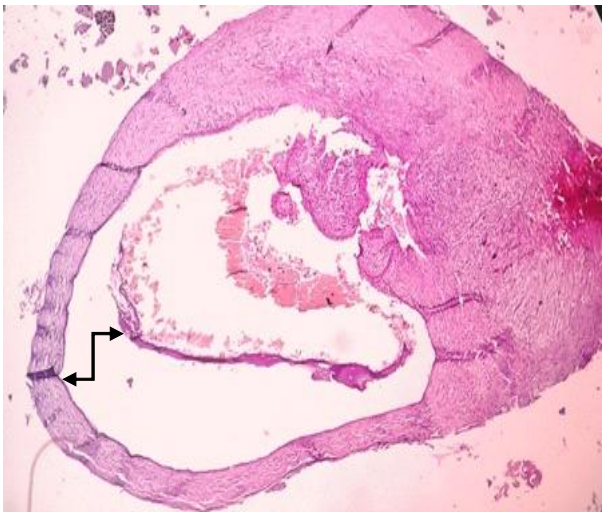

Figure 3: Photomicrograph of the same patient revealing a cystic cavity lined by stratified squamous epithelium, diagnostic of a periapical cyst.

DISCUSSION

Globally, PCs and PGs have been reported to be the most common types of apical pathology.[5, 11, 19,20] However, studies differ on the incidence of periapical lesions of the jaws. PCs have been reported as the predominant PLs in some studies,[5,11] while others have reported PGs as the most common.[19,20] In this study, we recorded a higher prevalence of granulomas (68.3%) over cysts (29.8%) which was in keeping with some studies [19,20] and in contrast with others that reported PCs as the predominant lesion.[5,11] Previous studies have attributed this variation in the prevalence of the two most common types of PLs to differences in the diagnostic criteria employed by the various studies.[12,21]

The mean age of PLs in our study was 35.6 years which was close to the 37.1 years reported by Ramanpreet *et al.* but was in contrast to Safi *et al.* and Lin *et al.* who reported a mean age of 30.2 years and 43.6 years respectively in their studies.[4,5,19] However, this study reported a peak incidence in the third decade

of life which was in agreement with Safi *et al.* but differed from the fourth decade recorded by Stockdale and Chandler; Ramanpreet *et al.*[4,5,12] Also, PLs were more frequent in females in this study. This is consistent with findings by Lin *et al.* as well as Stockdale and Chandler, [12,19] but different from the studies by Safi *et al.* and Ramanpreet *et al.* who both reported a male preponderance. [4,5] In view of the differences reported in literature about PLs, there may be no specific correlation between these lesions and patients demographics.

In this study, the maxilla was the most common site of PLs with 56.9% of cases which was consistent with findings from other studies.[4,5,19] The upper left central incisor was the most affected tooth in this study which differed from previous studies that reported the lateral incisors as the most commonly affected tooth.[12,19] The predominance of anterior maxillary lesions may not be unconnected with the presence of epithelial residues in this region[22] and the high incidence of trauma to anterior maxillary teeth because of their morphology and location [23,24] leading to a higher incidence of pulpal necrosis in this region than the posterior parts of the jaws.

Controversies exist in literature on the handling of PLs of the jaws.[25, 26] While no universally accepted protocol exist on subjecting these lesions to histopathological examination, periapical tissue is often submitted for histopathologic review only when there are concerns about the clinical diagnosis, instead of a routine microscopic examination to which all diseased tissue excised from humans are subjected.[15,27] This may account for the low number of periapical tissue submitted for histopathological diagnosis in this study, despite the fact that the centre where this study was conducted serves as the only referral centre for oral pathology laboratory services in the state. This can be attributed to the low utilization of oral biopsy services in our environment, probably due to lack of awareness of the inherent risks in discarding diseased periapical tissue and the high cost of histopathology examination for routine purposes. [15] Also, many dental practitioners may be unaware of the availability of these services and that neoplasms unrelated to pulpal disease are occasionally discovered in the periapical region which may mimick PLs [7] as confirmed by the diagnosis of pleomorphic adenoma in the periapical region of an upper left third molar tooth in this study.

CONCLUSION

PGs and PCs are the most frequently seen PLs as seen in this study with a predominance of PGs. However, it is still necessary for all periapical pathological specimens to be subjected to histological examination which is the gold standard to establish an accurate diagnosis and to categorize all tissues obtained from periapical surgical sites and apices of extracted teeth. This would allow for the identification of the rare lesions that mimic PLs in their presentation, thus providing patients with early diagnosis and appropriate management.

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