



Evaluation the effect of pulp polyp on periapical area of primary and permanent dentition: Periapical radiographic Iraqi study

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Abstract

Introduction: The pulp polyp (PP), also known as chronic hyperplastic pulpitis or proliferative pulpitis, is a type of inflammatory hyperplasia. It occurs in a vital tooth with a good blood supply when the pulp has been exposed to caries or trauma.

Objective: The aim of this study to evaluate different radiographic periapical changes of primary and permanent dentition in clinically detected pulp polyp patients.

Materials and Methods: Patients who were clinically diagnosed with pulp polyp were subjected to radiographic examination. Digital intraoral periapical radiographs of 70 patients with pulp polyp were taken. Various periapical changes of primary and permanent dentition in the digital radiographs were recorded . The data obtained was subjected to statistical analysis using SPSS version 16.0.

Result: All 70 patients showed definite periapical changes. Out of which periodontal ligament (PDL) space widening was seen in all 70 cases (100%), lamina dura discontinuity was observed in 50 cases (71.43%), periapical rarefying osteitis was noted in 20 cases (28.57%), condensing osteitis was accounted in ten cases (14.29%), periapical granuloma was observed in six cases (8.57%), hypercementosis was accounted in nine cases (12.86%) , root resorption and periapical cyst was observed in eight cases each (11.43%).

Conclusions: The results of the present study showed that majority of the pulp polyp patients observed at young age group in both gender and the majority of the pulp polyp patients were associated with definite periapical changes that suggested being a periapical lesion.

Key words: Proliferative pulpitis, periapical radiograph, primary, permanent, pulp polyp.

Introduction

The pulp polyp, also known as chronic hyperplastic pulpitis or proliferative pulpitis, is a type of inflammatory hyperplasia. It occurs in a vital tooth with a good blood supply when the pulp has been exposed to

caries or trauma¹. It is more common in teeth of children and adolescents in which pulp tissue has a high resistance and a good blood supply. It is symptomless except during mastication when pressure of the food bolus may

cause discomfort unless there is also periapical involvement presenting as a radiolucency or radiopacity².

Radiographic examination generally shows a large open cavity with direct access to the pulp chamber, periapical radiographic evidence when extensive or longstanding pulpal involvement may reveal an incipient chronic apical periodontitis. Intraoral periapical radiographs (IOPARs) are conventional screening aids, to visualize the tooth and the structures surrounding it. Though there are numerous advanced of imaging modalities to visualized the periapical region of the tooth radiographically, IOPARs still remain as the best routinely employed method for evaluation, diagnosis and treatment planning³. A digital intraoral radiographic system rather than a conventional X-ray film was used in this study as the resulting image was dynamic and therefore could be easily enhanced (contrast/brightness) to improve the diagnostic yield of the radiographic image^{4,5}.

Periapical diseases are closely associated with pulp tissue diseases. Apart from the direct effect of microorganisms, their metabolic products, toxins, enzymes and products of decayed pulpal and periapical tissue can act as antigens and induce immunological responses of cellular and humoral type. Thus, together with nonspecific inflammatory reactions, they have a significant role in the pathogenesis of pulpal periapical diseases⁶. Diseases of the pulp and periapical tissues are, in general terms, either inflammatory in nature or due to infections. An infection will also be associated with inflammation of the adjacent tissues. Hence an accurate diagnosis is essential to ensure appropriate treatment is provided⁷. As the disease progresses to involve the periapical tissues, periapical changes

are more likely to be evident radiographically and/or clinically⁷.

The aim of this study to evaluate different radiographic periapical changes of primary and permanent dentition in clinically detected PP patients.

Materials and Methods

Present radiographic observational study was conducted in the Collage of Dentistry (Al Mustansiria University). Seventy Patients (40 female and 30 male, age ranged from 10 to 45 years) were clinically diagnosed with PP were subjected to further radiographic examination. Digital intraoral periapical radiographs were taken by X pad digital machine (figure (1)) with long cone paralling technique (My Ray : new comfort in digital imaging ; digital X –ray sensor for :Cw5607-281, WDS (made in Italy)) . Exposure factors were constantly maintained at 0.25 second, 8 mA and 63 kV. All the digital intraoral radiographs were interpreted by a double experienced oral radiologist. Various periapical changes in PP patients were recorded. Inclusion criteria constituted the subjects clinically diagnosed with PP in any tooth irrespective of age and gender. Exclusion criteria constituted subjects with advanced periodontitis, teeth without antagonist and mesial or distal drifting. Subjects with systemic diseases were also excluded from the study. Diagnosis of PP was made on clinical examination; clinically PP shows chronic inflammation with a pedunculated or sessile mass of tissue protruding from large pulp exposure. The data obtained was subjected to statistical analysis by using SPSS Version 16.0.

Result

In present study ,most cases of PP in both female and male observed at young age group(10-14year) ,table(1) showed that . A total of 70 subjects; out of which, (29) 41.43% of PP subjects were symptomatic and observed in female (tables 2,3). Out of 70 subjects, 19 cases showed involvement of mandibular first molar (27.14%) , 14 cases in lower E (20%) , 30 cases in first molar (42.85%) and 20 cases in E (28.57%) cases showed involvement of mandibular third molar (5.71%). Hence PP was commonly seen in mandibular molar and lower E (tables 4,5; figure 2).

All 70 patients showed definite periapical changes. Out of which PDL space widening was seen in all 70 cases (100%), lamina dura discontinuity was observed in 50 cases (71.43%), periapical rarefying osteitis was noted in 20 cases (28.57%), condensing osteitis was accounted in ten cases (14.29%), periapical granuloma was observed in six cases (8.57%), hypercementosis was accounted in nine cases (12.86%) , root resorption and periapical cyst was observed in eight cases each (11.43%) (table 6; figure 3).

The table(7) show sensitivity and specificity with upper and lower jaws ,the largest value show in PA granuloma ,the sensitivity (78.6%) and the root resorption, PA cyst equal(73.3%) ,while the specificity in pdl space width (59.3%) . False negative rate (77.57%) in PA granuloma conversely false positive rate in pdl space width (58.32%).

Discussion

Hyperplasia of the pulp occurs almost exclusively in young teeth with an abundant blood supply and a large carious lesion. It is essentially an

overgrowth of granulation tissue and may result in the development of a pulp polyp. The hyperplastic tissue is relatively insensitive to touch due to having only a few nerves present. It may bleed easily depending on the degree of the tissue vascularization and the degree of ulceration ⁸ . A digital intraoral radiographic system rather than a conventional X-ray film was used in this study as the resulting image was dynamic and therefore could be easily enhanced (contrast/brightness) to improve the diagnostic yield of the radiographic image ⁴ . The present study results showed widening of PDL space in all cases and discontinuity of lamina dura in 71.43% cases which in conformity with results of study done by Suresh KV et al. in 2015 ⁹ .This could be because, in chronic PP, microorganisms and their metabolic products, from the pulpal tissue extend to the periapical area leading to inflammatory responses and bone destruction at the periapical area. Severity of radiographic changes in periapical lesions depends on the duration of PP, virulence of microorganism and bacterial activity. The present study results showed that the majority of PP patient had periapical changes , this was in accordance with a study done by Raphael Carlos Comelli et al. ¹⁰ , conducted a radiographic evaluation of chronic inflammatory periapical lesions in decayed teeth and with the studies that conclusion it is usually the specific characteristic of inflammatory lesions, in some cases, loss of lamina dura and root resorption can be seen ^{11,12} .

Condensing osteitis or focal chronic sclerosing osteomyelitis is the focal lesion in periapical area of the teeth with necrotic or inflamed pulps, extended caries, and restorations. Furthermore, this lesion may be seen in

the teeth with inappropriate root canal therapy and the teeth under occlusal trauma¹³. This lesion has a higher prevalence in the mandible than the maxilla, and is most frequently located in molars areas¹⁴. In radiographic feature, this lesion appears as a local homogeneous radiodensity in root apex area of the teeth with PDL widening. This lesion does not have radiolucent margin^{11,15}. The result of this study is in conformity with the conclusions of these researchers.

Ossifynig fibroma (OF) is a rare benign jaw neoplasm, which is constructed by connective tissue of variable cellularity with mineral component in the form of trabecular or woven bones. The posterior region of the mandible is the most common site of this lesion¹⁶. Based on the amount of calcified material, radiographic view could be mixed radiolucent and radiopaque¹⁷. This tumor is often asymptomatic, and in some cases lead to swelling of the cortical plate of the jaw¹⁸. In some cases, it can imitate endodontic lesions. In contrast to inflammatory periapical lesions, it has a spectrum of radiographic features and involves vital teeth¹⁹. The present study concluded that the majority of cases in lower jaw and in posterior region so in agreement with previous studies. This pulpal disease occurs almost exclusively in children and young adults, and it can occur in both the primary dentition and the permanent dentition²⁰. These findings were consistent with the results of the present study that concluded that the majority of the PP patients observed at young age group in both gender.

The hyperplastic response of the pulp to acute inflammation occur in young teeth²¹ but never in teeth of old patients²². This may be indicative of a good pulpal response. Presumably the young pulp does not become necrotic following exposure because its natural

defenses and rich supply of blood allow to resist bacterial infection²³. In this study 70 cases, out of which 29 cases (41.43%) symptomatic which proximated with finding of Suresh KV et al. in 2015⁹ that 44% of PP were symptomatic and suggestion of study that most of inflammatory periapical lesions have no symptom until acute inflammatory reaction, swellings or displacement of the adjacent teeth have been observed only in very large lesions²⁴ and radiographic evaluations are very important to differentiate lesions from each other. In this study PP has shown radiographic periapical pathologies in all the cases right from the initial PDL space widening to periapical granuloma. The limitation of the present study was the same limitation of previous study⁹ that, external factors like (anatomical noise and poor irradiation geometry), the small sample size and the imaging technique like CBCT removes these external factors; in addition, it improved detection of the presence and absence of periapical lesions²⁵.

Conclusions

The results of the present study showed that majority of the PP patients observed at young age group in both gender and the majority of the PP patients were associated with definite periapical changes that suggested to be a periapical lesion.

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Figure (1) : X pad digital machine.

Table (1): Distribution pulp polyp by age groups.

Age	Female				Male			
	No.	%	Mean	SD	No.	%	Mean	SD
10-14	16	40	9	2.78	10	33.33	8	1.82
15-24	10	25	19.6	2.796	6	20	19.5	2.16
25-34	8	20	35	30	9	30	29	2.645
35-45	6	15	39.3	40.03	5	16.67	37.8	4.658
Total	40	100	20.4	11.646	30	100	21.5	11.56

Table (2): Shows number of asymptomatic and symptomatic by gender.

Age	Female				Male			
	Asymptomatic		Symptomatic		Asymptomatic		Symptomatic	
	No.	%	No.	%	No.	%	No.	%
10-14	7	29.16	9	56.25	4	23.53	6	46.15
15-24	6	25	4	25	2	11.76	4	30.76
25-34	7	29.16	1	6.25	7	41.18	2	15.38
35-45	4	16.66	2	12.5	4	23.53	1	7.692
Total	24	100	16	100	17	100	13	100

Table (3): Shows number of asymptomatic and symptomatic by age groups.

Age	Asymptomatic		Symptomatic	
	No.	%	No.	%
10-14	11	26.82	15	51.72
15-24	8	19.51	8	27.58
25-34	14	34.14	3	10.34
35-45	8	19.51	3	10.34
Total	41	100(58.57)	29(41.43)	100

Table (4): Distribution of pulp polyp in different teeth of upper and lower jaw.

Total Age	Upper					Lower					Total
	E	D	M1	M2	M3	E	D	M1	M2	M3	
10-14	6	0	0	0	0	14	3	3	0	0	26
15-24	0	0	5	0	0	0	0	10	1	0	16
25-34	0	0	5	3	0	0	0	4	3	2	17
35-45	0	0	1	2	0	0	0	2	4	2	11
Total	6	0	11	5	0	14	3	19	8	4	70

Table (5): Distribution of pulp polyp by different teeth.

	No.	%
E	20	28.57
D	3	4.28
M1	30	42.85
M2	13	18.57
M3	4	5.71
Total	70	100

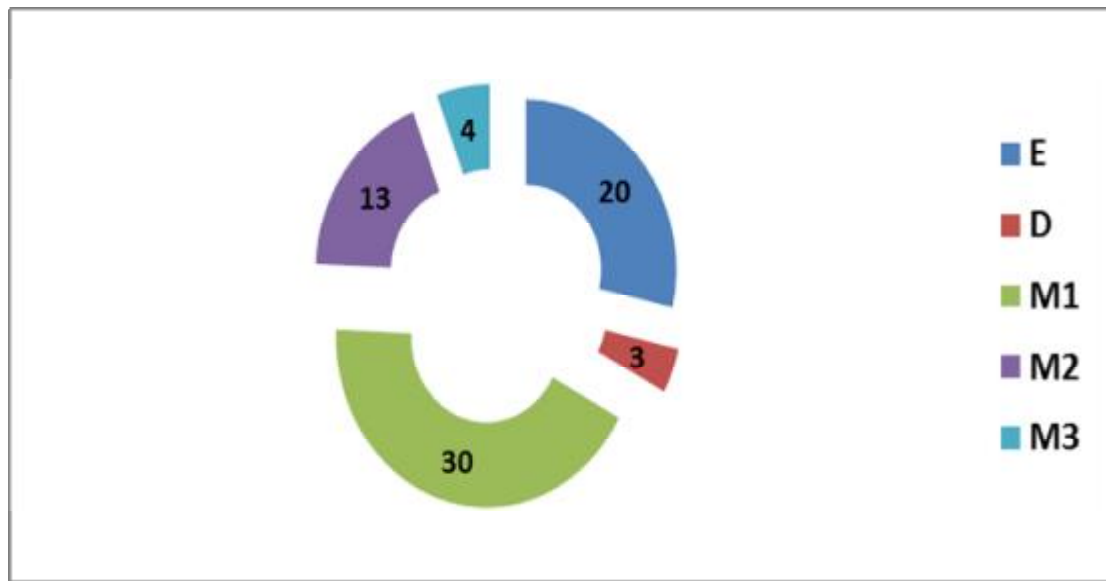
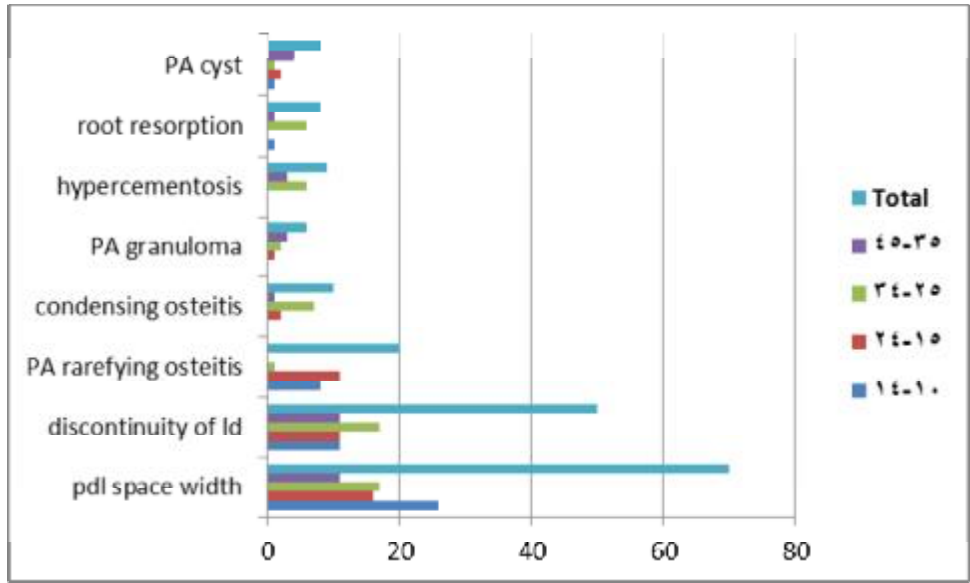


Figure (2): Distribution of pulp polyp in different teeth.

Table (6): Distribution of periapical changes by age groups.

Age	pdl space width	discontinuity of Id	PA rarefying osteitis	condensing osteitis	PA granuloma	hypercementosis	Root resorption	PA cyst
10-14	26	11	8	0	0	0	1	1
15-24	16	11	11	2	1	0	0	2
25-34	17	17	1	7	2	6	6	1
35-45	11	11	0	1	3	3	1	4
Total	70	50	20	10	6	9	8	8



Figure(3): Distribution of periapical changes by age groups.

Table (7) : Sensitivity and specificity with upper and lower jaws.

Age	pdl space width	discontinuity of Id	PA rarefying osteitis	condensing osteitis	PA granuloma	hypercementosis	root resorption	PA cyst
sensitivity	23.9	30.6	52.4	68.8	78.6	71	73.3	73.3
specificity	59.3	51	29.4	17.2	11.1	15.8	14.3	14.3
PV+	31.4	31.4	31.4	31.4	31.4	31.4	31.4	31.4
PV-	50	50	50	50	50	50	50	50
False negative rate	-22.91	-29.55	-51.381	-67.75	-77.57	-69.96	-72.33	-72.33
False positive rate	-58.32	-50.02	-28.4118	-16.24	-10.11	-14.78	-13.28	-13.28

False negative rate 1- sensitivity
 False positive rate 1- specificity
 PV predictive