

Pre-Eruptive Intracoronar Resorption: The Hidden Truth

Research Article

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Abstract

Aim: To evaluate the prevalence of pre-eruptive intra-coronal resorption (PEIR) in unerupted permanent teeth using a whole slew of panoramic radiographs of Chennai residents.

Design: Orthopantomograph (OPG) of 4700 patients from different parts of Chennai were retrospectively screened in the present study. Evaluation of patient details and OPG screening were done. Evaluation was based on the following dossier: age, sex, number of unerupted teeth, number of teeth showing PEIR defects, affected tooth type and number of PEIR in each radiograph.

Results: In total, 3568 OPG's had at least one unerupted tooth in 4700 patients, with a pervasiveness of 75.9%. Of the 3568 patients screened, 2103 were male and 1465 were female. Intra-coronal resorption was observed in 20 of 3568 subjects. The age groups ranged between 4 -15 years.

Conclusion: PEIR defects were observed in 20 OPG's. Early diagnosis of PEIR and its enhanced awareness helps in proper treatment planning of the affected teeth.

Keywords: Radiograph; Prevalence; Intra-Coronal; Panoramic; Resorption.

Introduction

PEIR is an anomaly presenting as an abnormal, well circumscribed, radiolucent area, often occurring in the coronal dentin adjacent to the amelo-dentin junction of unerupted teeth [1-3]. Most PEIR's are often detected as incidental findings in routine dental radiographs [4]. The depth of the lesion is adaptable and not often involves the pulp. Although some lesions progress rapidly, the others progress slowly before the tooth erupts into the oral cavity [5-8]. In most scenarios, a single tooth is affected, although cases involving several teeth have also been reported [9]. Most commonly affected teeth are molars and premolars [4].

PEIR can have three etiological factors (1) Chronic apical inflammation of primary teeth affecting the erupting successor, dental caries [10, 11, 12]; (2) Developmental mineralization defect of dentine [13, 12]; (3) Resorption superimposed on existing developmental defects [10-14]. The conventional theory describes the

lesion as an idiopathic external resorption of coronal dentin; resorptive cells originating from the surrounding connective tissue or bone penetrating the developing tooth through a breach in the reduced enamel epithelium and cause dentin resorption [13, 15, 16]. Factors to contemplate in timing the intervention include lesion size, expected time of tooth emergence, nature of the lesion (Static or Progressive), patient's caries risk [4, 17]. The prevalence of PEIR is of 3-6% of the patients and in 0.5-2% of the teeth [16, 18, 19].

Forensic odontology is an emerging science and has a greater scope of development. Many methods have been developed to determine age, sex and ethnicity of the person using dental tissues. Every individual has a unique dentition which can sometimes be attributed to the dental procedures. Dentition of a person serves the purpose of individual identification and comparison. Forensic identification of dentition is dependent on the availability and accuracy of antemortem dental records. By comparing antemortem

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and postmortem radiographs, forensic remains can be reliably identified. This raises the need for appropriate cataloging of dental records which is duly the duty of the dentist there by providing an information source in medico-legal, administrative, and for forensic purposes. Dental analysis plays an important role similar to fingerprint and DNA analysis.

To the best of our observation, there have not been any epidemiological studies of PEIR in Chennai residents. Consequently, the purpose of the current study was to observe for the presence of PEIR in unerupted teeth by examining OPG's of 4-15 year old Chennai patients. In addition, these radiographs might help in forensic identification of PEIR in the future.

Materials and Methods

Ethical Approval:

The protocol for the current study was approved by the Institutional Review Board (SRB/MDS/PEDO/18-19/0007) from October 2018 - December 2018.

Sample Selection:

In this retrospective study, standard OPG's were taken as they are commonly taken in clinical practice for patients with developing dentition, and show the maximum number of teeth in a single radiograph. The sample for the current study consisted of 4700 OPG's [2754 (59%) boys; 1946 (41%) girls] from different parts of Chennai with an age range of 4-15 years.

Inclusion Criteria:

Presence of at least one unerupted tooth with full crown formation, age less than 15 years. Supernumerary teeth and unerupted third molars and were included. Patients with documented medical and dental anomalies such as amelogenesis imperfecta, dentinogenesis imperfecta, and hypophosphatemic rickets were eliminated from the study. Radiographs which were not of optimal diagnostic quality were also excluded. Due to lack of definition of teeth in the anterior region of OPG, incisor teeth were excluded from examination. Also, radiolucencies on mandibular molars showed a linear appearance resembling buccal grooves were not recorded as PEIR defects.

Radiographic Examination:

OPG's used in this study were taken from different parts of Chennai. They were taken as standard OPG's. The examiner was

trained to detect PEIR defects using OPG's which were not part of the study, and were assessed twice for calibration and reproducibility purposes. The intra-examiner correlation coefficient was measured using Kappa statistics which found to be 0.9.

A tooth beneath the bone and/or mucosa was considered as an unerupted tooth and those deviated from the normal eruption pathway were considered as ectopically positioned. According to the classification scheme of a study [19], the size of each defect relative to coronal dentine thickness was noted, whether it is (1) within one-third of the dentin thickness (2) or two-third of the dentin thickness (3) or extended through the full dentin thickness of the crown.

Results

A total of 4700 OPG's were evaluated in the current study. In total, 3568 OPG's had at least one unerupted tooth with a pervasiveness of 75.9%. Of the 3568 OPG's screened, 2103 were male and 1465 were female. Intra-coronal resorption was identified in 20 teeth with a frequency of 0.5% (Table-1) The localization of intracoronal radiolucencies is shown in Table-1. Intra-cornal resorption was identified in both maxillary and mandibular teeth. 9 affected teeth were observed in maxilla (0.2%), where as 11 were in the mandible (0.3%). PEIR were seen to be equally distributed on both sides. Intra-coronal radiolucency by tooth type, location and size of the defect is documented according to male and female cases in Table-2. Of the 20 intra-coronal resorption, 9 (45%) were seen in canine, followed by 7 molar teeth (35%) and 4 premolar teeth (20%). For the sizes of the defects scored relative to the width of dentin thickness, most prevalent (50%) was a score of 2 and scores of 1 and 3 were equally prevalent (25% each). (Table-2) (Fig-1,2,3).

Discussion

To the best of our observation, the present study was the first to screen for PEIR in Chennai residents. The tooth pervasiveness of PEIR in the present study (0.5%) was similar to that of other studies using OPG's (Table-3) [3, 16, 19, 20, 21, 22, 23]. This low pervasiveness could suggest that all OPG's should be screened routinely for PEIR. The unerupted permanent incisors were not included in the current study as they were not well defined in the OPG's which were similar to those in Australian [3] and Jordanian studies [22].

There were no obvious racial and gender differences in the prevalence of PEIR defects. A study (Seow et al 1999a) [3] reported that the PEIR was observed higher in mandibular first molar

Table 1. Demographic analysis, prevalence and localization of intra-coronal resorption.

Patients examined Gender	Patients with at least one unerupted teeth	Intra-coronal resorption			
		Present(%)	Absent(%)	Present(%)	Maxilla(%)
Male	2103	651	13	6	6
Female	1465	481	7	3	5
Total	3568(75%)	1132(24%)	20(0.5%)	9(0.2%)	11(0.3%)

Table 2. Distribution of patients with PEIR and radiographic features.

Patient	Sex	Age(years)	Affected tooth	Location of PEIR	Size of PEIR
1	Male	10	13	Distal	2
2	Male	13	28	Distal	2
3	Female	14.5	18	Mesial	1
4	Male	7	25	Central	2
5	Male	15	28	Mesial	1
6	Male	8	45	Distal	1
7	Female	7	13	Distal	2
8	Female	6.5	34	Central	2
9	Male	9	43	Central	2
10	Female	10	37	Distal	1
11	Male	11	33	Central	3
12	Male	13.5	38	Mesial	1
13	Female	7	33	Central	3
14	Female	8	33	Central	3
15	Male	6	44	Mesial	2
16	Female	14	18	Central	2
17	Male	9	13	Distal	3
18	Male	10	13	Mesial	2
19	Male	15	48	Central	2
20	Male	7	33	Mesial	3

Score-1: Within one-third of the dentin thickness.

Score-2: Two-third of the dentin thickness.

Score-3: Extended through the full dentin thickness of the crown. (PEIR, Pre-eruptive intracoronalresorption).

Table 3. Prevalence studies of Pre-eruptive intracoronal radiolucencies.

Author, year	Study design			Population		Tooth prevalence (%, n/N)
	Type of study	Radio graphy	Teeth excluded	Country	Age (years)	
Seow et al., 1999a [3]	Prospective	Bitewing	Incisors & third molars	Australia	6-10	2% (163/9919)
Ozden&Acikgoz, 2009 [16]	Retrospective	OPG	None	Turkey	14-73	0.95% (28/2922)
Seow et al., 1999b [19]	Prospective	OPG	Incisors	Australia	3.5-25	0.5% (57/11767)
Wang et al., 2013 [20]	Retrospective	OPG	N/A	China	3.6-12.5	0.7% (6/8171)
Uzun et al., 2014 [21]	Retrospective	OPG	None	Turkey	18-69	NA
Al-Batayneh et al., 2014 [24]	Retrospective	OPG	Incisors	Jordan	6-15	0.62% (128/20788)
Umansky et al., 2016 [25]	Retrospective	OPG	None	Israel	4-53	NA
Present study	Retrospective	OPG	Incisors	India	4-15	0.5% (20/4700)

(4%), mandibular first premolar (2%) and mandibular second molar (1%) compared to maxillary premolars and molars [3]. Another study (Ozden&Acikgoz 2009) disclosed that the most frequently damaged teeth were the mandibular second molar, followed by maxillary second premolar, maxillary central and maxillary canine [16]. However, in contrast to other studies, the prevalence of PEIR was found to be more in mandibular canine followed by maxillary canine, maxillary third molar, mandibular third molar, maxillary and mandibular premolars. In the present study, most PEIR were found in the central aspect of the crown (66.6%) similar to the results seen in previous studies [16, 19, 21, 22, 23]. However, various studies evaluated that PEIR were also commonly found in the

distal [20] and mesial [3, 24, 25] aspects of the crown.

In the current study, all lesions were detected beneath amelodentin junction and extended to depths within dentine, as evaluated in previous studies (Hata et al. 2007, Grundy GE et al.1984, Seow et al. 1999b, Mc Donald & Avery 2000) [8, 13, 19, 26] Seow et al 1999b,. [19] described that 40% of the defects continued to more than two-thirds of the thickness of the coronal dentine [19]. In the present study, most prevalent (50%) was the score of 2 and the scores of 1 & 3 were the same (25% each).

Present study involved radiographs specifically from the Dravidi-

Figure 1. Score 1 PEIR defect located in the distal aspect of unerupted right mandibular second premolar crown.



Figure 2. Score 2 PEIR defect located in the central aspect of the unerupted left mandibular first premolar crown.



Figure 3. Score 3 PEIR defect located in the central aspect of unerupted left mandibular first premolar crown.



an population. Considering the large number of samples involved, the results of the study can be extrapolated to the Dravidian community. Further, longitudinal studies have to be conducted keeping the forensic aspect in mind as the presence of PEIR will help in assessing, handling and evaluation of previous records of the individual.

Conclusion

The pervasiveness of PEIR in the present study was 0.5%. Teeth with highest prevalence of PEIR were the mandibular canines. The lesion was found primarily in mandibular teeth, as a single lesion, in the central part of the crown and had at least two-third of dentin thickness. Although, PEIR has a relatively low pervasiveness in the present study, it must be ensured that clinicians are aware of this lesion. A careful analysis during radiographic examination of unerupted teeth is highly required for early diagnosis and treatment of the lesion.

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