

## Unrevealed Caries in Unerupted Teeth: A Prevalence Study

### Abstract

**Background:** Preeruptive caries are an abnormal, well-circumscribed, radiolucent area, occurring within the coronal dentinal tissue close to the dentinoenamel junction of unerupted teeth. OPGs are commonly taken in children for assessing the dental age and eruption sequence. It can be used as a good diagnostic source for detection of PEIR defects. **Aim:** The aim of this study is to determine the prevalence of Preeruptive intracoronal dentin radiolucencies in unerupted permanent teeth from orthopantomogram. **Settings and Design:** A total of 1000 standard orthopantomographs of children below 12 years of age were collected and examined. **Methodology:** The OPGs were examined for PIER defects in the unerupted teeth. The prevalence of PEIR defects was assessed with respect to age, sex, tooth, and the arch involved. **Statistical Analysis:** The data obtained were tabulated and analyzed. The prevalence was calculated in percentage. **Results:** The participant prevalence was 13.6%. The teeth prevalence was 1.20%. The majority (38.9%) of defects were seen in the in the mandibular first premolar. Almost half of the lesions were located on the mesial side (52.3%), with a size less than one-third of dentine thickness (53%). **Conclusion:** PIER defects constitutes an important part of anomalies associated with unerupted teeth and thus needs a proper understanding of its prevalence, etiology, manifestations, and complications. These defects are usually overlooked by clinicians while interpreting radiographs; however, it is of utmost importance to promptly diagnose these defects thus preventing further complications.

**Keywords:** OPG, preeruptive intracoronal dentine radiolucencies, unerupted teeth

### Introduction

Preeruptive intracoronal dentine radiolucency/resorption (PEIR) is a term used to describe an anomaly presenting as an abnormal, well-circumscribed, radiolucent area, occurring within the coronal dentinal tissue close to the enamel–dentine junction of unerupted teeth.<sup>[1-3]</sup>

Three possible etiological mechanisms have been proposed in the literature. These include the following: (a) an acquired pathological condition occurring after coronal development due to chronic apical inflammation of primary teeth, dental caries, or coronal resorption;<sup>[4-6]</sup> (b) a localized developmental mineralization defect of dentine with or without an accompanying enamel defect during crown formation;<sup>[6,7]</sup> and (c) resorption superimposed on existing developmental defects.<sup>[8]</sup> The most common etiology of this defect is the spread of infection from the infected primary teeth into the unerupted permanent teeth.

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These defects have been reported as early as 1941, but only four large-scale studies have been conducted to determine the prevalence of this condition till date.<sup>[9]</sup> Although radiographs are routinely taken in children, the unerupted teeth are not examined meticulously. It is essential to increase the awareness among dentists regarding the occurrence of this lesion, for prompt diagnosis and treatment planning. There is a paucity of data on the prevalence of PEIR defects, and thus, this study aims to determine the prevalence of PEIR defects from OPGs in children <12 years of age.

### Methodology

A total of 1000 standard orthopantomograms (OPG) of children below 12 years of age were collected. An unerupted tooth was defined as one covered by bone and/or mucosa and below the occlusal plane. All radiographs were examined by the same examiner and recorded for the number of unerupted teeth and the teeth showing PEIR defects.

The lesion was then divided into grids using grid guidelines in Photoshop C S4

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Software and the location, and the grade of the lesion was determined and classified.

- Location of the defect in the coronal dentine was classified as follows:
  - Mesial
  - Central
  - Distal aspects.
- The relative size of the lesion with regard to the mesiodistal dimension which was divided into three grades as follows:
  - Grade 1: Less than one-third of the dentine thickness
  - Grade 2: Between one-third and two-thirds of the dentine thickness
  - Grade 3: More than two-thirds of dentine thickness.

The data obtained were tabulated and analyzed. The prevalence was calculated in percentage.

### Results

A total of 1000 children’s OPGs were included in the study of which 136 children were detected with PEIR defect, giving participants prevalence of 13.6%. The total number of unerupted teeth was 11,300 of which 136 teeth showed the defect giving teeth prevalence of 1.20%. The maximum prevalence of the defect was in the mandibular first premolar [Figure 1] followed by mandibular second premolar [Figure 2] and then maxillary second premolar. No defects were found in the maxillary central incisor, lateral incisor, and mandibular central incisor. The distribution of defects is illustrated in Table 1.

The most common location of the defects was the mesial one-third followed by distal and central [Table 2].

It was found that 53% of the defects extended less than one-third of the dentin thickness (Grade 1) followed by 44% of the lesions extending between one-third and two-third of dentin thickness (Grade 2) [Table 3].

### Discussion

Although PEIR defects have been recognized as a clinical finding for more than 70 years, most of the dental literature related to these defects are in the form of case reports.<sup>[9,10]</sup>

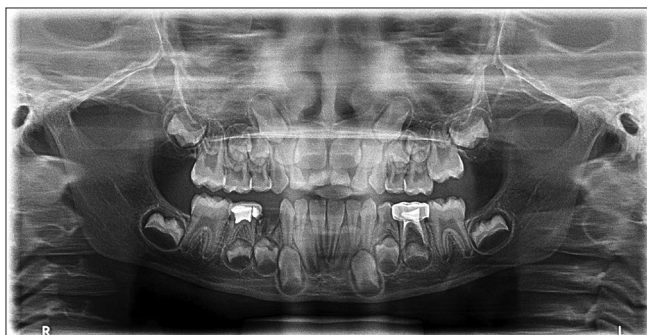


Figure 1: PEIR defect in relation to mandibular first premolar defect seen in mesial one-third of the tooth, with a Grade 1 size \*PEIR: Preeruptive intracoronal dentin radiolucency

This study is one of the few studies which evaluated the prevalence of PEIR defects.

The tooth and participant prevalence of PEIR defects in the current study was 1.2% and 13.6%, respectively.

**Table 1: Distribution of preeruptive intracoronal radiolucency defects in maxilla and mandible**

| Teeth    | Number of PEIR defects | Number of unerupted teeth | Percentage |
|----------|------------------------|---------------------------|------------|
| Maxilla  | 64                     | 6072                      |            |
| 2 PM     | 22                     | 1224                      | 34.37      |
| 1 PM     | 19                     | 1272                      | 29.68      |
| 2 M      | 13                     | 1247                      | 20.31      |
| C        | 9                      | 948                       | 14.06      |
| 1 M      | 1                      | 145                       | 1.56       |
| LI       | 0                      | 1021                      | 0          |
| CI       | 0                      | 215                       | 0          |
| Mandible | 72                     | 5228                      |            |
| 1 PM     | 28                     | 1197                      | 38.89      |
| 2 PM     | 24                     | 1103                      | 33.33      |
| 2 M      | 11                     | 1078                      | 15.27      |
| C        | 7                      | 589                       | 9.72       |
| 1 M      | 1                      | 129                       | 1.39       |
| LI       | 1                      | 949                       | 1.39       |
| CI       | 0                      | 183                       | 0          |

\*PEIR: Preeruptive intracoronal dentin radiolucency; 1 PM: First Premolar; 2 PM: Second Premolar; 1 M: First Molar; 2 M: Second Molar; C: Canine; LI: Lateral incisor; CI: Central incisor

**Table 2: Location of defects**

| Location | n (%)     |
|----------|-----------|
| Mesial   | 71 (52.3) |
| Distal   | 51 (37.5) |
| Central  | 14 (10.2) |

\*PEIR: Preeruptive intracoronal dentin radiolucency

**Table 3: Extent of lesion within dentinoenamel junction**

| Size    | n (%)   |
|---------|---------|
| Grade 1 | 72 (53) |
| Grade 2 | 44 (44) |
| Grade 3 | 20 (20) |

\*PEIR: Preeruptive intracoronal dentin radiolucency



Figure 2: PEIR defect in relation to mandibular second premolar defect seen in central one-third of the tooth, with a Grade 2 size \*PEIR: Preeruptive intracoronal dentin radiolucency

Seow *et al.* in Brisbane, Australia, used panoramic radiographs to diagnose these anomalies and reported a participant and tooth prevalence of 3% and 0.5%, respectively.<sup>[1]</sup> However, in another study, by him in the same population, he utilized bitewing radiographs and reported a higher participant prevalence and a tooth prevalence of 6% and 2%, respectively.<sup>[11]</sup> Although the use of bitewing radiographs showed a higher prevalence, it is not a feasible method. Nik and Abul Rahman reported a tooth prevalence of 2.1% and participant prevalence of 27.3%.<sup>[12]</sup> The higher prevalence rate was possibly due to the inclusion of the third molars as the sample age was up to 25 years. Whereas in the current study, the age group included was up to 12 years, and thus, third molars were not considered.

Earlier studies have indicated that the most commonly affected teeth were the premolars, which is in accordance to the current study in which the mandibular premolars displayed the highest prevalence.<sup>[13,14]</sup> In contrast, Seow *et al.* found that the most commonly affected tooth was the mandibular second molar followed by mandibular first molar.<sup>[11]</sup>

Studies by Al-Batayneh, Özden and Acikgoz, Nik and Abul Rahman reported that the majority of the defects were commonly located in the mesial aspect (>50%).<sup>[12-14]</sup> In the current study, 52.3% of the lesions were located in the mesial aspect, 37.5% in the distal, and 10.2% in central location.

This study also noted that of 53% of the lesions was less than one-third of the dentin thickness, and 20% of the defects extended to greater than two-third of the dentin thickness. Özden and Acikgoz observed that 39.3% of the lesions had extended to greater than two-third of the dentin thickness which could be due to the sample age included (47 years),<sup>[13]</sup> the lesions would have increased in size due to its progressive nature.

Although the etiology of the PEIR defects is unclear, there are various etiological mechanisms proposed in the literature. Majority of studies suggest that preeruptive lesions are resorptive in nature due to the presence of multinucleate cells, osteoclasts, and other chronic inflammatory cells.<sup>[1,7]</sup> The presence of persistent infection in the primary teeth, leads to periradicular spread of infection into the bone covering the unerupted teeth, in turn leading to the formation of osteoclast type of cells. These inflammatory cells then invade the dental follicle covering the unerupted teeth leading to the formation of PIER defects.<sup>[1,11]</sup> It is also speculated that preeruptive dentin defects may originate as developmental anomalies in which parts of the tooth are not mineralized completely.<sup>[6]</sup> Studies have indicated that preeruptive dentin defects occur more frequently due to local factors rather than systemic factors and a higher prevalence of PEIR defects are seen in ectopically positioned and impacted teeth as compared to teeth in a normal position.<sup>[6]</sup>

The management of preeruptive dentin radiolucencies depends largely on the extent of radiolucency at the time of initial diagnosis. Several researchers suggest that a rapidly progressive and large lesion requires immediate surgical exposure and curettage of defects followed by lining with calcium hydroxide and restoration with dental cements or amalgam.<sup>[1,11,15]</sup> However, if the lesion is small and the tooth is close to eruption, it may be advisable to continuously monitor the tooth, till it erupts to achieve occlusal access for the restoration of the defects.<sup>[10]</sup>

## Conclusion

The participant prevalence of PEIR defects was 13.6%, and the tooth prevalence was 1.2%. The high prevalence of this condition indicates the need for increased awareness and recognition of this condition during routine radiographic evaluation. Preventive measures include the treatment of early infections in primary teeth, thus preventing periradicular spread of infection into the unerupted permanent teeth. This study is a milestone to spread awareness on the prevalence and clinical importance of PIER defects, thus aiding to explore the various treatment modalities.

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## Conflicts of interest

There are no conflicts of interest.

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