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Cone Beam Computed Tomographic Analysis of Pre-Eruptive Intracoronal Resorption in a Primary Tooth: A Very Rare Case

Süt Dişinde Görülen Pre-Eruptif İntrakoronal Rezorpsiyonun Konik Işınlı Bilgisayarlı Tomografi ile Analizi: Çok Nadir Bir Vaka Raporu

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ABSTRACT Pre-eruptive intracoronal resorption (PIR) is very rare in primary teeth, and the etiology and factors associated with the resorptive process remain unclear. PIR is a developmental defect of the teeth that results in an abnormal, well-circumscribed, radiolucent lesion within coronal dentinal tissue. This paper describes a PIR defect in a 9-year-old male child. The dental examination showed an unerupted maxillary right primary second molar. Cone beam computed tomography (CBCT) revealed PIR in the primary second molar. The aim of this case report is to introduce, for the first time, a PIR defect in primary teeth with three-dimensional (3D) CBCT imaging in a pediatric patient and to shed light on the diagnosis and treatment of PIR defects for pediatric dentists.

Key Words: Cone-beam computed tomography; tooth resorption; pediatric dentistry; abnormalities

ÖZET Pre-eruptive intrakoronal rezorpsiyon süt dişlerinde oldukça nadir rastlanılan bir durumdur ve rezorpsiyon sürecinin etyolojisi ve bununla ilişkili faktörler halen daha tam bilinmemektedir. Pre-eruptive intrakoronal rezorpsiyon, koronal dentin dokusunda radyolüsens iyi sınırlı ve anormal bir lezyon olup dişin gelişimsel bir defektidir. Bu vaka raporu ile 9 yaşındaki bir erkek çocuktaki süt dişinin pre-eruptif intrakoronal rezorpsiyonu sunulmaktadır. Yapılan dental muayene, sağ maksiller premolar bölgesinde sürmemiş bir süt 2. molar dişinin olduğunu göstermiştir. Yapılan konik ışınlı bilgisayarlı tomografi incelemesi ile bu dişte pre-eruptif intrakoronal rezorpsiyon görülmüştür. Bu çalışma bir çocuk hastada sürmemiş süt dişindeki intrakoronal rezorpsiyonun konik ışınlı bilgisayarlı tomografi ile incelenmesini aktarmayı amaçlamıştır.

Anahtar Kelimeler: Konik ışınlı bilgisayarlı tomografi; diş rezorpsiyonu; çocuk diş hekimliği; anormallikler

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Pre-eruptive intracoronal resorption (PIR) is a developmental defect of the teeth that results in an abnormal, well-circumscribed, radiolucent lesion within coronal dentinal tissue.[1] PIR occurs close to the dentino-enamel junction of unerupted teeth in the occlusal aspect of the crown.[1] The etiology and factors associated with the initiation of the resorptive process remain unclear.[1-2] However, some studies suggested that PIR was associated with local factors, such as chronic apical inflammation and ectopic eruption, or systemic factors.[3-4]

A number of case reports described this defect in permanent teeth, using panoramic or bitewing radiographs.[1-6-8] As conventional radiographs

produce only a two-dimensional (2D) view of teeth and adjacent structures, they cannot provide a clear view of the crowns of unerupted teeth. Hence, defects might be missed, especially in mixed dentition.[3] Recently, cone beam computed tomography (CBCT) has been used to evaluate the internal and external morphology of teeth.[5] CBCT offers high-resolution and three-dimensional (3D) views, without superimposition, thereby overcoming the limitations of 2D imaging. CBCT provides a practical tool for noninvasive, 3D reconstruction imaging and an accurate representation of internal and external dental anatomy.

To the best of our knowledge, there have been no case reports of CBCT imaging of PIR defects in primary teeth. The aim of this case report was to evaluate a PIR defect in the primary teeth of a pediatric patient with 3D CBCT imaging and to shed light on the diagnosis and treatment of PIR defects for pediatric dentists.

CASE

A 9-year-old male was referred to the Department of Pediatric Dentistry at Izmir Katip Çelebi University, Izmir, Turkey for evaluation of the maxillary left central incisor. The first dental examination revealed a central incisor that had been intruded 2 years earlier. A medical history revealed no systemic disease or allergies. A general dental examination showed that the maxillary right first molar inclined to mesial and that there was no primary second molar on this side. A panoramic radiograph showed an unerupted maxillary right primary second molar. As this meant the maxillary right second premolar could not erupt, we decided to extract the unerupted maxillary right primary second molar. To clarify the localization of the tooth prior to maxillofacial surgery, CBCT images of the dentition were obtained (Figure 1). The patient's parents provided informed consent was obtained prior to the radiography, and the CBCT examinations were performed according to the principles of the Declaration of Helsinki. Only the researchers had access to the acquired data. All the images were obtained using a NewTom 5G CBCT machine (NewTom 5G; QR, Verona, Italy). The

FIGURE 1: First orthopantomogram (OPG) of the patient.

CBCT images were analyzed with the inbuilt software (NNT), using a Dell Precision T5400 workstation (Dell, Round Rock, TX) with a 32-in Dell LCD screen (resolution of 1280 × 1024 pixels) in a darkroom. The CBCT images revealed intracoronal resorption of the unerupted maxillary right primary second molar (Figure 2).

The localization of the tooth was detected using the CBCT images. After appropriate local anesthesia (1.8% lignocaine with 1:100,000 adrenaline), the overlying mucosa was surgically removed, and the tooth was extracted. In a follow-up examination 6 months later, the dental examination showed that the maxillary right first molar was still inclined to mesial and that the second premolar was embedded. Thus, the patient was redirected to an orthodontic consultant (Figures 3, 4).

DISCUSSION

Except for a single case report, a PubMed search did not retrieve any screening studies of the prevalence of PIR in primary teeth.[6] Thus, the present study seems to be the first report of the detection of PIR in a primary tooth with CBCT imaging. The absence of the detection and reporting of PIR defects in primary dentition may be because routine radiographs are not routinely performed in young children (i.e., younger than 4–5 years).[6] According to our recent study, CBCT images are superior to panoramic radiographs in diagnosing PIR defects. In addition to low radiation exposure, CBCT images offer accurate 3D multiplanar, cross-sectional views of dentition that can reveal accurate relationship of structures, underlying anatomical and pathological abnormalities.[7] Most importantly, by

FIGURE 2: Three different aspects (axial, coronal, and sagittal) of the unerupted primary tooth with a PIR defect.

revealing the actual position and measurement of the anatomical structures, it eliminates crude estimation and interpretations, allowing precision surgery to be performed.[8-9]

In permanent teeth, the reported prevalence of teeth affected by PIR defects range from 0.7% to 27.3%. [4-10] The widespread variation in the reported prevalence may be explained by the different cohorts studied, variations in the diagnostic techniques used, and diagnostic difficulties. PIR defects are classified according to the size of the defect, with resorption less than one-third of the dentin thickness classified as I, between one-third and two-thirds of the dentin thickness classified as II, and extending more than two-thirds of the dentin thickness classified as III.[2] In the present case, the primary second molar tooth with a PIR defect was classified as PIR II. In the previous case report of a PIR defect in a primary tooth, the defect was classified as PIR I.[6] The difference may be related to multiple local factors, unknown etiological factors, and radiological techniques. According to the CBCT images, the defect of the primary tooth was at the distal and palatal aspect of the crown.

FIGURE 3: Patient's last OPG after tooth extraction.

FIGURE 4: Maxillary image after tooth extraction.

The etiology of PIR is controversial and unclear. According to one theory, it may be due to pressure-induced local damage to the protective layer of a tooth caused by an abnormal tooth position, resulting in resorptive cells easily reaching the dentinal layer of the tooth and causing resorption.[11] Ectopic positioning of affected teeth or adjacent abutting teeth can cause local pressure, which may then enable resorptive cells to invade the dentin through enamel fissures or via the cementoenamel junction. A previous study found a highly significant association of ectopically positioned permanent molars with pre-eruptive dentin radiolucencies, suggesting that the ectopic positions of these molars may act as a trigger factor for PIR. It may be hypothesized that pressure resulting from an abnormal position induces sufficient local damage to the tooth protective covering to allow re-

sorptive cells to enter through the tooth and reach the dentin. In the present case, the pressure applied by the erupting premolar over the submerged primary molar may have caused intracoronal resorption.[11]

Regardless of the cause of a PIR defect, the clinician must choose the best treatment option that suits each case separately. According to Seow and Hackley, the clinical significance of PIR defects are rapid rate of progress and needs endodontic treatment, so a careful radiographic examination of unerupted teeth is essential for early diagnosis and treatment.[6] According to some studies, surgical intervention and restoration of an unerupted tooth or after eruption root canal treatment are recommended.[2-6] In the present case, the maxillary primary second molar tooth with PIR was extracted due to obstruction of the maxillary second premolar. The patient was then referred to an orthodontist for additional dental treatment.

Conflicts of Interest

All authors deny any conflicts of interest related to this study.

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