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Case report

Multiple impacted third molars with pre-eruptive intracoronal resorption in geriatric patients: Two case reports

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ABSTRACT

Background: *Pre-eruptive intracoronal resorption (PEIR) is a rare condition usually detected through an incidental radiographic finding. The etiology and pathogenesis of this phenomenon are not fully understood.* ***Purpose:*** *To describe two cases in which multiple impacted third molars with PEIR defects were identified.* ***Cases:*** *Female patients aged 77 and 82 years, respectively, were presented with dental issues. Radiolucencies in the dental crown areas of the impacted maxillary and mandibular third molars were initially detected on the panoramic radiographs. Cone-beam computed tomography (CBCT) was performed to better evaluate the impacted teeth. The results showed that the intracoronal defects extended through more than two-thirds of the thickness of the coronal dentin.* ***Case Managements:*** *Considering the patients' age and their asymptomatic status, a conservative approach with radiographic follow-up was considered most appropriate. Four-year follow-up checks revealed that the teeth remained asymptomatic in both patients.* ***Conclusion:*** *This case report confirms that PEIR can affect impacted third molars, even in elderly patients. CBCT images are preferred for diagnosing PEIR defects because this method provides an accurate assessment of internal tooth anatomy. With an accurate diagnosis of asymptomatic PEIR, the lesion can be monitored.*

Keywords: *cone-beam computed tomography; diagnostic imaging; geriatric dentistry; impacted tooth; tooth resorption*
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INTRODUCTION

Pre-eruptive intracoronal resorption (PEIR) is an anomaly that most often occurs within the dentin of unerupted teeth, although the enamel may also be involved in advanced cases.[1,2] This finding is uncommon, and most PEIR lesions are identified incidentally during routine radiography.[3] Studies have revealed the prevalence of PEIR to be 0.7% to 9.5% by subject and 0.5% to 2% by tooth, depending on the tooth type and radiographic technique employed.[2,4,5] One study that used cone-beam computed tomography (CBCT) revealed PEIR in 15% of a Turkish population.[6] Of the 48 intracoronal resorption lesions investigated, 30 (63%) were in third molars.

The etiology of PEIR remains unclear, but histologically it is a resorptive process that is driven by activated osteoclast-like giant cells on the pulpal wall of the dentin[7] or originates from undifferentiated cells in the developing dental follicle.[8] Predisposing factors, such as ectopic positioning of the tooth or the adjacent teeth, may create local pressure that induces the resorption process to invade the dentin along enamel fissures or through the cementoenamel junction.[1]

The treatment options for these lesions are monitoring without treatment until the tooth erupts, surgical exposure with treatment of the lesion, including endodontic treatment as needed, or extraction.[9] In the case of unerupted teeth, PEIR lesions have often been considered aseptic since there is no bacterial invasion.[2] Most static cases have been addressed using a preventative, non-invasive approach of monitoring without intervention.[7,10]

This report presents two cases of PEIR involving bony impacted third molars in elderly patients treated at Baskent University, Faculty of Dentistry, Department

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of Endodontics. Our intent was to describe the clinical and radiographic features of this condition to help guide clinicians in diagnosis and to suggest a preventative, non-invasive approach of monitoring. The ethics committee of Baskent University, Ankara, Turkey, waived the ethical approval of this study because it was a case report. Informed consent was obtained from the patients for publication of this case report and any accompanying images.

CASE 1

A 77-year-old Caucasian female patient was referred for treatment with the primary complaint of discomfort on the right side of her mandible. An informed consent was obtained for further investigation. Her medical history included osteoporosis, rheumatic mitral stenosis, and a kyphoplasty procedure for a lumbar compression fracture. Her regular medications were triamterene 50mg daily, atenolol 75mg daily, acetylsalicylic acid 100mg daily, and furosemide 40mg on alternate days. A panoramic radiograph revealed secondary caries in the patient's mandibular right second molar and second premolar teeth, which had been restored with a fixed partial denture. The same radiograph also showed radiolucencies in the dental crown areas of the maxillary right and left third molars, which were impacted (Figure 1). The affected teeth were asymptomatic, and no sinus tract or communication was identified between them and the oral cavity. CBCT was performed to better evaluate the impacted teeth. All CBCT images were taken using a Morita 3D Accuitomo 170 (J Morita, Japan) according to the following parameters: 90 kVp, 5 mA, voxel size: 0.08 mm, field of view (FOV) size: 40x40 mm. The i-Dixel software (v.2.2.1.6, Morita, Japan) was used to analyze the images on a medical monitor (Eizo Radiforce MX270W, Eizo Corporation, Japan). This showed that the defects extended through the full dentin thickness of the crowns (Figures 2 and 3). A connection between the surrounding bone and the defect was noted in the distal intracoronal area of the maxillary right third molar (Figure 2). The enamel of the maxillary left third molar was intact (Figure 3).

CASE MANAGEMENT 1

The positions of the lesions, the patient's clinical history, and her historical and current radiographic findings supported a diagnosis of PEIR. Because of her age and asymptomatic status, monitoring the maxillary right and left third molars was considered the most appropriate treatment. Four years after presentation, a telephone follow-up was carried out due to the COVID-19 pandemic and the patient's poor health. No radiographs could be taken, but it was verbally confirmed that her affected teeth remained asymptomatic. It was decided that follow-ups would be conducted periodically in order to monitor the patient's affected teeth.

CASE 2

An 82-year-old Caucasian female patient had a primary complaint of discomfort in the right posterior area of her maxilla. An informed consent was obtained for further investigation. Her medical history included osteoporosis, hypertension, hyperlipidemia, iron deficiency anemia, right and left temporal meningioma, and surgery for a right femur fracture. Her regular medications included nifedipine 30mg daily, atorvastatin 40mg daily, acetylsalicylic acid 100mg daily, pantoprazole 40mg daily, and zoledronic acid 5mg once yearly. A panoramic radiograph revealed that her first molar and second premolar teeth had been treated endodontically (Figure 4). The same radiograph showed radiolucencies in the dental crown areas of the maxillary and mandibular right third molars, which were impacted and ectopically positioned (Figure 4).

CBCT was performed exclusively on the maxillary right third molar in accordance with the patient's request; however, the imaging also encompassed the mandibular right third molar. All CBCT images were taken using a Morita 3D Accuitomo 170 (J Morita, Japan) according to the following parameters: 90 kVp, 5 mA, voxel size: 0.08 mm, FOV size: 40x40 mm. The i-Dixel software (v.2.2.1.6, Morita, Japan) was used to analyze the images on a medical monitor (Eizo Radiforce MX270W, Eizo Corporation, Japan). The results showed that the intracoronal defect in the maxillary right third molar extended through more than two-thirds of the thickness of the coronal dentin (Figure 5). Additionally, a small part of the adjacent enamel was found to be affected by the resorption, and a connection between the surrounding bone and the defect was noted on the distal and occlusal aspects of the maxillary right third molar (Figure 5). The CBCT analyses also showed that the defect extended through the full thickness of the dentin of the crown of the mandibular right third molar, and the occlusal portion of the defect was in contact with the surrounding bone (Figure 5). One of the images also revealed a hypodense area associated with the roots of the second molar (Figure 5).

CASE MANAGEMENT 2

The patient's complaints diminished after root canal therapy was performed on the maxillary right second molar. Due to her age and asymptomatic status, monitoring the maxillary and mandibular right third molars was considered the most appropriate treatment. A four-year follow-up examination revealed that the affected teeth remained asymptomatic, and there was no sinus tract or communication between the impacted teeth and the oral cavity. Radiographic examination showed no changes in the extent of the lesions (Figure 6). CBCT was not performed in accordance with the patient's request, and it was also desired to comply with the ALARA (as low as reasonably achievable) principle.[11]

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Figure 1. A panoramic radiograph of patient 1 reveals radiolucencies in the dental crown areas of the maxillary right and left third molars, which were impacted (arrows).

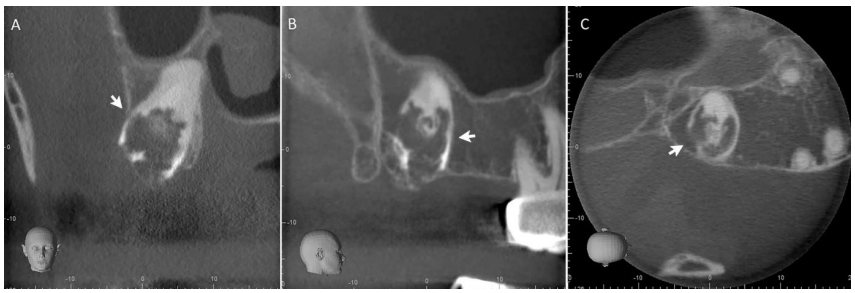

Figure 2 CBCT images of patient 1: Coronal (A) and sagittal (B) images of the maxillary right third molar show the defect extending through the full dentin thickness of the crown (arrows); an axial view (C) reveals a connection (arrow) between the surrounding bone and the defect in the distal intracoronal area.

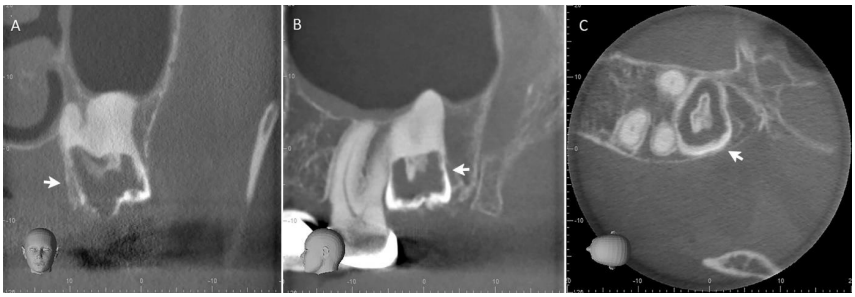

Figure 3. CBCT images of patient 1: Coronal (A) and sagittal (B) views of the maxillary left third molar show the defect extending through the full dentin thickness of the crown (arrows); an axial view (C) shows the enamel intact (arrow).

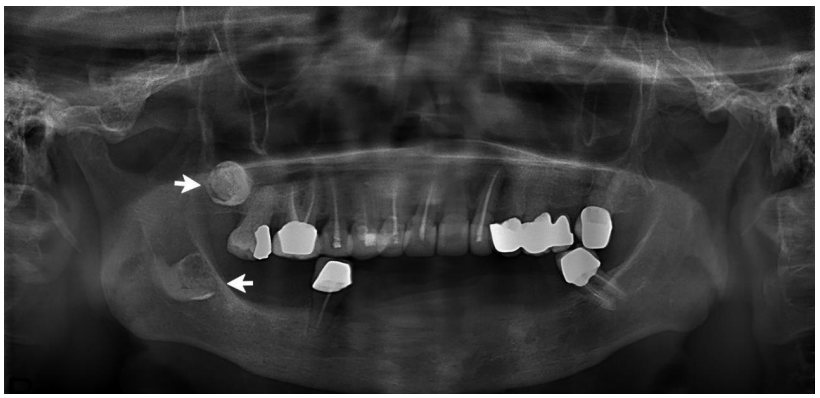

Figure 4. A panoramic radiograph of patient 2 reveals radiolucencies in the dental crown areas of the maxillary and mandibular right third molars, which were both impacted (arrows).

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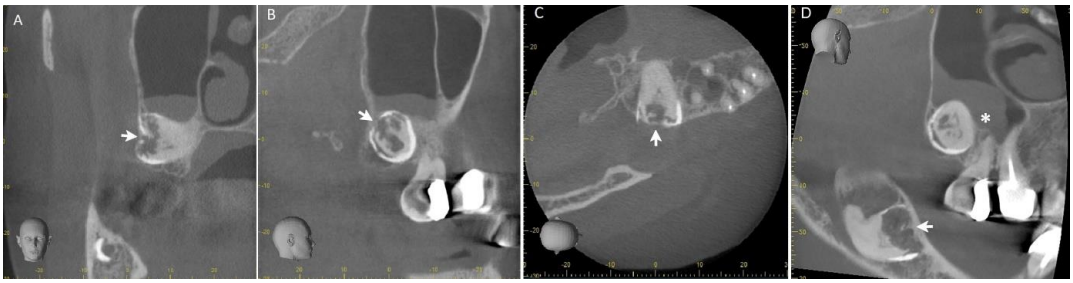

Figure 5. CBCT images of patient 2: Coronal (A), sagittal (B), and axial (C) views of the maxillary right third molar show the intracoronal defect extending through more than two-thirds of the thickness of the coronal dentin (arrows). Additionally, a small portion of the adjacent enamel was affected by the resorption, and a connection between the surrounding bone and the defect was noted on the distal (B) and occlusal (C) sides of the maxillary right third molar (arrows). A hypodense area (asterisk) related to the roots of the maxillary right second molar was also identified (D). The CBCT image (D) of mandibular right third molar shows the defect extending through the full dentin thickness of the crown and the occlusal portion of the defect in contact with the surrounding bone (arrow).

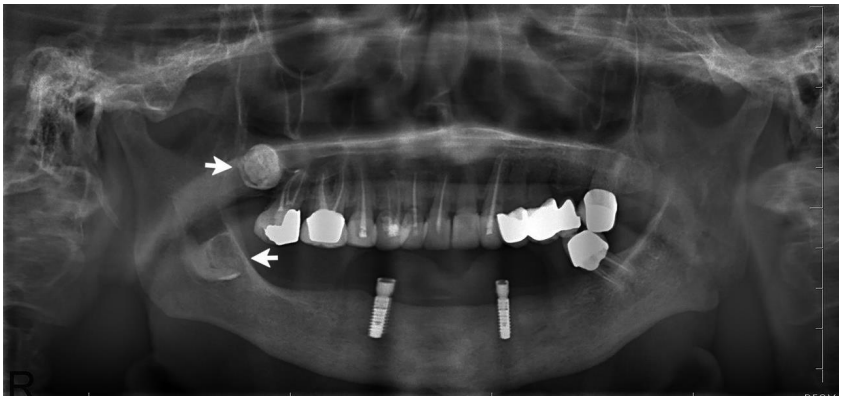

Figure 6. A panoramic radiograph taken during patient 2's four-year follow-up exam revealed no changes to the extent of the lesions in her maxillary and mandibular right third molars (arrows).

DISCUSSION

In both cases, and as described previously,[1,12] all lesions were below the dentinoenamel junction and extended from this part to various depths through the dentin. A previous report noted that 40% of 57 defects extended through more than two-thirds of the thickness of the coronal dentin.[1] We also observed this with the lesions in our two patients.

A previous study also found no association between PEIR lesions and medical conditions.[1] Interestingly, both our patients with PEIR had a history of osteoporosis. Estrogen withdrawal has a critical role in the pathogenesis of post-menopausal osteoporosis, inducing bone remodeling with a negative calcium balance.[13] Decreased levels of estrogen are due to the unbalanced production of the receptor activator known as nuclear factor kB ligand (RANKL), which both induces differentiation of hemopoietic precursor cells into osteoclasts and stimulates bone resorption activities.[14,15] Nishida et al.[16] reported a common regulatory mechanism for resorptions from mineralized tissues in bone and teeth, as their study revealed RANKL expression in odontoclasts located on resorbing root dentin. In addition, RANKL has been shown to play a key role in the differentiation of odontoblast-like cells into odontoclast-like cells or the function of odontoclasts.[17] Further investigations with larger study groups are needed to identify whether PEIR defects are associated with osteoporosis.

CBCT enables high-resolution images and three-dimensional evaluation and has been demonstrated to be an accurate technique for diagnosing and assessing PEIR. The sizes and locations of PEIR defects may not be accurately visualized using two-dimensional radiography techniques, such as bitewing, periapical, and panoramic radiographs.[5] This suggests that in cases where PEIR defects are identified or suspected, conventional two-dimensional radiographs should be analyzed in detail, and CBCT should be performed when available.[8] It is highly recommended that CBCT be utilized to diagnose and evaluate the resorptive lesions to determine the treatment needed, as specified in position statements by the American Association of Endodontists/American Association of Oral and Maxillofacial Radiology[18] and the European Society of Endodontology[19] concerning the use of CBCT in endodontics.

It has been widely reported in the literature that the quality of CBCT images changes when different FOVs or voxel sizes are selected.[20] CBCT with a limited FOV, which is typically used for endodontic diagnosis of PEIR,

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ranges in diameter from 40 to 100 mm. The voxel size is generally smaller for a limited FOV (0.08–0.2 mm), thus providing higher resolution and greater utility for detecting and monitoring PEIR lesions. Various factors can clinically affect detection of PEIR on CBCT images, such as the observer's experience level, different CBCT parameters, viewing conditions, and artefacts.[21]

In this case report, an invasive treatment method was not preferred due to the age of the patients, the aseptic conditions of the teeth, and their asymptomatic nature. A conservative perspective with meticulous clinical and radiographic follow-up is usually preferred in these cases. An invasive approach, such as restorative treatment, endodontic treatment, and extraction, can be postponed until the teeth erupt and/or get infected.[8,9]

The rate of PEIR defects affecting the third molar teeth can be different in the same individual. Generally, only a single tooth has been reported to be affected,[1,3] although some studies have shown more than one affected tooth in the same individual.[5,6] No explanation has been offered for this finding, but it is conceivable that teeth with longstanding or large PEIR defects would have been reported less frequently, especially in geriatric patients, because such teeth in these patients are more likely to have been extracted.[8]

In conclusion, our two cases confirm that PEIR can affect impacted third molars, even in elderly patients. CBCT is preferred for diagnosing PEIR defects because this modality enables the accurate assessment of internal tooth anatomy. If asymptomatic PEIR is accurately diagnosed, the lesion can be monitored.

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