

# Raise Your Brow on a Missing Tooth from Dental Arch—How far CBCT is Helpful?

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## Abstract

The aim of this article is to discuss the sequelae of a missing tooth from normal series of dental arch and the importance of cone beam computed tomography (CBCT) in diagnosis and treatment planning in such cases. We also correlate the position of an impacted maxillary premolar as seen on panoramic radiography with CBCT. Routine imaging modalities like intraoral periapical, occlusal, and panoramic view often give inadequate information which can be misleading to the surgeon. Exact location of an impacted/missing tooth and its relation to dental and vital structures which was previously a challenge to assess by the clinician, can now be very well interpreted with CBCT. In this report, a case of impacted maxillary premolar is highlighted with its image on the panoramic radiograph, its exact location/position on CBCT, and how surgical removal was accomplished.

## Keywords

- ▶ CBCT
- ▶ image-guided surgery
- ▶ impacted maxillary premolars

## Introduction

Premolars are the third most common type of occurrence when talking about impacted or unerupted teeth.<sup>1</sup> The incidence of maxillary first premolar is estimated to be about 0.5% among all teeth considered to be impacted.<sup>2</sup> Premolars that have been impacted can cause a variety of issues like aesthetic disharmony, decreased masticatory efficiency, poor oral hygiene, and more. Above all, an impacted maxillary premolar lies very close to the nose and maxillary sinus, thus posing a risk of difficulties that may require additional surgical procedure. As agreed by many authors in the past, every impacted tooth should be removed if they exceed their normal age of eruption as they have the

potential to transform into cyst or tumor. We present here a case of impacted premolar located at an aberrant position diagnosed and treated by image-guided surgery using cone beam computed tomography (CBCT).

## Case Report

A 25-year-old female patient reported to department with chief complaint of pain in the left upper back tooth region since 15 days and swelling since 1 week on the left side of the face. On examination, 26 was found tender on percussion while 25 was missing from the arch. Swelling over the cheek was extending from the infraorbital region to the left upper lip. There was pus discharge intraorally from

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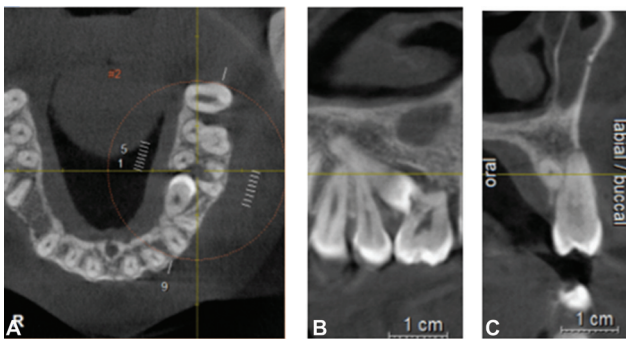
**Fig. 1** Orthopantomograph (OPG) showing impacted 25 at unusual position.

region of 26. All of the other findings were within normal limits.

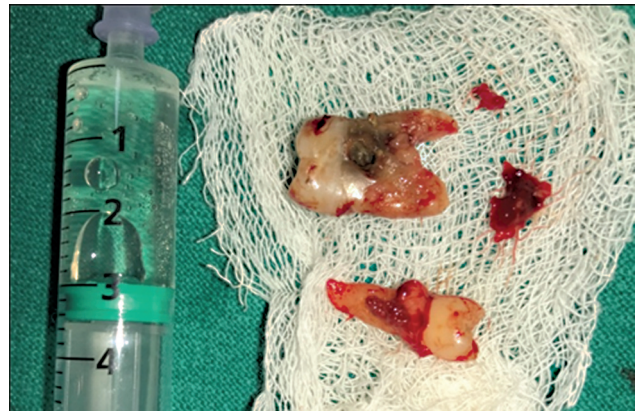
An orthopantomograph was advised. This two-dimensional radiographic image displayed the presence of an impacted 25 at an unusual position and a relationship with 26 (→ Fig. 1). It was, however, limited in terms of revealing giving a three-dimensional (3D) view of the placement of the impacted teeth and their effect on surrounding teeth and their adjoining structures/tissues. As literature is devoid of proper classification of impacted premolars, it was deemed necessary to get a descriptive analysis of this tooth. Hence, we advised for an axial, coronal, and sagittal CBCT view of the entire maxillary arch.

On radiographic interpretation of the axial view of CBCT we found that the coronal portion of the impacted maxillary premolar was located on the buccal aspect while the root was inclined palatally (→ Fig. 2A). The total length of the tooth which needs to be extracted, shape of the crown and root, number of roots, and its relation with the adjacent tooth/root was clearly seen in this view. On interpretation of the sagittal view of CBCT we found that there was a considerable amount of bone between the tooth and floor of the maxillary sinus (→ Fig. 2B). The root of 24 was displaced and the crown of 25 was almost in contact with the palatal root of 26 (→ Fig. 2C). Twenty-six was also found to be carious with external resorption.

After analyzing the details of the location of the impacted tooth (25) and carious 26, a treatment plan was now formulated. Image-guided surgery was executed with buccal approach. A crevicular incision was made on the buccal side, extending from 24 to 27 with releasing incision at 24 creating a



**Fig. 2** (A–C) Axial, sagittal, and coronal views of cone beam computed tomography (CBCT) showing exact location and relation of premolar with adjacent structures.



**Fig. 3** Extracted 26 showed the presence of external resorption.

three-cornered flap. A mucoperiosteal flap was reflected and raised. Twenty-six was elevated and extracted using maxillary forceps. The extraction socket showed the presence of crown of 25 which was teased and elevated carefully with straight elevator. The entire tooth (25) was removed with minimum trauma to investing tissue. Hemostasis was achieved, closure was done using 3–0 silk suture along with compression to avoid blood collection in dead space. The extracted 26 showed the presence of external resorption caused by the pressure of 25 (→ Fig. 3). The healing was uneventful.

## Discussion

The tooth is said to be impacted when it passes its chronological age of eruption and is not able to erupt in oral cavity and withstand the functional demand. The treatment options of these impacted teeth may include diagnosis, adequate clinical and radiological examination which may prevent further complications like space loss, crowding, or collapse of the dental arch. A reliable diagnostic tool is required which may be helpful in detecting and treating unerupted teeth. The observations must include the diagnosis of congenitally missing permanent teeth, interpreted as generalized or localized, the successor tooth has a viable form and orientation, eruptive potential, or if there is delayed eruption, it may be due to overretained deciduous teeth or incomplete root resorption, the amount of space available for teeth to erupt, and the presence of overlying soft tissue or bone.<sup>1</sup>

Any tooth missing from the dental arch shall raise the suspicion of an impacted tooth associated with/without pathology. Clinician as well as the patient should be vigilant in such a finding as early as possible to avoid the possible sequelae. In our case, if diagnosis of the missing tooth had been found early, we could have saved a permanent maxillary molar.

To arrange the extraction of an impacted tooth, appropriate imaging studies are required. These radiographs are helpful in the diagnosis and surgical planning of impacted teeth. The morphological changes associated with these teeth and their relationship to their adjoining structures can be visualized. Mainly, intraoral periapical (IOPA), occlusal, and panoramic radiographs are the most commonly useful radiographic modalities for treatment planning in

this type of surgical procedure. But its limitations are variable such as magnified and distorted image, superimposition, and suboptimal imaging of structures which are not located in focal trough.<sup>3</sup>

Nowadays, CBCT has been a very important diagnostic tool for improving accurate angulation of the tooth and its relation to its surrounding structures. Familiarity and full utilization of its many options can provide the dentist with a valuable treatment planning tool. When compared with other radiographic CT modalities, CBCT produces good quality 3D images with little distortion with comparative low cost from other CT diagnostic tool with substantially lesser radiation dose.<sup>4</sup>

With the help of multiplanar views (multiplanar reconstruction) it is possible for the surgeon to obtain the accurate location of the impacted tooth and to establish the relations with the adjoining structures. The CBCT radiography is useful for the diagnosis, treatment planning, and assessment of surgical complications in the management of impacted teeth.<sup>5</sup> The close approximation of the impacted tooth (premolar) with the root of permanent maxillary canine and the nose is an important finding for the surgical procedure which may prevent further complication such as bleeding, maxillary infections, and adjacent tooth root resorption.<sup>6</sup> The limitation with panorama radiographs is related with the accuracy in estimating the number of roots and root anatomy, therefore CBCT was shown to be more accurate than panoramic radiography in determining the number of roots. CBCT made it possible to interpret the images in 3D view. The surgeons can describe and evaluate about diseases, unusual malformations, and impactions with greater detail and accuracy. The 3D images are required prior to the procedure so as to know the angulation of impacted teeth and relation with the adjacent vital structures.<sup>7</sup> These 3D images are helpful for the surgeon to establish an optimal clinical approach in treating impacted premolars.

## Conclusion

The congregation of diagnostic information is very important in decision making when concerned to its surgical

procedures. As a result, choosing the right radiograph is crucial in surgical planning and yields more foreseeable outcome. The 3D imaging using CBCT can precisely assess the accurate location and angulation facilitating exact surgical management. The exact location and angulation of the tooth provides better information so as to get the best possible direction of access, and may further reduce the invasiveness of the surgery. Surgeons can eliminate the presumption of complication if CBCT imaging is available. CBCT should not be performed frequently for the assessment of unerupted teeth, but it may be advised when traditional intraoral radiography fails to provide appropriate information.<sup>8</sup>

## Conflict of Interest

None declared.

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