



# USE OF CBCT IN DIAGNOSIS AND ORTHOSURGICAL MANAGEMENT OF IMPACTED MAXILLARY INCISORS: A CASE REPORT


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## ABSTRACT

This case report describes the use of CBCT in the diagnosis and treatment of impacted maxillary left incisors in a 10 year old boy which were impacted because of over-retained deciduous left central incisor. An initial 2D radiograph revealed rotated and impacted maxillary incisors. However, the precise location and exact distance between the two incisors was not revealed so a CBCT was advised which helped in assessing precise location of impacted teeth and also proper planning for surgical exposure and orthodontic traction of the impacted teeth that resulted in eruption and proper incisor positioning.

**Key words:** Impacted incisors, CBCT, Orthosurgical Management.

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## INTRODUCTION

With boon of technology in 21<sup>st</sup> century everything has been evolving and each passing day brings a new technology which serves to improve our lives. One such emerging technology is the three-dimensional imaging. The introduction of three-dimensional imaging in dentistry is characterized by cone beam computerized tomography and it has brought a remarkable impact on diagnosis and treatment planning [1]. Until recently diagnosis and treatment planning of impacted teeth has been based on combination of palpation and along with conventional two-dimensional (2D) radiographs [2]. Since there are several disadvantages with 2D images, including distortion, inability to detect resorption of adjacent teeth, superimposition of structures, errors in projection, imaging artifacts, and variation in magnification, the application of

3D imaging technology called Cone Beam Computed tomography (CBCT) scanning has been suggested in the management of impacted teeth as well [3,4].

As maxillary incisors and canines are the most prominently visible teeth in an individual's smile they are called as the 'social six'. Therefore, normal eruption, position and morphology of these teeth are crucial to facial esthetics and phonetics [5]. The missing upper incisors appear unattractive and this may have an effect on self-esteem of the patient and general social interaction and thus it is important to detect and manage the problem as early as possible in the best possible way [6].

The present case report describes the use of this 3D imaging technology - CBCT in diagnosis and orthosurgical management of impacted maxillary incisors.

## Case report

A 10 year old boy reported to the Department of Pedodontics and Preventive dentistry, Sri Aurobindo College of Dentistry, Indore M.P with a chief complaint of discoloured tooth in the upper front teeth region. The child

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had no relevant past medical or dental history and parents could not recall any history of trauma. Intraoral examination revealed an angle's class I molar relationship with over-retained deciduous left maxillary central incisor (fig 1) and no apparent arch length discrepancy in maxillary arch and mild crowding in mandibular arch.

Neighbouring central and lateral incisor showed normal eruption. An initial 2D radiograph revealed rotated and impacted maxillary incisors (fig 2).

However the precise location and exact distance between the two incisors was not revealed. So a CBCT was advised to the patient. CBCT revealed that the maxillary central incisor was distoangularly oriented and labially placed and the lateral incisor was mesioangularly oriented and palatally placed. Also in contrast to the 2D imaging where the two teeth appeared to be superimposing each other thus blocking each others's eruption, CBCT revealed that there was a distance of 1.2 mm between them (fig 3(a), (b), (c), (d)).

After considering all the possible treatment alternatives, surgical exposure followed by orthodontic

extrusion of the impacted incisors was planned. The CBCT image confirmed the feasibility of orthodontic extrusion treatment plan. After the extraction of over-retained deciduous tooth, bonding of MBT 018 5x5 brackets (Orthix, US orthodontics, USA) was done the upper arch. Under local anesthesia full thickness mucoperiosteal flap was reflected. Surgical exposure of the the labial surface of impacted incisor was done. After proper isolation bracket was light cure on 21 and lingual button on 22 on exposed crown surface and 0.16 x 0.22 NiTi wire was placed. The lingual button on 22 was attached with a ligature wire. The flap was returned to the same position and sutured (fig 4).

After 1 week healing was normal and the sutures were removed and E chain was places between 11 and 21. Through the combined effect of surgical exposure and orthodontic traction, the impacted maxillary left central and lateral incisor was successfully positioned into proper alignment in the dental arch by the end of 2 months (fig 5). After treatment completion, the exposed incisor had acceptable gingival contour and attached gingiva.

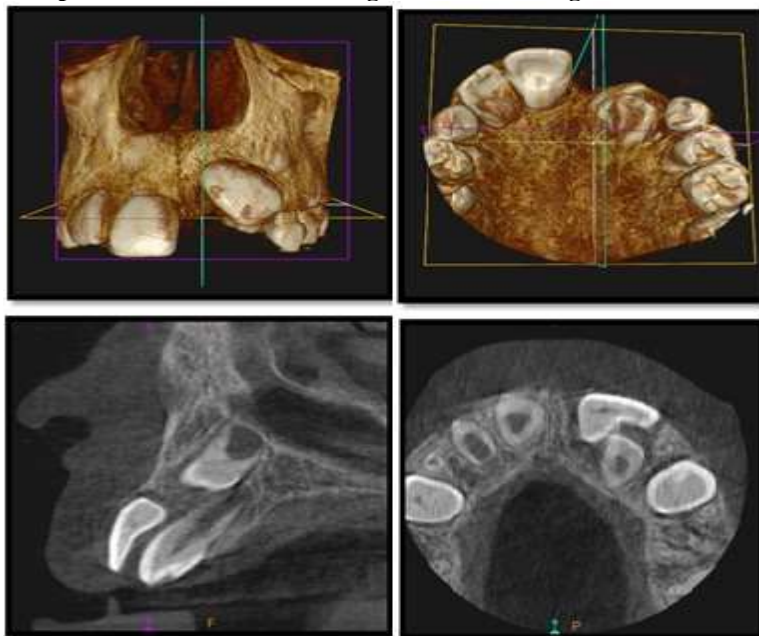
**Fig 1. Pre-treatment intra oral picture showing an over retained deciduous maxillary left central incisor and clinically missing 21, 22**



**Fig 2. OPG revealed rotated and impacted maxillary incisors**



**Fig 3. CBCT images of the impacted teeth at different angulations revealing their exact location and orientation**



**Fig 4. Surgical exposure followed by bracket placement**



**Fig 5. Three-month post treatment intraoral view of the patient showing well aligned left central incisors**



## DISCUSSION

Impaction is the total or partial lack of eruption of a tooth well after the normal age of eruption [7] and the frequency of maxillary incisor impaction has been reported between 0.06% to 0.2% [8,9]. Several causes have been mentioned in the literature regarding the failure or delayed eruption of maxillary incisors. In the present case over-retained deciduous teeth appeared to be the cause of impaction of maxillary incisors. After thorough clinical and radiographic examination, followed by CBCT (KODAK-CS-9300 CBCT MACHINE) it was decided that combined ortho surgical approach comprising of both surgical and orthodontic treatment to bring unerupted maxillary incisor into position was required. The conservative surgical exposure combined with orthodontic treatment has been reported with success in management of such cases by various authors as well [10-12]. CBCT scans are far better than conventional panoramic radiographs in verifying the orientation and location of the impacted tooth and its relationship to neighbouring structures. This technique makes identification of the exact position and shape of impacted tooth possible, which is crucial in treatment planning. Furthermore, it is very helpful in evaluating damage to adjacent teeth and the amount of surrounding bone and proper planning of the surgical procedure as well [13].

Although several approaches have been proposed for the treatment of impacted maxillary incisor, a common feature among them is early diagnosis and management. It is thought that the less the time of eruption is delayed, the better the outcome [5]. Also Orthodontic and surgical intervention should not be delayed to avoid unnecessary

space loss and difficulties in aligning the tooth in the arch [14].

To prevent any harmful effects on the periodontium the surgical exposure for orthodontic guidance of impacted tooth must be well planned. In the present case the impacted incisors were assisted in eruption by using the closed-eruption technique [13]. When 2 surgical procedures were compared negative esthetic effects such as increased clinical crown length and gingival scarring with the apically positioned flap technique than the closed-eruption technique were reported by Vermette et al [15]. Therefore, in the present case it was decided to use the closed-eruption surgical technique, which returns the flap to its original location after placing an attachment on the impacted tooth. The technique induces natural tooth eruption of the impacted tooth. The exposed incisor after orthodontic treatment showed an acceptable gingival contour and attached gingiva.

Apart from ligature wire, orthodontic traction can also be carried out using elastics [16] or removable appliance. [17] An alternative to mechanical traction can be magnetic traction as well.

## CONCLUSION

The present case report describes the ortho surgical extrusion of impacted maxillary incisors, and advantage of CBCT in a better diagnosis and treatment plan than conventional radiographic methods indicated. CBCT provides an excellent diagnostic tool to improve diagnosis, treatment planning and outcomes.

## STATEMENT OF HUMAN AND ANIMAL RIGHTS

All procedures performed in human participants were in accordance with the ethical standards of the institutional research committee and with the 1964Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

## ACKNOWLEDGMENTS

Nil

## CONFLICT OF INTEREST

No interest

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