

## Surgical and Orthodontic Treatment of Impaction Maxillary Central Incisor Associated With Supernumerary

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### ABSTRACT

Impaction of maxillary central incisors is frequent in dental practice. However its management is challenging because of its importance in aesthetics. Supernumerary teeth are the most common dental anomaly that can cause impaction of adjacent teeth, crowding, diastema, rotation and displacement of teeth. We report a case of 13 year old male with an impacted supernumerary tooth in the maxillary anterior region, which was interfering with the eruption of the permanent, left central incisor. The impacted supernumerary tooth was surgically removed. With the application of an orthodontic traction, impacted left maxillary central incisor was brought down to its proper position in the dental arch.

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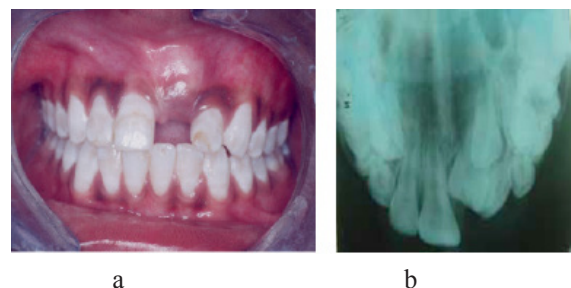
### Introduction

The term impaction is of Latin origin coming from the term "impactus" which means "wedged or packed in together" [1]. Impacted tooth is defined as tooth whose roots are 2/3rd or fully developed but nevertheless expected to erupt. In impacted teeth, root development might have finished, but unaided eruption is not expected to occur [2]. Occasionally, malposition of a permanent tooth bud can lead to eruption at a wrong place [1-3]. Impaction of maxillary central incisors (MCI) is only seldom encountered in clinical practices with a low prevalence rate of 0.06% to 0.2% [2-4]. The delay in eruption of the tooth more than 6 months from the contralateral central incisor and even after eruption of adjacent lateral incisor is an anomalous outcome [3-5].

Delayed eruption can be classified into two causative groups:

1. Hereditary Supernumerary teeth, cleft lip and palate, cleidocranial dysostosis, odontomes, abnormal tooth/tissue ratio, generalised retarded eruption, gingival fibromatosis. [6-10]

1. Environmental Trauma, early extraction or loss of deciduous teeth (with or without space loss), retained deciduous teeth, cystic formation, endocrine abnormalities, bone disease. [8-10]



**Figure. 1** a, b: a. Intraoral view of the patient showing the unerupted maxillary permanent left central incisor b. Maxillary occlusal X ray showing Supernumerary tooth.

Missing and unerupted maxillary incisors can have a major impact on dental and facial aesthetics and were considered to be the most unattractive deviant occlusal trait [11]. Missing upper incisors can also have a psychological impact on a child because of its unattractiveness. There are two approaches in Orthodontically forced eruption [1-4,12]:

1. Open eruption by raising a flap and leaving an open window to the tooth to allow traction or eruption.
2. Closed eruptions by doing a flap, installing attachment components for orthodontically forced eruption, and then closing the flap.

This paper presents a case with a deeply impacted maxillary left incisor that was managed by combined orthodontic-surgical technique.

### Case report

A 13-year-old male patient reported with the chief complaint of unerupted upper left front tooth. Patient had no significant medical history & Dental history and intra oral examination revealed missing maxillary permanent left central incisor (Fig. 1a). An intra oral periapical radiograph of upper anterior region demonstrated an impacted supernumerary tooth and an impacted permanent left central incisor. Upper occlusal radiograph was taken which showed the presence of supernumerary tooth (Fig. 1b) and SLOB (same side lingual, opposite side buccal) technique with two intra-oral periapical radiographs confirmed the presence of supernumerary tooth on the palatal side and an impacted tooth in the buccal side.

The treatment plan comprised of surgical removal of the supernumerary tooth and orthodontic traction of the impacted incisor with closed eruption technician to bring it into proper position in the dental arch. With the patient under local anesthesia, full thickness



Figure 2: Operative view showing the impacted left central incisor on the labial side.

mucoperiosteal flap on the palatal side was reflected. After careful elevation of the flap, adequate amount of bone was removed using the rotary cutting instruments and the impacted supernumerary tooth was exposed. The supernumerary tooth was removed surgically and extraction socket was inspected for any pathology. The extracted supernumerary tooth was conical in shape. The palatal mucoperiosteal flap was repositioned but not sutured at this time. A full thickness mucoperiosteal flap was reflected labially, the bone and the follicular connective tissue covering the impacted incisor was removed and adequate amount of crown was exposed for bonding of the orthodontic bracket (Fig. 2). Ligature was twisted to the flat Begg's incisor bracket and made into a hook form and was bonded on the labial surface of the impacted incisor. The labial and palatal flap was repositioned and sutured, keeping the ligature wire hook suspended in the oral cavity making sure the occlusion was not interfered. After a week, the healing was normal and the sutures were removed. Begg's bracket was bonded on lower permanent incisors and canines and 0.020 A. J. Wilcock arch wire was used for anchorage. Yellow elastic was tied to the ligature wire hook and was engaged to the lower brackets for the traction (Fig. 3). Elastic was engaged more towards the left side of the mandibular teeth so as to de-rotate the impacted incisor. The patient was demonstrated about how to engage the elastics and was told to disengage the elastics during eating and long speech. Elastics were changed every fifth

day. After two weeks of traction with the yellow elastics, the incisor with the bracket was seen in the oral cavity. Begg's bracket was bonded on permanent maxillary left central incisor, lateral incisor, and canine and right lateral incisor and canine. 0.020 A. J. Wilcock arch wire was used for anchorage.

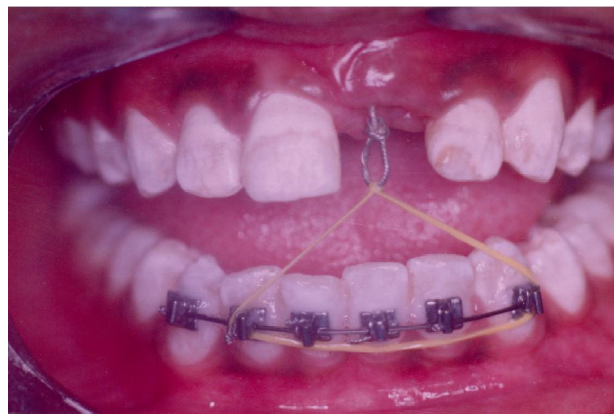


Figure 3: Yellow elastic tied to the ligature wire hook and engaged other lower brackets for the tract.

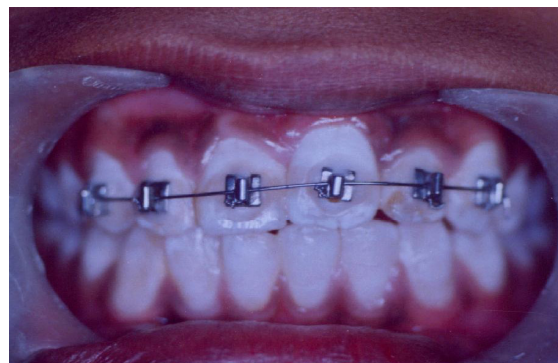


Figure 4: Placement of 0.016 NiTi round arch wire to align the left central incisor.



Figure 5: Post treatment intraoral view of the patient showing well aligned left central incisor.

The ligature wire hook was cut till the arch wire and the remaining part was passively tied to the arch wire. Elastic thread was tied from the slot of the bracket to the sectional arch wire for further traction of left central incisor. After the crown of the impacted incisor was sufficiently erupted, 0.016 NiTi round arch wire) was used to align the incisor. Once the incisor was well aligned the mammelons were trimmed and lingual fixed retention was

given. The patient showed normal clinical crown length with acceptable gingival contour (Fig. 4) and the tooth maintained its vitality with no evidence of root resorption. At six-month follow up (Fig. 5), the left maxillary incisor remained vital and responded normally to percussion and mobility and sensitivity testing with good width of attached gingival.

**Discussion**

The literature showed that perfect alignment of impacted incisor can be achieved by careful treatment planning [1-3,8,10]. The successful management of the impacted central incisor is often a difficult task and enquires the joint expertise. It is important that orthodontist and oral surgeon together prepare a full proof treatment plan based on scientific rationale [9,10]. Delayed eruption of maxillary incisors requires monitoring or intervention when:

1. There is eruption of contra lateral teeth that occurred greater than six months previously [3,4,13].
2. Both central incisors remain unerupted and the lower incisors have erupted greater than one year previously [13,14].
3. There is deviation from the normal sequence of eruption (e.g., lateral incisors erupting prior to the central incisor) [10,11,13].

When impaction of an MCI is suspected, it is essential to search for certain indications of impaction in clinical examinations namely, an asymmetrical eruption with the homologous contralateral for roughly 6 months, the alteration of the sequence or chronology

of eruption, deciduous tooth retention, midline deviation, loss of space, and elevations in the soft palatine tissue or labial mucosa [13-15]. Following a careful clinical examination, it is imperative to use a complementary means of diagnosis. In all clinical cases presented, panoramic radiography and lateral tele radiography were important methods for studying the impacted MCI and general orthodontics [1-3,13-15].

The presence of supernumerary tooth is one of the most common causes for failure of eruption of maxillary central incisors. There are various other problems that may be associated with supernumerary teeth like crowding, displacement of permanent teeth and cystic formation. In order to avoid pathologies relating to supernumerary teeth it is always suggestive that supernumerary teeth should be extracted [16]. The literature reports that 80% to 90% of all supernumerary teeth occur in the maxilla. The greatest proportion are found in the maxillary anterior region [17]. Failure of eruption of permanent incisors due to supernumerary teeth have been reported variably at 28% and 38% [18,19]. Tuberculate supernumerary teeth are more likely to cause an obstruction than conical supernumerary teeth [20]. The technique to be used during forced eruption should be based on the angulations, degree of impaction, root completion and other local factors [21]. These factors were considered during treatment planning of the case. Closed eruption surgical technique was not used for this case. Circular excision of the overlying mucosa immediately over the impacted central incisor was done as suggested by Becker in 1998 [5]. Epithelial attachment of the impacted central incisor should be retained as possible in order to obtain normal contour of gingiva and

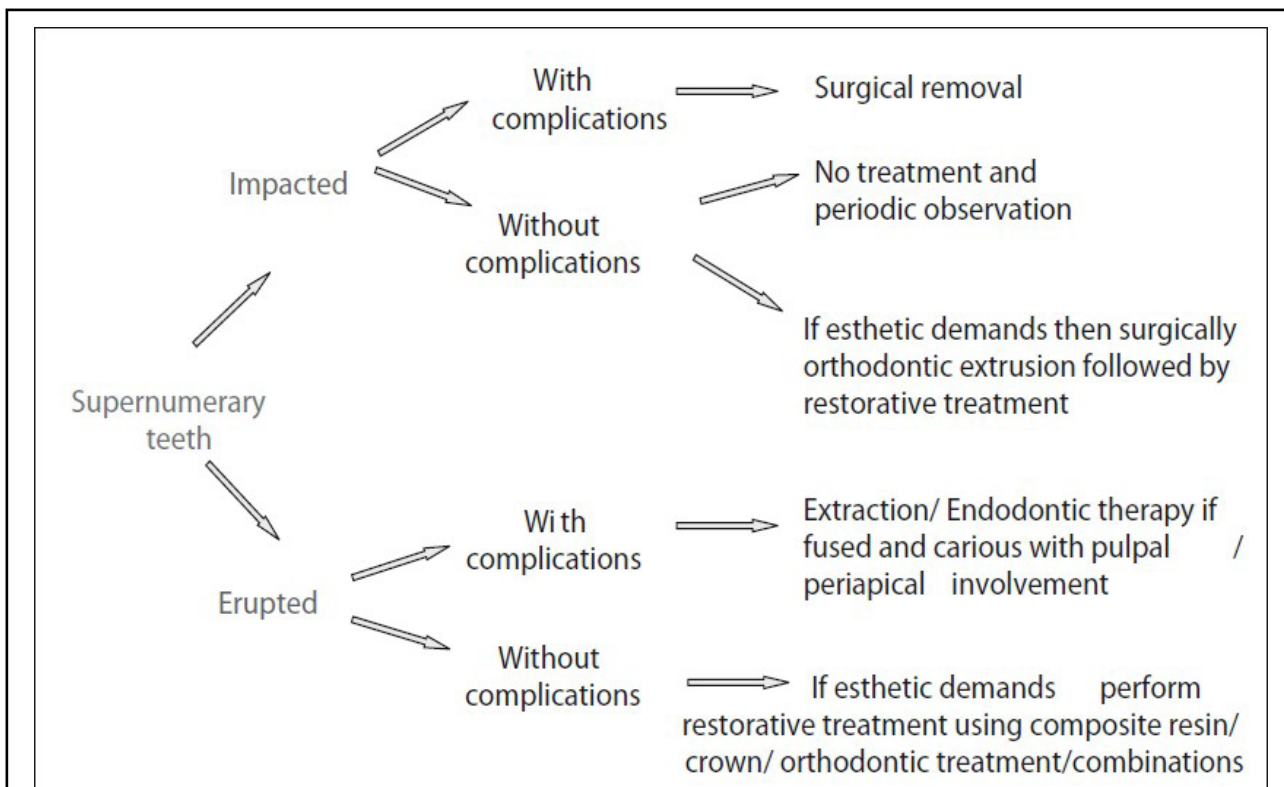


Table 1: MANAGEMENT OF UNERUPTED MAXILLARY INCISOR

The treatment protocol available for management of impacted permanent teeth due to supernumerary teeth are diverse. Table.1 Methods of management of crowding or impaction due to supernumerary tooth are; removal of supernumerary teeth or tooth only, removal of supernumerary teeth and bone overlying impacted teeth, incision of fibrous tissue over the alveolar ridge to promote the eruption with or without orthodontic traction [22,23].

Three accepted ways of surgical exposure have been suggested by Becker (1998) as [5]:

- a. Circular excision of the oral mucosa immediately overlying the impacted tooth.
- b. Apically repositioning of the raised flap that incorporates the attached gingiva overlying the impacted tooth.
- c. Closed eruption technique in which the raised flap that incorporates attached gingiva is fully replaced back in its former position after an attachment has been bonded to the impacted tooth.

The closed eruption technique has been favoured by many clinicians who claim that the aesthetic and periodontal outcome is far more superior when compared with the circular excision and apically positioned flap [24-26].

In the presented case the closed eruption technique was used for better and esthetic gingival margin. At the end of the treatment, patient showed normal clinical crown length with acceptable gingival contour.

Few reports have been published in the management of unerupted, impacted tooth with horizontally positioned crown but clinical and radiological variance will be there with respect to the age, position, angulation of the crown-root and various other factors, which will have the impact on the selection of the various treatment options. Even though complex, forced eruption method employing surgical and orthodontic means using light traction force was evaluated as the viable treatment option in this case and resulted in this treatment option is well accepted and the child retains the natural tooth in the arch [1-3].

The forced eruption technique is performed by a button or a bracket attached to the teeth either labially or palatally after the crown is surgically exposed. The force of 50 gm is applied either by an elastomeric chain, an elastic thread or ligature wire tied between the bracket and the arch wire. In some cases, closed eruption surgical technique is applied and the flap is returned to its original location after placing the attachments on the impacted tooth, while in others the tooth is surgically exposed with an apically positioned flap or a "U" shaped flap. [1,2,13-15].

Early diagnosis of the maxillary central incisor impactions with surgical removal of supernumerary tooth coupled with adequate space spontaneous eruption of the impacted maxillary central incisors [27]. If the impacted tooth is diagnosed at a later stage with its root completely formed or if present in the unfavorable position, combination of surgical and orthodontic treatment has to be carried out [28].

## Conclusion

Impaction of maxillary anterior teeth can be a challenging orthodontic problem. Treatment of impacted teeth varies widely depending on the state of the impacted tooth, the degree of impaction and its position. Every case should be analyzed individually to develop the proper treatment plan. Multidisciplinary team approach should be utilized to ensure successful outcome of the treatment. Early diagnosis of the presence and removal of supernumerary teeth is essential. Maxillary permanent left incisor was successfully positioned in the maxillary arch by surgical exposure and orthodontic traction, which showed good stability.

## Declaration of patient consent:

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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