

ORTHODONTIC ASSISTED ERUPTION OF PERMANENT MAXILLARY CENTRAL INCISOR**Dhritiman Barman^{1*}, Punam Hossain², Ravindra D. Rekhade³, Sankha Biswas⁴, Vivek Agarwal⁵ and Depratim Jana⁶**^{1,2}Post Graduate Trainee, Department of Orthodontics and Dentofacial Orthopaedics, Haldia Institute of Dental Sciences and Research.³Professor and Head, Department of Orthodontics and Dentofacial Orthopaedics, Haldia Institute of Dental Sciences and Research.^{4,5}Professor, Department of Orthodontics and Dentofacial Orthopaedics, Haldia Institute of Dental Sciences and Research.⁶Senior Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, Haldia Institute of Dental Sciences and Research.***Corresponding Author: Dr. Dhritiman Barman**

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ABSTRACT

Maxillary central incisor plays an important role in dental as well as facial esthetics. That is why the treatment of impacted central incisor is challenging for clinicians. This is a case report of 19 years old female with an impacted central incisor along with an impacted supernumerary tooth. The impacted supernumerary tooth was an obstacle for the natural eruption of the permanent central incisor which was surgically removed and the impacted tooth was brought into the occlusion by closed forced eruption technique.

KEYWORDS: Impacted incisor, Supernumerary tooth, Surgical exposure, Orthodontic traction.**INTRODUCTION**

Maxillary central incisor plays an important role in maintaining dental and facial esthetics. That is why its impaction has a great impact on the self-esteem of the child.^[1] The objectives of orthodontic therapy are to establish a good occlusion, enhance the health of the periodontium, and most importantly to improve dental and facial esthetics.^[2] Normally a tooth erupts into the oral cavity once two-thirds of the root formation is complete. The term 'dental impaction' refers to a tooth placed within the bone and/or soft tissue, which won't erupt or fails to erupt within the expected time of eruption while the contra-lateral tooth has erupted six months earlier.^[3] Archer defined 'impacted tooth as one which is completely or partially unerupted and is positioned against another tooth or bone or soft tissue so that its further eruption is unlikely'.^[4] According to Kuffinec and Shapira, impaction is 'a condition in which a tooth is embedded in the alveolus so that its eruption is impeded and it is locked in position by bone or by adjacent teeth'.^[5] The most commonly impacted teeth are mandibular third molars, maxillary canines, mandibular second premolars and maxillary central incisors.^[3]

Maxillary central incisors usually erupt at the age of 7-8 years. The absence of the permanent central incisor is readily noted by the parents.^[1] The incidence of un-

erupted maxillary central incisor in the 5-12 years old age group has been reported to be at 0.13%.^[6] The factors responsible for non-eruption are: [1] Hereditary (Supernumerary teeth, cleft lip and palate, cleidocranial dysostosis, odontomes, gingival fibromatosis) and [2] environmental (Trauma, early extraction or loss of deciduous predecessor, retained deciduous tooth).^[6] Among these, the presence of supernumerary teeth is the most common cause of impacted maxillary central incisor.^[7]

Supernumerary teeth are most frequently located in the maxillary incisor region (64.3%) with mesiodens accounting for 32.4%.^[8] Tuberculate supernumeraries are often paired and are commonly located on the palatal aspect of the central incisors. They rarely erupt and are frequently associated with delayed eruption of the incisors.^[9] Spontaneous eruption of impacted maxillary incisors occurs in 54-76% of cases when supernumerary tooth is removed along with ample amount of available space in the dental arch.^[7] The need for surgical exposure and orthodontic traction comes into play when the time has lapsed beyond the eruption-time.

CASE-REPORT

A 19 years old female patient reported to the Department of Orthodontics and Dentofacial Orthopaedics, Haldia

Institute of Dental Sciences and Research with a chief complaint of small upper front tooth. She had a history of trauma to her upper front tooth region at 5 years of age.

Extra-oral examination indicates apparently symmetrical face with meso-cephalic head, mesoprosopic facial form, convex facial profile.



Figure 1: Pre-Treatment Extra-Oral Photographs

On intra-oral examination, a full complement of teeth was present except permanent maxillary right central incisor and maxillary and mandibular third molars. Deciduous maxillary right central incisor was retained.

The molars were in Angle's Class II relation along with Class II canine and incisor relationship. Orthopantomogram confirmed the clinical findings.



Figure 2: Pre-Treatment Intra-Oral Photographs.

A bulge was seen and palpated in the labial sulcus. Its position was very high up in the alveolar bone with a layer of soft tissue covering the crown. The direction of the crown was vertically downwards without any rotation. The mesio-distal width of the crown of adjacent erupted 21 was 8mm. The space for the eruption of impacted 11 was also the same which was maintained by 51. This confirmed that there was ample space for eruption of the impacted 11.

The treatment objective included bringing the crown to the occlusal plane to enhance stable functional occlusion along with dental and facial esthetics.

The treatment plan comprised of: [1] Extraction of the retained deciduous right maxillary central incisor along with the impacted supernumerary tooth, [2] Maintenance of the space in the maxilla for the eruption of the right central incisor, [3] Orthodontic traction for the impacted tooth, [4] Establishment of adequate attached gingiva and symmetrical gingival margins for both maxillary central incisors along with a stable functional occlusion.



Figure 3: (A) Maintenance of space. (B) Surgical exposure and Bonding of attachment.

The teeth were strapped up and the wires were used sequentially for initial levelling and alignment. After 4 months when the maxillary arch was in a relatively rigid stabilizing wire (0.019" X 0.025" stainless steel in a 0.022 MBT slot), surgical exposure of impacted tooth along with surgical extraction of the impacted mesiodens were done in the Department of Oral and Maxillofacial Surgery. A full thickness flap was raised to bond a bracket on the labial surface of the tooth. A passive

open-coil spring was placed between the brackets of the permanent maxillary left central incisor and right lateral incisor to maintain the space. 0.022" slot right central incisor MBT bracket was bonded with acid-etch technique. A 0.010" stainless steel ligature wire was tied on the bracket and the free end was tied with the main arch wire. The patient was asked to report every 15 days for further activation of the tie.



Figure 4: Different stages of orthodontic traction.

After 5 months the crown was visible in the oral cavity. The bracket was positioned further gingivally. A 0.014" Ni-Ti wire was used as a piggy-back wire over the main rigid arch wire. After 2 months, the bracket was re-bonded in its appropriate position and a lighter 0.016" X 0.016" Ni-Ti wire was used as a main arch wire. After 3

months, the case was finished using the rigid 0.017" X 0.025" stainless-steel followed by 0.019" X 0.025" stainless-steel wire. The brackets were de-bonded and a fixed bonded retainer was placed engaging maxillary canine to canine.



Figure 5: (A) Impacted central incisor approaching occlusal plane. (B) Final position.

DISCUSSION

An anomaly in the eruption of anterior teeth can affect facial esthetics and may cause psychological problems. The various treatment modalities available include the surgical exposure followed by orthodontic traction, transplantation or surgical removal of the impacted tooth followed by prosthetics. If the impacted tooth is extracted, alveolar bone loss occurs. In case of transplantation, the root apex of the tooth to be transplanted should not be complete as it might cause ankylosis. In this case, the root apex of the impacted 11 was complete. Surgical exposure followed by facilitated eruption of the natural tooth was the treatment of choice.

The success of alignment of the impacted tooth depends upon: (1) the position and direction of the impacted

tooth, (2) the degree of root completion, and (3) the presence of space for the impacted tooth.^[8]

Various surgical techniques have been described for exposing an impacted tooth before orthodontic tooth movement. The two most commonly used surgical techniques for labially impacted teeth are: (1) Open technique: exposure of the entire labial aspect to the anatomic crown with total excision of all keratinized tissue (the window approach) and (2) Closed technique: a flap is raised which exposes only 4–5 mm of the most superficial portion of the labial aspect of the cusp tip while maintaining 2–3 mm of keratinized tissues.^[8] Several case reports have shown that the window or open approach causes statistically significant loss of attachment, recession and the non-keratinized gingival margin would not match with the adjacent one.^[10] That is

why in this case, closed surgical technique was opted for the maintenance of the gingival margin height along with the preservation of the keratinized gingiva around the entire erupting tooth.^[11] It is important for a tooth to erupt through attached gingiva rather than through alveolar mucosa to prevent loss of attachment.^[12]

There are two schools of thought regarding the amount of time the clinician should wait to apply post-surgical orthodontic forces after exposure and bonding. Some authors recommend application of force immediately^[13] after exposure while others recommend waiting for one^[14] to two weeks.^[15]

Several reports have indicated the use of lingual button with gold chain. In this case a stainless-steel ligature tie was used instead of the gold chain because of the expense.

The extrusive force produced by the ligature tie was measured using the dontrix gauge. The gauge was placed passively above the main rigid arch-wire and the deflection occurred during activation of the ligature tie assisted to measure the amount of extrusive force.

CONCLUSION

Maxillary anterior teeth play an important part in facial esthetics. That is why the management of impacted tooth in the anterior region is a challenging orthodontic problem. Proper diagnosis concerning the exact localization of the impacted tooth, an appropriate surgical technique, and a light orthodontic force system are effective approach to successfully bring the tooth into the arch. It will help not only to maintain functional occlusion but also to improve facial esthetics.

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