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Surgically assisted orthodontic management of impacted permanent maxillary central incisor - A case report

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Abstract

Maxillary central incisors are the third most commonly impacted teeth, following third molars and maxillary canines[1].

It is mandatory and beneficial to use interdisciplinary treatment approach for the most predictable outcome. This paper describes a case report of a 17 years female patient reported at the Department of Orthodontics of Dr R Ahmed Dental College & Hospital complaining of missing front teeth. Clinical examination revealed missing maxillary central incisors, on the right side, which later was radiologically confirmed. Surgical exposure was planned where in attachments were placed on the exposed central and lateral incisors and impacted canine was included for initial traction. Later fixed mechanotherapy was planned after eruption for further alignment.

An successful and stable result has been achieved after 2 years of treatment although patient reported in her adult age. Proper planning and successful execution is always a key to success and necessary for better result.

Keywords: impaction, Orthodontic, Permanent maxillary central incisor, Surgical, Traction.

Introduction

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.[2] In simple words, an impacted tooth is the one that fails to erupt into a normal functional position past its root formation, which may be attributable to physical impedance (other tooth or surrounding soft or hard tissue), ankylosis, a systemic cause or primary failure of eruption. The etiology of tooth impaction is multifactorial, typically involving genetic and environmental factors such as lack of space in the dental arch, an abnormal frenulum, prolonged retention of deciduous teeth, ankylosis, supernumerary teeth, tumours, cysts, or trauma[3]. Although the maxillary canine is the most commonly impacted anterior tooth the impaction of permanent maxillary central incisor possesses a problem at an earlier age and it compromises the facial aesthetics as well. Impaction of maxillary permanent central incisor is not a frequently reported case in dental practice, but its treatment is challenging because of its importance to facial esthetics[4]. Early detection of such teeth is most important if complications are to be avoided. Permanent central incisor impaction is quite a rare condition having a prevalence of 0.06%[5.] Impaction of the maxillary central incisor is almost as prevalent as impaction of the canines; its etiology is different.

The principal factors involved are various local causes like failure of resorption of the roots of a deciduous tooth, an abnormal eruptive path, a supernumerary tooth, dental crowding or a disturbance in the eruption mechanism of the tooth, supernumerary teeth, odontomas, and trauma[6]. Adjacent anomalous or missing maxillary lateral incisors have been implicated in the etiology of palatally displaced canines by not providing proper guidance to the canine during its eruption. An impacted tooth other than third molar need to be aligned else there could be local loss of space in the arch adjacent to the area, development of pathological factors like cyst and tumours. Treatment alternatives for an impacted central incisor include extraction and restoration with a bridge or an implant later when growth has ceased[7,8,9]; extraction and closure of the space by substituting the lateral incisor for the central incisor with subsequent prosthetic restoration; and surgical exposure, orthodontic space opening, and traction of the impacted central incisor into its proper position[10].

Case Report

A 17-year-old female patient came to Department of Orthodontics and Dentofacial Orthopaedics, Dr. R. Ahmed Dental College & Hospital complaining of missing upper front tooth. On Extraoral examination she was found to have meso-prosopic facial form with straight profile with incompetent lips having 5 mm of inter-labial distance. (Fig-2) Intraorally there is clinically absent permanent upper maxillary central incisor, collapsed upper arch, crowing in lower arch with 2.5mm overjet and 3 mm of overbite with crowding in anterior region (Fig-2). The maxillary dental midline deviated about 2 mm to the right. Radiographically there was impacted upper right permanent central incisor. The largest width of the crown of erupted permanent left central incisor was 10 mm. The space available for unerupted right permanent central incisor in maxilla was 8 mm.

Panoramic (orthopantomogram or OPG), CBCT radiographs were taken to establish a good idea about the position and morphology of unerupted right permanent central incisor. (Fig – 1)

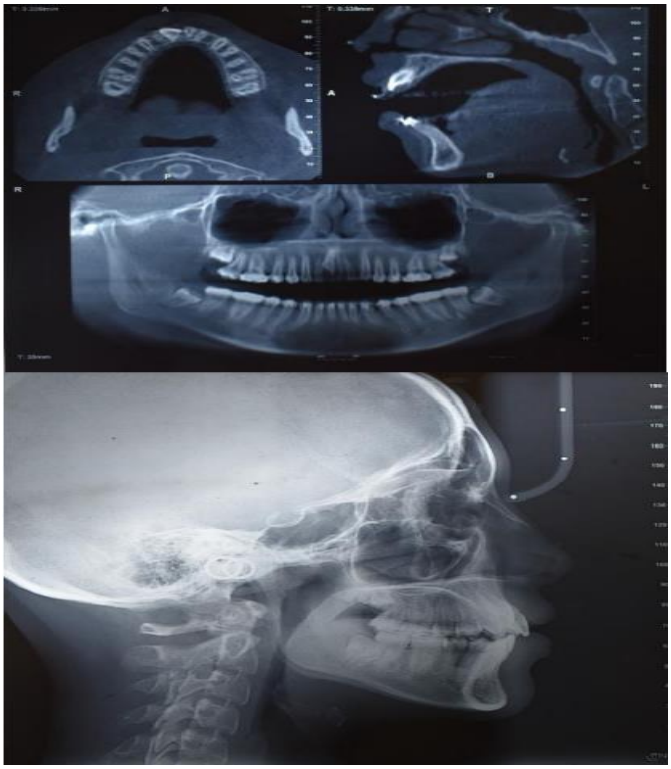

Fig 1: Pre-treatment Radiograph and CBCT.

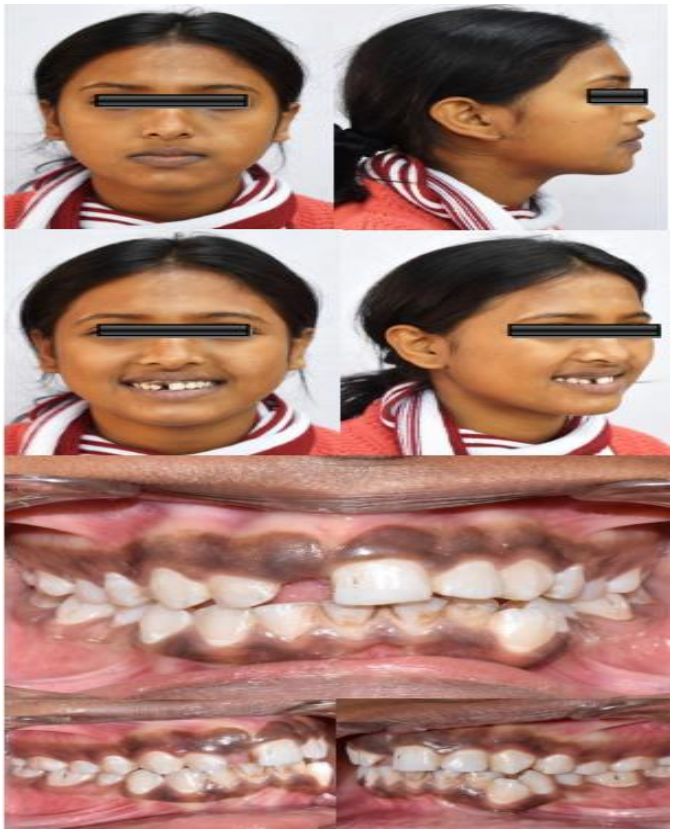

Fig 2: Extraoral and Intraoral pre-treatment photographs

Diagnosis A 17-year-old female non growing patient with Angle's class I molar relation on class I skeletal base with average growth pattern and missing right upper central incisor along with straight profile.

Treatment objectives

(1) Orthodontic space opening in the maxilla and provide orthodontic traction for the impacted tooth with special attention to the gingival recession.

(2) establish adequate attached gingiva and symmetric gingival margins for both maxillary central incisors.

(3) To correct lower incisor crowing and proper alignment on the basal bone with normal overjet and overbite.

(4) To improve the smile and aesthetics and overall appearance.

Treatment plan

After discussing the possible treatment alternatives, the parents and the conservative treatment approach is opted to bring the tooth into its proper position. The treatment plan consisted of orthodontic space opening, surgical exposure, and traction of the impacted right central incisor down to its normal position and its alignment to obtain a normal occlusal relationship.

Treatment Progress

Patient was treated with fixed mechanotherapy using PreAdjusted Edgewise MBT 022 Slot Brackets, to achieve proper alignment and levelling of the maxillary and mandibular arch.

Once the maxillary arch was in a relatively rigid stabilizing wire (0.019X 0.025-stainless steel wire in a 0.022-in slot), a coil spring was placed to create adequate space for impacted incisor.

Surgery was performed to expose the maxillary right central incisor. A circular incision was made to expose the tooth, a lingual button was bonded to the exposed incisor elastic chain was placed to that button for applying traction in the occlusal direction (fig-3). Once the impacted tooth had erupted, a bracket was bonded to

the crown and tied to a double arch wire (0.014-in nickel-titanium). In the mandibular arch, alignment and levelling were achieved with a sequence of 0.014- and 0.018-in nickel-titanium arch wires, later replaced by rectangular nickel-titanium arch wires (0.017 X0.022 and 0.019 3X0.025 in).

At 6- months follow-up, the right maxillary incisor remained vital and respond normally to percussion and mobility and sensitivity testing with good width of attached gingival.

Fig -3 photos of surgical exposure

Treatment results

The impacted maxillary right central incisor was brought into proper alignment with the adjacent teeth. Bilateral Class I molar, canine and incisal relationships were achieved with ideal overjet and overbite. The final radiographs indicated intact roots, proper root alignment, and no root disease.

The crowding in the lower arch has been relieved. 6 months follow up after the orthodontic treatment, the affected central incisor remained asymptomatic. (Fig-4)

Fig 4: post treatment extra & intraoral Photographs.

Discussion

An impacted central incisor is usually diagnosed, when there is a delay in the eruption of the tooth. This tooth usually erupts when the child is between 6 to 7 years of age, and its impaction is more conspicuous to the parents as it can affect facial esthetics and may cause psychological problems. The management becomes more challenging when an adult case of impacted central incisor is reported. The factors that can predict the successful alignment of an impacted tooth are (1) the position and direction of the impacted tooth, (2) the degree of root completion, (3) the degree of dilacerations, and (4) the presence of space for the impacted tooth11-16. In this patient, there was

insufficient space for the maxillary right canine; the lateral incisors had drifted into the unoccupied space, Orthodontic and surgical intervention should not be delayed to avoid unnecessary difficulties in aligning the tooth in the arch[18]. In this case, the orientation and intensity of the force vectors of orthodontic traction was planned to provide gradual tooth movement so that it can promote Esthetic gingival contours and minimizing root resorption. Considering the high impaction of the maxillary right central incisor and its proximity to the upper labial frenulum, we decided for a close eruption technique in tunnel method to preservation of the buccal cortical plate and gingival contour.

Conclusion

The closed-eruption technique is the recommended treatment of choice when the tooth is impacted in the middle of alveolus or high level near the nasal spine. Since this approach replicates the natural tooth eruption, it is likely to provide the best aesthetic and periodontal results. [19.]

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