

# Impacted maxillary central incisor and over-retained deciduous central incisor: Combined surgical and orthodontic treatment - A case report

Avinash K\* Aieshya F†

\*M.D.S, Senior Lecturer, †Post Graduate Student, Department of Orthodontics, Al-Badar Rural dental college and hospital, Gulbarga, Karnataka, India. Contact: avinash.orthodontist@yahoo.com

## Abstract:

This case report describes the treatment of an adult patient with maxillary left central incisor impacted because of over-retained deciduous left central incisor. Therapeutic management of the impacted tooth was combined with orthodontic treatment of a Class I malocclusion. A sequential approach of extraction of over-retained deciduous maxillary left central incisor, and surgical exposure and orthodontic traction of the impacted tooth with closed eruption technique resulted in proper incisor positioning. Our results suggest that close monitoring and interdisciplinary cooperation during the treatment phases led to a successful esthetic result, with good periodontal health and functional occlusion.

**Keywords:** Impacted maxillary incisor, orthodontic traction, closed eruption.

## Introduction:

Impaction is the total or partial lack of eruption of a tooth well after the normal age of eruption<sup>1</sup>. The most commonly impacted maxillary tooth is the canine, occurring in less than 2% of the general population,<sup>2</sup> followed by the central incisor with a frequency of 0.06% to 0.2%<sup>3</sup>. Several contributing factors have been suggested that impede tooth eruption. These could be mesiodens or multiple supernumerary teeth in the anterior maxillary region,<sup>4,5</sup> odontogenic tumors such as

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odontomas or cysts,<sup>6-8</sup> alteration in the eruption path or formation of scar tissue due to trauma or premature loss of the primary incisors,<sup>9,10</sup> and abnormal root angulation or dilacerations.<sup>11</sup> The anterior maxilla is a highly demanding area from an esthetic point of view, and orthodontic treatment of impacted maxillary incisor requires a well synchronized and interdisciplinary approach to obtain an acceptable esthetic and functional result<sup>12</sup>.

This report describes the sequential management of an impacted tooth in the maxillary arch. The treatment success was the result of the combined efforts of an orthodontist and the oral surgeon.

#### **Case presentation:**

A 22 year old male patient reported to the Department of Orthodontics at Al-Badar Rural Dental College, Gulbarga, (India) with the chief complaint of unpleasant look due to small front tooth. The patient was physically healthy and had no history of medical and dental trauma.

#### **Diagnosis and etiology:**

The patient had a balanced facial pattern. Intraoral examination revealed an Angle's class I molar relationship with over-retained deciduous left maxillary central incisor and a missing maxillary permanent left central incisor (Figures 1) and no apparent arch length discrepancy in maxillary arch and mild crowding in mandibular arch.

An intraoral periapical radiograph of upper anterior region demonstrated an impacted permanent maxillary left central incisor. To confirm the position of impacted tooth, the Clarke's tube shift (SLOB rule) was used, which showed the presence of impacted tooth on the labial side (Figure 2). The panoramic radiograph demonstrated an impacted maxillary left central incisor. The maxillary left central incisor was positioned horizontally with the tip of the crown close to the apex of the right central incisor (Figure 3). The etiology of the maxillary left central incisor impaction could be due to over-retained deciduous maxillary left central incisor.

#### **Treatment objectives:**

1. Surgically expose the impacted left maxillary permanent central incisor, apply orthodontic traction with light forces, and align the maxillary dental arch.
2. Correct the mild mandibular anterior crowding.
3. Establish ideal overbite and overjet.
4. Improve facial esthetics.

#### **Treatment alternatives:**

The following are three possible treatment alternatives:

1. Extraction of the impacted central incisor and restoration with a bridge or an implant.
2. Extraction of the impacted central incisor and closure of the space, substituting the lateral incisor for the central incisor with subsequent prosthetic restoration.
3. Surgical exposure and orthodontic traction of the impacted central incisor into proper position.

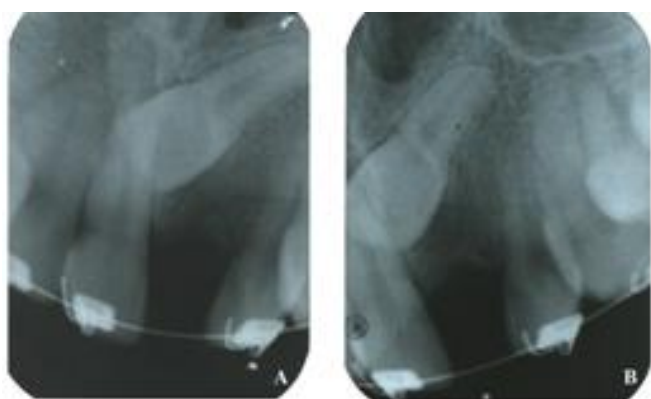
#### **Treatment progress:**

After realizing the possible treatment alternatives, the patient chose to try to save the tooth and bring it into proper position. Molar bands were placed on the maxillary first permanent molars, and the maxillary teeth were bonded with a Begg appliance. After initial leveling and alignment with a 0.016-in nickel titanium wire, the patient was transferred to an oral surgeon for surgical exposure of the impacted tooth, and the closed eruption technique was used to extrude the tooth.

A full thickness mucoperiosteal flap was elevated, approximately two-thirds of the crown is exposed with appropriate bone removal by means of surgical burs. The tooth was isolated with haemostatic agent. A Begg bracket was bonded on the labial surface of the incisor. The flap was returned to the same position and sutured, leaving a tied 0.010-in ligature wire protruding through the mucosa and attached to the Begg bracket (Figure 4). After a week, a light force of 60 to 90 g was applied by an elastomeric chain from the ligature wire to the maxillary left canine. This not only corrected the angulation of the impacted incisor,



**Figure 1.** Pretreatment facial and intraoral photographs



**Figure 2.** Pretreatment periapical radiographs: A and B, the maxillary anterior region (tube-shift technique)



**Figure 3.** Pretreatment panoramic radiograph

but also pulled the crown tip away from the root of the central incisor (Figure 5).

After the tooth has erupted into its position in dental arch. The single tooth torquing box auxiliary was placed to correct the root inclination (Figure 6). Interproximal stripping of premolars was done to relieve the mandibular anterior crowding. After debonding, permanent lingual



**A**



**B**

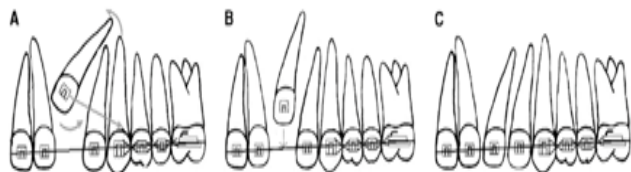
**Figure 4.** Impacted maxillary central incisor uncovered with a closed eruption technique A. The two-thirds of the crown is exposed. B. A Begg bracket was bonded on the labial surface of the incisor and a 0.010-in ligature wire tied to the bracket

retainers were placed in the maxillary and mandibular arches.

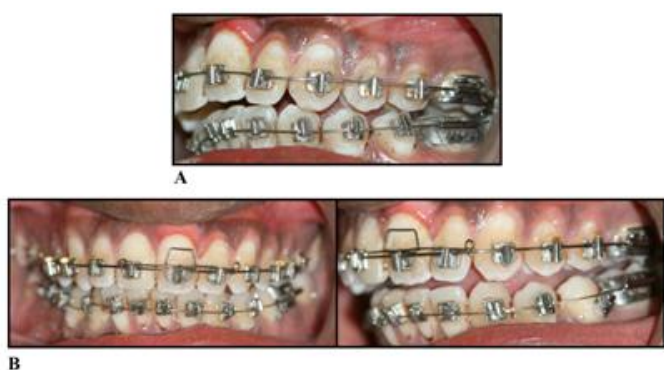
#### **Treatment results:**

The overall active treatment time was 15 months. The impacted permanent maxillary central incisor was successfully aligned in proper position. The post-treatment radiograph showed intact root and no apparent root resorption or periodontal bone loss. Periodontal evaluation showed acceptable gingival contour and adequate width of keratinized attached gingival tissue with good emergence profile of the central incisor. Ideal overjet and overbite were established. There was remarkable

improvement of the patient's facial esthetics (Figures 7-9).



**Figure 5.** Diagrammatic representation of the treatment strategy used for eruption of the impacted central incisor: A, elastic chain from the incisor bracket to the left canine bracket causing the crown to tip distally and the root mesially; B, the incisor is uprighted; C, the incisor in position.



**Figure 6.** Progress intraoral photographs A. The tooth is brought into its position. B. The single tooth torquing box auxiliary was used to correct root inclination

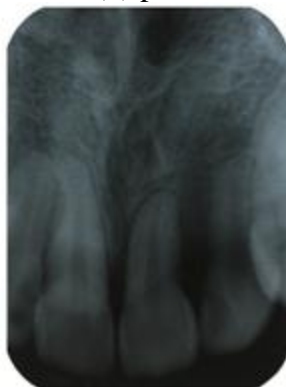


**Figure 7.** Post treatment facial and intraoral photographs

#### Discussion:

The successful relocation and esthetic management of impacted permanent maxillary incisor is

multifactorial and it depends on the following factors (1) position and direction of the impacted



**Figure 8.** Post treatment periapical radiograph



**Figure 9.** Post treatment panoramic radiograph.

teeth, (2) degree of root completion, (3) degree of dilaceration, and (4) enough space for the impacted teeth.

Lin<sup>13</sup> successfully treated a patient with an impacted dilacerated maxillary central incisor and pointed out that the success rate of an impacted dilacerated tooth depends on the degree of dilaceration, the position of the tooth, and the amount of root formation.

A dilacerated root with an obtuse angle, lower down position, and incomplete root formation of the tooth would have a better prognosis for orthodontic traction. Studies have shown that the more bone removed during surgical exposure, the greater the bone loss after orthodontic treatment and the chance of injury to the tooth during traction.<sup>14-15</sup>

The treatment approach of impacted maxillary teeth requires the cooperation of dental specialties such as orthodontics, oral surgery, and prosthodontics. The current treatment modality,

instead of extraction, is to have surgical crown exposure with the placement of an auxiliary, followed by orthodontic positioning of the tooth.<sup>16</sup>

Root resorption was always a concern during treatment. According to Brezniak and Wasserstein,<sup>17</sup> abnormalities in the morphology of the roots, or the time, type, and magnitude of orthodontic force can contribute towards root resorption. This case used sequential traction of the impacted teeth, repositioning of incisor into occlusion with minimal intrusive effects on anchor teeth was achieved. The rigid A. J. Wilcock stainless steel base arch wire helped to distribute the unwanted intrusive side effects over a larger cumulative root surface area, thus minimizing localized deleterious effects.

The surgical exposure for orthodontic guidance of impacted tooth must be well planned to prevent any harmful effects on the periodontium. The impacted incisor was erupted by using the closed-eruption technique.<sup>18</sup> It was suggested that labially impacted teeth might have a thinner plate of bone and therefore are at greater risk for attachment loss if uncovered with an apically positioned flap.<sup>19</sup> Vermette et al<sup>20</sup> compared these 2 surgical procedures and showed negative esthetic effects such as increased clinical crown length and gingival scarring with the apically positioned flap technique than the closed-eruption technique.

Therefore, we 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 induced natural tooth eruption of the impacted tooth. The periodontal status of the exposed incisor after orthodontic treatment showed an acceptable gingival contour and attached gingiva.

#### **Conclusion:**

Successful management of anterior impacted maxillary tooth can be challenging in a clinical practice. Proper diagnosis concerning the exact localization of the impacted tooth, an appropriate surgical technique, and a light orthodontic force system can be an effective approach to successfully bring the tooth into occlusion. The closed-eruption

technique provided an esthetically pleasing result in this patient.

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