

# Management of Impacted Maxillary Central Incisor: Combined Orthodontic-Surgical Technique

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**To cite:** Khera A, Raghav P, Amit K. Management of impacted maxillary central incisor: Combined Orthodontic-Surgical technique,

J Contemp Orthod  
2018;2(4):5-8.

**Received on:**  
15-11-2018

**Accepted on:**  
19-12-2018

**Source of Support:** Nil

**Conflict of Interest:** None

## ABSTRACT

This case report presents the management of impacted right central incisor in 11 year old girl by surgically exposing the crown of impacted tooth and applying light force orthodontic traction technique. An Interdisciplinary approach is essential to successfully move an impacted incisor into proper position. The Surgical- orthodontic treatment plan included surgical removal of odontoma and orthodontic traction in this patient. However, long-term monitoring of the stability and periodontal health is critical after orthodontic traction. The outcome was excellent esthetically and functionally.

**Key words:** Impacted incisor, orthodontic traction, surgical exposure.

## INTRODUCTION

The primary problem associated with missing central incisor is esthetic concern of patient. The incidence of impacted central incisor is about only.06 to 0.2%.<sup>1,2</sup> Although some cases have iatrogenic or idiopathic origin, Potential etiological factors includes- arch length-tooth material discrepancy, transverse maxillary deficiencies, prolonged retention or early loss of deciduous teeth, abnormal positioning of dental buds, trauma to deciduous incisors and physical obstacles such as Supernumerary teeth, mesiodens, odontomas, neoplastic formations, cysts, and root dilacerations.<sup>3,4</sup> The management of impacted central incisor is usually a clinical challenge for orthodontists. In cases involving impacted central incisor, an interdisciplinary treatment approach is beneficial for best esthetic and functional results.<sup>5</sup> The management of a patient with such a problem involves multiple treatment options. Orthodontically induced eruption of impacted tooth is the best treatment option because it restores esthetics and regains alveolar bone width.<sup>6</sup> Although this treatment option might be associated with the risk of gingival recession and long clinical crown<sup>7</sup>, so multidisciplinary team approach is required that includes orthodontist, oral-surgeon and periodontist. The procedures used for surgical exposure and traction are important in any impaction case. If the tooth is positioned high in the alveolus, full-thickness flap surgery is generally required to expose the crown.<sup>8,9</sup>

Here we report a case of impacted central incisor for which treatment was done in two phases. In first phase a large odontoma that impeded the eruption of impacted right central

incisor was removed in anticipation of spontaneous eruption of the impacted tooth. In second phase, when the tooth did not erupt spontaneously during the waiting period of 2 years then orthodontic traction was planned.

## DIAGNOSIS AND ETIOLOGY

An 11-year-old girl was brought by her parents with a chief complain of retained deciduous upper front teeth. The child was physically healthy and had no history of medical and dental trauma. The facial analysis showed a symmetric face with an unaesthetic smile. The patient intraoral examination showed late mixed dentition phase. Upper deciduous right central and lateral incisors were retained. Occlusal analysis revealed super class I molar relationship, with an overbite of 2 mm and an over jet of 2 mm (Fig-1). The arch length discrepancy was - 5 mm (arch length is more than tooth material) in the maxillary arch and 2 mm in the mandibular arch, as calculated from Moyers' prediction tables.

Analysis of the lateral cephalometric radiograph revealed a skeletal Class II (ANB = 7°) malocclusion and a vertical growth pattern (FMA=35°). The panoramic and periapical radiographs demonstrated an impacted maxillary right central incisor and an odontoma. Denta scan evaluation confirmed the presence of the right impacted maxillary incisor impeded by odontoma (Fig-2).



**Fig-1:** Pretreatment facial and intraoral photographs



**Fig-2:** Pretreatment radiographs

## TREATMENT OBJECTIVES

1. Restore the normal appearance of the maxillary anterior teeth.
2. Establish an acceptable occlusion.

**Treatment Plan:** Although it is generally considered that an impacted incisor has a poor prognosis, we decided to expose the tooth and bring it into the arch orthodontically because the patient and her parents requested non-extraction treatment. So the treatment plan was:-

1. Surgical exposure of impacted central incisor and removal of odontoma.
2. Traction of maxillary right central incisor.

## TREATMENT PROGRESS

After being explained about the possible treatment alternatives, the parents chose to try to save the tooth and bring it into proper position. The patient was transferred to the oral surgeon for extraction of retained deciduous incisors, removal of odontoma and exposure of the impacted incisor. The surgeon raised a wide mucoperiosteal flap similar to that described in the closed-eruption technique. The bone and the follicular connective tissue covering the tooth were

removed and a very large odontoma was removed and sent for pathological examination (Fig-3). A large bony defect was seen after removal of odontoma. Because of lack of bone support around the impacted tooth it was decided to place the bone graft and close the flap and to wait for bone healing and spontaneous eruption. Patient was reviewed after every 6 months. After a period of 2 years, when the impacted tooth did not erupt in the oral cavity, orthodontic treatment was planned for the patient (Fig-4). 0.022x.028 slot Edgewise brackets were bonded in maxillary arch. The initial alignment and leveling was done with a .014, 0.016-inch Ni-Ti wire, followed by a 0.016 x.022 and .019x.025 inch stainless steel wire. The patient was referred to the oral surgeon for exposure of the impacted incisor. To bring the right central incisor into dental arch, a wide mucoperiosteal flap was raised. Adequate amount of crown was exposed for bonding the orthodontic button with a ligature wire tied to it. The flap was closed after bonding the orthodontic button and the ligature wire was brought out by piercing through the gingiva and passively tied to the arch wire. Two weeks later, orthodontic traction of the impacted incisor was initiated with elastic module later on 0.017 X 0.025 TMA wire with palatal extension was ligated to maxillary arch for traction. An extrusive force of approximately 60 gm was applied by an elastic module. After crown appeared in the oral cavity, the lingual button was removed, and a bracket was bonded to labial surface of central incisor and .014 cuNiTi auxiliary wire was ligated to bring the tooth in the proper alignment (Fig-5). After the alignment of impacted incisor, there was extra space left that was initially tried to be closed by using elastomeric chain on .019x.025 stainless steel wire. Due to compromised periodontal condition of aligned right central incisor, space closure with elastomeric chain was discontinued after 10 days and patient was referred to periodontist for gingival management and remaining space was closed by composite buildup of right central incisor.



**Fig-3:** Surgical removal of odontoma



**Fig-4** Two years follow-up after the removal of odontoma

## RESULTS

The impacted right maxillary central incisor was successfully aligned in proper position but the esthetic of repositioned right incisor was slightly compromised due to long clinical crown. A fixed canine to canine lingual bonded retainer was placed in maxillary arch for retention after deboning (Fig-6 and Fig-7).

## DISCUSSION

The over retained deciduous teeth and presence of odontomas are the common etiological factors for impacted central incisor. In this case both factors were present. Odontomas are relatively common odontogenic lesions, generally asymptomatic, and are rarely diagnosed before the second decade of life. They frequently lead to impaction or delayed eruption of permanent teeth.<sup>10,11</sup> 68% of teeth are impacted because of odontomas, so they should be removed in early stage. Literature suggests that radiographic evaluation of all younger children that present with delayed eruption of permanent tooth should be performed. In this case, a large odontoma of 10-11mm was present over the impacted right central incisor. Surgical removal of odontoma leaves a large bony defect as it was encountered in this case too. Due to lack of proper bone support tooth movement can not be initiated. Bone graft to fill the bone defect is required. So, the same was followed in the patient and follow up was done every 6 months. Orthodontic traction for dis-impaction could be performed only after elimination of the bone defect which in our case could occur after a period of 2 years. With respect to the surgical exposure, there are different approaches like open surgical technique and closed surgical technique.<sup>12</sup> Closed-eruption surgical technique was used in this case. An extrusive force of 60-90 gm is required for dis-impaction which we applied in this case too. Anchorage preparation should be complete before applying orthodontic traction force to the impacted tooth. To prevent the exposure of impacted tooth in high gingival position, it is necessary to apply the

force in palatal direction. For this .017x .025 TMA wire with palatal extension was used.<sup>13</sup>



**Fig-5:** Orthodontic traction of impacted right central incisor



**Fig-6:** Posttreatment facial and intra-oral photographs



**Fig-7:** Post treatment Radiographs

## CONCLUSIONS

Surgical exposure and orthodontic retraction of impacted incisor is a clinical challenge. The patient now possesses confidence to smile and with enhanced self-esteem, which is critical even in early life.

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