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Original Research Paper

Orthodontics

TREATMENT OF IMPACTED MAXILLARY CENTRAL INCISOR WITH A REMOVABLE APPLIANCE: A CASE REPORT

Abdul Baais Akhoon* Senior Resident, Department of Orthodontics and Dentofacial Orthopaedics, Government Dental College and Hospital, Srinagar, J & K, India. *Corresponding Author

Nameeta Kaur Lecturer, Department of Orthodontics, Government Dental College, Srinagar, J & K, India.

Zubair Ahmad Akhoon Senior Assistant Professor, Department of Clinical Veterinary Medicine, SKUAST Kashmir.

ABSTRACT Maxillary central incisors impaction is a challenging problem in orthodontics, which has a major effect on dental and facial esthetics. Scientific literature agree on the importance of early diagnosis and appropriate intervention. This is a case report of a 09 year-old boy who presented with impaction of maxillary central incisor. The treatment proposed involved space maintenance with a removable appliance, surgical exposure of impacted tooth with extraction of odontome followed by orthodontic traction with a removable appliance. This approach showed many advantages over fixed treatment and early exposure in mixed dentition.

KEYWORDS : *Maxillary central incisor, Impaction, Orthodontic traction.*

1. INTRODUCTION

Maxillary central incisor impaction is not so common, with frequency of 0.06 to 0.2% but its management poses a great challenge for orthodontists because it has a major effect on dental and facial esthetics [1-3]. Treatment for cases of maxillary central incisor impaction needs a synchronized, multidisciplinary approach in order to achieve optimal esthetic outcome and function [4,5]. An impacted maxillary central incisor easily is diagnosed by both parents and patients. As the condition usually causes concern to parents, many patients are referred to an orthodontist by a pediatric dentist or a general practitioner [6,7]. Maxillary central incisors normally erupt between the ages of 8-10 years and delayed eruption has an adverse effect on esthetics, speech and function. It may also result in adjacent tooth migration, space loss and midline deviation [6,8]. Trauma to the primary teeth and mechanical obstruction are the main causes of central incisor impaction [8]. Trauma to the deciduous teeth is a common type of injury in the maxillofacial region and about one-third of children have had some injury to their primary dentition [3,9]. Any traumatic event to the primary teeth can cause an adverse effect on eruption of the permanent teeth via transmission of force to the germ of a developing tooth being in close proximity [3,8]. Treatment options for impacted central incisors include extraction of the primary tooth, surgical exposure and orthodontic traction, extraction of impacted incisor and space closure with substitution of a central incisor with a lateral incisor, or extraction of impacted incisor and replacement with removable or fixed prosthesis [6,7,10]. It is wise to open a space before surgical exposure, to provoke eruption of the incisor, because adjacent teeth often become tilted to fill the space of a non-erupted incisor [6,7]. Spontaneous eruption occurs in 54-78% of patients [11]. Many approaches are suggested for space opening and tooth traction to the arch, but they must be in accordance with objectives of the treatment i.e. maintaining periodontal health, dental and facial esthetics and avoiding root resorption [12].

2. Presentation Of The Case

A 09-year-old boy was referred to the Orthodontic department with the chief complaint of a nonerupted left front tooth. Clinical examination revealed absence of the left upper central incisor (Fig. 1). Molars were in Class I relation. CBCT examination confirmed impaction of the upper left central incisor with normal orientation and associated odontome. (Fig. 1).

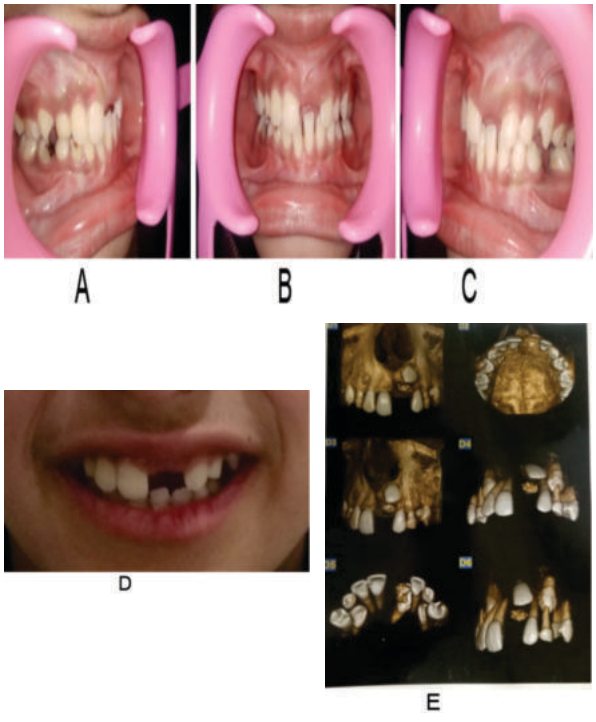

Fig. 1. Pretreatment records showing the absence of the maxillary left central incisor. (A) Intraoral right occlusion (B) frontal occlusion (C) left occlusion (D) frontal smile photographs. (E) CBCT of anterior maxilla.

2.1 Treatment Objectives

1. Space maintenance for left maxillary central incisor.
2. Exposure of the crown with removal of the odontome and delivering force to the tooth.
4. To obtain as near to normal as possible appearance of the impacted tooth and gingival tissue.

2.2 Treatment Progress

A removable maxillary appliance was fabricated with two C-clasps made from 19 gauge stainless steel wire mesial to right central incisor and left lateral incisor, an Adams clasp on the first molars and a labial bow with a helix at the site of the impacted tooth (Fig. 2).

Fig. 2. Removable appliance fabricated for the patient. (A) Occlusal view, (B) Frontal view

Surgical exposure with the closed approach was performed and a Begg bracket with eyelet ss ligature was bonded to tooth at the time of surgery which was passed through the flap to the oral cavity. The ligature was attached to the helix of the appliance by means of an elastic thread. The patient visited weekly to re-activate the elastic thread. After 10 weeks, the patient was referred to a periodontist for surgical exposure of the tooth. Apically positioned flap technique was performed due to lack of keratinized gingiva at the site of the impacted tooth, and a lingual button was bonded to the labial surface of the tooth. The patient was instructed to place a 1/6 inch medium force latex elastic from the button to the helix of the appliance. He was asked to wear it 24 hours a day, except for meal and brushing time (Fig. 3).

Fig. 3. Intraoral photograph with lingual button bonded on labial surface for orthodontic traction with elastic.

After 6 months the incisor had erupted to a good level, and the traction was discontinued and the patient used the appliance as a retainer (Fig. 4 & 5). The patient was then bonded with fixed orthodontic appliance to finalize leveling and alignment (Fig. 6).

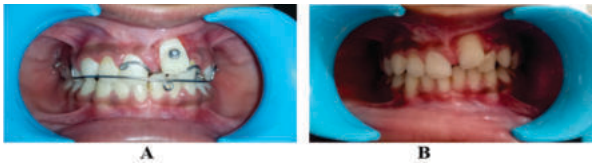

Fig. 4. Intraoral photogahs showing traction completed for the impacted incisor. (A) The appliance used as a retainer (B) After traction completed.

Fig. 5. Phase 1 completion. (A) Intraoral right occlusion, (B) frontal occlusion, (C) left occlusion, (D) frontal smile photographs, (E) Panoramic radiograph.

Fig. 6. Fixed orthodontic appliance bonded for leveling, aligning and detailing of occlusion.

3. DISCUSSION

Although impaction of maxillary central incisors occurs less frequently than maxillary canine, it causes concern for parents in the early mixed dentition because of esthetic issues and psychological sequel [13].

Treatment options for incisor impaction include extraction, observation and surgical exposure [4]. Many articles have described different approaches for this situation. However, the most conservative method should be chosen. Spontaneous eruption has been reported in many cases after space creation. If spontaneous eruption does not occur, surgical exposure and orthodontic traction of impacted teeth is the better choice.

There are two main approaches for surgical exposure of impacted teeth: closed and open approaches. If the tooth is placed at a high level in the alveolar bone then the closed approach is recommended. As reported by Becker, central incisors exposed by the closed technique showed no significant difference in gingival indices, width of attached gingiva and crown length when compared with untreated teeth. The only difference was a small increase in the mean pocket depth compared with untreated teeth. Only about 1/3 of treated teeth showed an abnormal gingival contour using this method [14]. It has been reported that teeth exposed by the apically positioned flap technique had greater crown height, increased probing depth, gingival scarring and a tendency to vertical relapse but a greater amount of keratinized gingiva [15]. In this patient, the initial selection was the closed approach but after some movement of the tooth and due to lack of keratinized gingiva, the apically positioned flap was treated.

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 [15]. In the present case, the periodontal status of the exposed incisor after orthodontic treatment revealed an acceptable gingival contour and attached gingiva and no further mucogingival surgery was needed.

In order to apply the orthodontic traction, anchorage must be reinforced with a heavy rectangular arch wire on the fixed orthodontic appliance or a removable appliance. Factors such as dental age, compliance, and oral hygiene may influence selection of treatment [7,15].

Several reports have recently presented success in treating impacted maxillary anterior teeth by proper crown exposure surgery and orthodontic traction, although anchorage preparation with removable appliance is seldom reported. As in many patients with complaints of incisor impaction are usually in mixed dentition with only the first molars and incisors available for bonding so that the force may impact on the anchored teeth and may lead to root resorption in adjacent teeth, as well as, changes in arch form. Application of a removable appliance allows for the reaction force to be anchored by posterior teeth and palatal area, so there is no side effect on the adjacent teeth. Another issue with utilizing

fixed appliance is oral hygiene, which is challenging in mixed-dentition patients. Using fixed appliance in these children has greater potential for decalcification and gingival inflammation due to lack of cooperation and poor oral hygiene. Orthodontic traction with removable appliance shortens the length of further fixed orthodontics which by turn decrease the risk of complications [16].

One of the limitations of removable appliance is that, optimal results can only be achieved if there is excellent cooperation by the patient. In our case, the patient was concerned about the esthetic effect of the impacted tooth and was motivated to wear the appliance. Furthermore, as the tooth was erupting, motivation increased and he became even more compliant.

Another difficulty with removable appliance is that precise positioning of the tooth is impossible with it. The erupted tooth is usually rotated or has improper tip or torque. This necessitates fixed appliance treatment in second phase.

The esthetic result was excellent as no gingival recession was observed, which is common in teeth that were previously impacted. The radiographs showed no sign of root resorption in the impacted tooth or in other teeth. The periodontium was in a healthy condition despite a 11- month treatment time. The removable appliance used initially helped the patient to maintain a good level of oral hygiene.

4. CONCLUSION

The patient with impacted central incisor was successfully treated with a removable appliance which maintained space and apply eruptive force. The fixed appliances were used in second phase of treatment for detailing of occlusion. The esthetic and periodontal result was excellent.

Consent

It is not applicable.

Ethical Approval

It is not applicable.

Competing Interests

Authors have declared that no competing interests exist.

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