

Autotransplantation of an Intruded Lateral Incisor Replacing an Avulsed Central Incisor—A Case Report

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*Oral injuries cause aesthetic, psychological, social, and therapeutic problems and also affect a large number of people, causing irreparable dental loss not only at the accident time but also during post-treatment. Missing permanent teeth by trauma in children is a particular challenge, especially in the anterior region of the maxilla. In the past few decades, tooth transplantation has been successfully researched for the treatment of anterior tooth loss in young individuals. **Objective:** The present case describes transplantation of an excessive intrusive maxillary left lateral incisor into the socket of avulsed maxillary left central incisor.*

***Study design:** The lateral incisor tooth was extracted and placed into the socket of avulsed tooth. Splinting was maintained for 2 weeks. After the root canal treatment, the crown of the lateral incisor tooth was reshaped with composite resin in central tooth form and performed an interim prosthesis both preventing movement of the canine tooth into the space of the transplanted lateral incisor tooth and providing aesthetic.*

***Conclusion:** The treatment provided is considered to be an interim solution for space maintenance, with time the child patient may reach an age that allows alternative, more definitive treatment as implant.*

***Keywords:** Avulsed Tooth, Intruded Tooth, Autotransplantation, Polyethylene Fiber-Reinforced Composite*
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INTRODUCTION

Trauma to the oral region occurs frequently and comprise 5% of all injuries for which people seek treatment. Avulsion of permanent teeth is one of the most serious of all dental injuries.¹ Avulsions account for 7.6% of all permanent teeth traumas.² The prognosis is related to the injury of the periodontal membrane during the time the tooth is out of its socket.³ Replantation is the treatment of choice, but cannot always be carried out immediately.¹

Although intrusive luxation is a relatively common type of dental injury in the primary dentition, intrusion of permanent teeth is a rare dental injury. Also, it is a relatively rare injury when compared with other types of trauma of the

permanent dentition. Andreasen showed that intrusion of permanent teeth was of rare injury only affecting 1.9% of traumatic injuries involving permanent teeth.^{4,5}

The optimal treatment for intruded permanent teeth has not yet been determined.^{4,6} The clinical treatment for intrusion is especially difficult, because of the severe complications accompanying it. These complications include pulp necrosis or obliteration, inflammatory root resorption, ankylosis, replacement root resorption and loss of marginal bone support.^{4,5} It might be required a different treatment management due to prognosis can vary from case to case. Ideal treatment option is the one with the lowest probability developing complications.

These oral injuries cause a tragic experience for the young patient and creates psychological impact on both the parents and children. If the injury involves the anterior tooth loss, it alters the child's appearance completely. In the past few decades, tooth transplantation has been successfully researched for the treatment of anterior tooth loss in young individuals.^{7,8}

The aim of the case report is to present the autotransplantation of the intruded lateral incisor into the space by an avulsed and lost central incisor after dental trauma.

CASE REPORT

An 11 year old boy was referred to Department of Pedodontics, Dental Faculty, Dicle University, one hour after trauma by fallen.

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Extraoral examination revealed no soft tissue injury. Intra-oral examination revealed that his permanent left maxillary central incisor had been avulsed and lost, permanent left maxillary lateral incisor had been also intruded (Figure 1). A periapical radiograph showed the complete loss of maxillary left central incisor with a normal socket. There was the child's tetanus vaccination record. Maxillary left lateral incisor was extracted slowly and then was placed into the socket of avulsed maxillary left central incisor after the radiographic examination (Figure 2). After suturing the gingiva, the transplanted tooth was splinted to neighbouring tooth with composite resin (Ecusit System, DMG Germany) and with polyethylene fiber-reinforced composite (FRCs) (Ribbond Bondable Reinforcement Ribbon, Ribbond, Seattle, WA, USA) which existed in our clinic for 2 weeks (Figure 3). The patient was prescribed 50 mg/kg amoxicillin for 7 days.⁹ Oral hygiene instruction was given

and the patient was prescribed 0.2% chlorhexidine mouthwash for 1 week.

Two weeks after the transplantation, the pulp was extirpated and the root canal dressed with calcium hydroxide paste (Vision, Germany). The splint was removed because the clinical findings revealed absence of abnormal mobility of the transplanted tooth. Calcium hydroxide paste was changed at 30 days later and the intracanal medication was changed every two months. After 9 months of calcium hydroxide medication, the root canal was filled with Diaket (3M ESPE Germany) and gutta-percha (Gapadent Co, Ltd Germany).

Two year after trauma, the transplanted maxillary left lateral incisor did not show any pathologic changes on clinical and radiographic examination (Figures 4a, 4b). The all enamel surface of the transplanted tooth was conditioned using 35% phosphoric acid gel for 30 s. Care was taken to



Figure 1. Initial clinical view of the 11-year-old patient with avulsed and lost tooth 21 and intruded tooth 22.



Figure 3. The transplanted tooth was splinted to neighbouring tooth with composite resin after suturing the gingiva.



Figure 2. Intraoral photograph of the transplanted tooth 22 in to the socket of the avulsed tooth 21.



Figure 4a. Two year after trauma, clinical view of the transplanted tooth 22.



Figure 4b. Two year after trauma, radiographic appearance of the transplanted tooth

remove the etchant gel completely; the tooth was sprayed with water for 30 s and then blown dry. The enamel surface was then covered with a bonding agent (Clearfil SE Bond, Kuraray Medical) and light cured for 10 s with a resin-composite curing unit, and the crown of transplanted tooth was reshaped with direct resin composite laminate veneer in central tooth form. A week later it was performed the interim prosthesis with composite resin (Ecusit System, DMG Germany) and with polyethylene fiber-reinforced composite (FRCs) fixed partial dentured (FPDs) (Ribbond Bondable Reinforcement Ribbon, Ribbond, Seattle, WA, USA), preventing movement of the canine tooth into the space of the transplanted lateral incisor tooth (Figure 5).

It was opened a new entrance cavity on the transplanted tooth which was reshaped with composite resin (Ecusit System, DMG Germany) in central tooth form., and 1/3 of the root canal was removed. The prepared dowel space was measured with a periodontal probe. The distance from the space of pontic to the root canal of the transplanted tooth was measured using dental floss. Bondable reinforcement polyethylene fiber needed (0.3 mm thickness and 3 mm width) was then cut with special scissors. The fiber piece was then coated with a dual-curing resin (Liner Bond II V, Kuraray Medical, Okayama, Japan) and set aside under a light-protective cover. The internal surfaces of the root canal was treated with the primer of the same system (Liner Bond II V, primer A and B mixture; Kuraray) for 30 s and dried with a gentle air stream for 15 s. A dual-polymerizing dentin bonding agent (Liner Bond II V, bond A and B mixture; Kuraray) was applied to the internal surfaces of the canal. Dual-polymerizing hybrid resin (Panavia-F; Kuraray) was injected into the canal space.

One piece of bondable reinforcement ribbon which had



Figure 5. The crown of transplanted tooth 22 was reshaped with composite resin in central tooth form and it was performed the interim prosthesis with composite resin and with fiber-reinforced composites.



Figure 6. Clinical view 3 months after interim prosthesis.

been coated with bonding agent was packed into the canal space as tightly as possible using an endodontic plugger and the free end of the bondable reinforcement ribbon extended to the space of pontic. The excess resin was removed. A composite resin (Ecusit System, DMG Germany) was placed into the cavity. Resin was cured for 60 s with a resin-composite curing unit. The crown of pontic was formed using a layer of composite resin (Ecusit System, DMG Germany). Then the restoration was contoured and polished with disks.

Three months after interim prosthesis, the maxillary left lateral incisor was still functioning and providing acceptable aesthetics (Figure 6).

DISCUSSION

Treatment and prognosis of intrusive luxations can vary depending on the age of the patient, type of dentition, stage

of root development and TME and severity of the trauma. Different treatments are suggested in the literatures for cases of intrusive luxation. Techniques include: (a) observation for spontaneous eruption, (b) surgical crown uncovering, (c) orthodontic extrusion, (d) partial surgical extrusion, immediately followed by orthodontic extrusion, and (e) surgical repositioning.⁶

Surgical replacement might be indicated only when the tooth is displaced into the vestibule or through the floor of the nose.¹⁰ In this case, the tooth was displaced into the vestibule.

The loss of maxillary incisors in childhood is problematic, and predictable treatment methods are difficult.¹¹ The treatment of an avulsed tooth is replantation of the tooth into its own socket within 20-30 min of injury or keeping the tooth in an appropriate storage medium until the patient can be treated by a dentist. If the tooth is not replanted, the alternative choices are orthodontic treatment to either close the space or preserve it for future restoration with a fixed or removable prosthesis or a dental implant. The type of restoration depends on factors including the patient's age, amount of alveolar bone present, and integrity of the adjacent teeth.^{3,12,13} Another option is the transplantation of a tooth into the space left by the avulsed tooth.¹⁴

Autotransplantation of teeth to replace missing incisors might be considered if suitable donor teeth are available.¹⁵ The transplantation of premolars after traumatic loss of incisors has shown a high success rate when more than 50% of the root is developed.¹⁶ The stage of root development has been thought to be one of the main factors affecting the prognosis of an autotransplanted tooth.^{15,17} Therefore, loss of anterior teeth in children younger than 10 years old cannot be adequately treated and collapse of the alveolar process and loss of fixed gingiva may result.

In this case essentially, it was decided to the transplantation of an excessive intrusive maxillary left lateral incisor into the socket of avulsed maxillary left central incisor with aim to preserve of the alveolar ridge in the site of the lost central incisor and to earn more aesthetic appearance to the patient.

In the revascularization process, there is penetration of connective tissue and blood vessels from the periapical tissues into the root canal space. This process is possible only in a tooth with an open apex, because of the wide apical foramen. In a tooth with a closed apex, where the apical foramen is smaller than 1mm, this process is impossible.¹³ Therefore, root canal therapy is recommended for these teeth at the second appointment, before the necrotic pulp becomes infected.¹⁸ In this case, the root canal treatment was completed after 9 months of calcium hydroxide medication.

The most frequent type of resorption resulting from major damage to periodontal ligament cells is replacement resorption, leading to dentoalveolar ankylosis.¹⁹ Ankylosis is usually observed within 1-2 months, but it may not be diagnosed until more than 6 months have elapsed.²⁰ Radiographic changes are seldom present initially and are more difficult to assess.²¹ It is known that optimal

periodontal ligament (PDL) healing is seen when an avulsed tooth is replaced into its own socket. In this situation, reattachment occurs in 2 weeks between the connective tissues of the root surface and recipient socket wall.²² However, PDL healing is also expected when a donor tooth is immediately placed into a fresh, unmodified extraction socket.^{3,23} In this case, ankylosis was not observed clinically and radiographically after 1 year.

Since 1991, polyethylene fibers have been successfully used in a variety of clinical techniques.^{24,25,26,27} In this case, it was decided to perform an interim prosthesis with fiber-reinforced composites (FRCs) both functioning and providing aesthetic and undergoing more growth of the child.

The patient has been followed up by us. Three months after interim prosthesis, the maxillary left lateral incisor was still functioning and providing acceptable aesthetics. The patient had no complaints. The treatment provided is considered to be an interim solution for space maintenance, with time the child patient may reach an age that allows alternative, more definitive treatment as implant.

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