

# DESIGN AND FABRICATION OF AN INTERIM PROSTHESIS FOR REPLACEMENT OF AVULSED PERMANENT MANDIBULAR INCISORS

## Modified lingual arch prosthesis

Dr. Sharon Vincent<sup>1</sup>, Dr. Ruchika Kundra<sup>2</sup>, Dr. Abi M. Thomas<sup>3</sup>

1. Assistant professor, Dept. of Pediatric and Preventive dentistry  
Al Azhar Dental College, Thodupuzha, Kerala, India.

2. Assistant Professor, 3. Principal and HOD

Dept. of Pediatric and Preventive Dentistry, Christian Dental College, Ludhiana, Punjab, India

### Abstract

The avulsion of anterior teeth in children creates a psychological impact on both the parents and the child especially if the injury affects the permanent dentition. Replantation of teeth lost due to avulsion is recommended, though it is not always possible due to failures in retrieving the tooth from the site of accident. More economically acceptable treatments should be investigated for the replacement of missing teeth, taking growth related changes into consideration before a definitive prosthesis is planned. This article describes the design and fabrication of an interim prosthesis for replacement of missing permanent mandibular incisors using a modified lingual arch space maintainer.

**Key words:** :fixed interim prosthesis, lingual arch.

### Introduction

Avulsion of anterior teeth may jeopardize the aesthetic appearance and psychological development of children especially during adolescence. Dental trauma is relatively more common in the first and second decades with a prevalence of 6.4% to 37.9%<sup>1</sup>. Avulsion of permanent teeth occurs in approximately 0.5-16% of the cases<sup>2</sup>. Majority of the dental injuries involve the maxillary anterior region, especially the incisors. The mandibular teeth, however, are protected by the non-rigid

connection between the cranial base and the mandible, and also by the overlapping maxillary teeth except in Class III malocclusions<sup>3</sup>. Tooth fractures are more common in mandibular teeth with avulsions being a rarity. In cases of exarticulation, replantation of tooth is usually recommended, though not always possible. Rehabilitation of such cases is an enigma to the dentist due to growth considerations and disadvantages of removable prostheses. Following the traumatic loss of an anterior tooth in children and adolescents, it is important that an immediate replacement is provided in order to avoid aesthetic, masticatory and phonetic difficulties and avoiding arch length discrepancies to maintain the edentulous space. More economically acceptable treatments should, therefore, be investigated for the replacement of a missing tooth as a long-term

Address of correspondence

Quick Response Code

**Dr. Sharon Vincent**

Assistant Professor, Dept of Pediatric and Preventive Dentistry Al Azhar Dental College, Thodupuzha, Kerala, India.

Email: sharonvincent03@gmail.com



provisional treatment before implant rehabilitation. This article describes the design and fabrication of an interim prosthesis for replacement of avulsed permanent mandibular incisors.

### Case History

A 12 year old boy reported to the Department of Paediatric and Preventive Dentistry with the chief complaint of missing lower front teeth due to fall . Primary wound care for abrasions at the philtrum and upper lip was done at a private hospital prior to referral . Intra-oral examination revealed missing mandibular permanent right central and lateral incisors and a deciduous canine(Figure1) Orthopantomogram confirmed the avulsion of mandibular right central and lateral incisors and deciduous canine (Figure 2). Avulsed teeth could not be retrieved from the site of incidence .The patient wanted a fixed and aesthetic replacement of missing teeth.



Figure 1 : Photograph showing missing mandibular right central and lateral incisor



Figure 2: OPG confirms avulsion of mandibular right central and lateral incisors and erupting canine

A modified lingual arch with artificial teeth was planned for prosthetic rehabilitation of missing teeth after the healing of sockets. Orthodontic bands(0.006 × 0.180 in) were adapted onto mandibular right and left first permanent molars. A modified lingual arch with a 0.9 mm stainless steel wire was fabricated. The anterior extension included a wire passing over the crest of alveolar ridge (Figure3) with two spikes soldered perpendicular to the wire.



Figure 3: Lingual arch with spikes soldered onto the anterior extension

Mandibular central and lateral incisor copings were directly fabricated using auto polymerizing acrylic resin followed by a composite veneer for superior aesthetics (Figure 4,5,6). The patient was recalled for regular follow up at 1 week, 1 month, 3 months, 6 months and 1st year. Retained deciduous teeth were extracted and oral hygiene instructions were delivered(Figure 7) The patient was satisfied with the improved aesthetics and has been under periodic evaluation for the past two years.



Figure 4:Prosthesis



Figure 4: Prosthesis



Figure 6: Prosthesis after cementation : lingual view



Figure 7: Two year follow up

### Discussion

The technique described here offers a simple and cost effective treatment alternative for the management of missing anteriors in a growing child. The immediate treatment that can be provided to the patient for trauma-related tooth avulsion is a space maintainer. Failure to do so

can lead to drifting of the adjacent teeth, mid line deviation, and space loss apart from over-eruption of the antagonistic teeth<sup>4</sup>.

The replacement of avulsed mandibular incisors in adolescents requires special considerations. Some of the challenges associated with the anterior mandible are limited space, growth considerations, overlapping maxillary incisors and aesthetic demands.

Various treatment options available include the placement of natural crown or acrylic tooth in a fixed or removable prosthesis, fixed bridges, fibre reinforced composite ,auto-transplantation or implant restoration. Removable partial dentures commonly used for tooth replacement have the problems of patient compliance, increased bulk of prosthesis, predisposition to fracture, problems in maintenance of hygiene, tissue inflammation, and papillary hyperplasia. Complications relating to the lack of stability, unfavourable stress distribution and the need of denture re-lining can also act as a deterrent to rehabilitation with a conventional acrylic removable prosthesis. A tooth supported fixed prosthesis would require the preparation of healthy abutment teeth which could pose a challenge due to pulpal morphology and growth considerations. Maryland bridges also would require slot preparation in the abutment teeth. However, the loss of the deciduous canine and the actively erupting premolars prevented the fabrication of a semi-permanent bridge.

Auto-transplantation of teeth to replace missing incisors can be considered during the mixed dentition if suitable donor teeth are available in the mouth<sup>5</sup>. It allows for normal development of alveolar bone until growth has ceased and also prevents future placement of bridges or implants. However, inflammatory or replacement resorption can occur and the procedure requires expertise.

Implants are definitive treatment for tooth loss as result of trauma. The continuing growth during adolescence can impede implant restorative therapy due to the possible risk of submergence and hence, must be considered after cessation of growth<sup>6</sup>. If the child is in a mixed dentition period, substitution of laterals

and canines can be effective but in this case mandibular central as well as lateral incisor was lost to avulsion.

A lingual arch with teeth was planned in this patient as it has the advantage of not impeding the growth of the mandible and preserving arch stability. A fixed appliance was fabricated as an affordable interim alternative to a removable prosthesis, thus ensuring patient compliance. The follow-up for 2 years revealed satisfactorily results. The appliance is easy to construct, needs a short fabrication time and is cost-effective. It can be easily removed and re-cemented for fluoride application at recall appointments, if the need arises. Oral hygiene maintenance is also simplified and prophylaxis can be carried out with ease. This fixed-interim prosthesis, using a modified lingual arch technique, can be considered a non-invasive and long-term provisional treatment option during the growing phase with superior esthetics, function and added psychological benefits

## References

1. Brüllmann D., Schulze R. K., d'Hoedt B. The treatment of anterior dental trauma. *Deutsches Ärzteblatt International*. 2010;108(34-35):565–570
2. Andreasen JO, Andreasen FM, Andersson L. *Textbook and Color Atlas of Traumatic Injuries to the Teeth*. 4 th ed. Oxford: Blackwell Munksgaard; 2007
3. Bozabadi A -An investigation into the association between facial profile and maxillary incisor trauma, a clinical non-radiographic study. *Dent Traumatol*; 2010; 26;311-6
4. Sabri, R. Treatment of a unilateral Class II crossbite malocclusion with traumatic loss of a maxillary central incisor and a lateral incisor. *Am J Orthod Dentofacial Orthop*. 2006; 130: 759–770
5. Waldon K, Barber S, Spencer R, Duggal M. Indications for the use of auto-transplantation of teeth in the child and adolescent. *European Archives of Paediatric Dentistry*. 2012;13(4):210-216.
6. Cronin RJ, Jr, Oesterle LJ, Ranly DM. Mandibular implants and the growing patient. *Int J Oral Maxillofac Implants*. 1994;9:55–62