

Mini-implant Supported Temporary Replacement of Teeth in Children- A Case Report

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ABSTRACT

Dental agenesis or hypodontia is a frequent cause of tooth loss in children, most common being the maxillary lateral incisors. The absence of teeth affects aesthetics and results in functional impairment that hampers the psychological development of the young child. Treatment options available for replacement of congenitally missing teeth include fixed and removable dentures, resin-related retention devices, and single-tooth implants. The main deterring factor for implant placement in young children is the impending growth. To overcome this drawback, one can use self-drilling, one-piece orthodontic mini screw implants as a temporary abutment for the replacement of congenitally missing teeth. Mini-implant with temporary crown can serve as a permanent dental restoration for a growing child as the mini-implant is well maintained throughout his/her growth period without significant changes in skeletal morphology. This case report deals with a 12-year-old young girl patient, who has been treated with self-drilling orthodontic mini-implant with a strip crown for her congenitally missing bilateral lateral incisors, without any complications with six months follow-up.

Keywords: Growth, Orthodontic mini screw implant, Temporary restoration

CASE REPORT

A 12-year-old girl patient reported to the Outpatient Department of Paediatric and Preventive Dentistry, with a chief complaint of spacing in between anterior teeth, since she was seven or eight year of age. All other medical/dental history was non contributory.

Clinical examination revealed that patients having a moderately straight profile, competent lips, normal mentolabial sulcus, and apparently symmetrical face. Intraoral examination revealed missing lateral incisors bilaterally with the presence of midline diastema in the upper arch [Table/Fig-1]. Patient had complete permanent dentition with permanent canines fully erupted bilaterally. Other intraoral soft tissue and hard tissues were normal in range. Family history revealed that her mother was also having the same type of dental anomaly i.e., missing lateral incisors bilaterally in the maxillary arch. So, in the present case, this dental anomaly had a hereditary background [Table/Fig-2,3].



[Table/Fig-1]: Intraoral view of patient.

[Table/Fig-2]: Right-sided molars view. (Images from left to right)

Provisional diagnosis was hypodontia in the maxillary arch. Evaluation of Orthopantomogram (OPG) revealed the patient had congenitally missing lateral incisors bilaterally in the maxillary arch [Table/Fig-4]. So, the final diagnosis was hereditary hypodontia in the maxillary arch. The treatment objectives were the closure of the midline diastema in upper the arch by orthodontic treatment so that adequate space can be obtained for temporary replacement of congenitally missing lateral incisors bilaterally, followed by placement of mini-implants. To restore aesthetics, tooth colored crowns would be placed over the mini-implants. Once alveolar growth is complete, when the patient reaches adolescent age, these mini-implants can be replaced by an osseointegrated implant placement in the



[Table/Fig-3]: Left-sided molars view.

[Table/Fig-4]: Orthopantomogram (OPG) of the patient. (Images from left to right)

bone, followed by the fabrication of a permanent prosthesis. The recommended treatment plan was discussed with the patient and the parents. Before going through any procedure, informed consent was obtained from the guardians of the patient.

1st Part: Orthodontic Treatment

The MBT (developed by McLaughlin, Bennett and Trevisi) bracket system was used. Brackets were placed and incorporated 0.016" NiTi wire with an open coil spring between central incisor and canine on both right and left sides to close the midline diastema, and adequate mesiodistal width for restoration of missing lateral incisors was achieved [Table/Fig-5]. After six weeks, clinical evaluation revealed the midline diastema was closed [Table/Fig-6]. The space available between 11 and 13 was 7 mm and between 21 and 23 was 6 mm. The spaces obtained were adequate to restore lateral incisors {mesiodistal width of the Lateral Incisors (LI) is 6.5-6.6 mm [1]} by the placement of mini-implants [Table/Fig-7].



[Table/Fig-5]: Treatment started view.

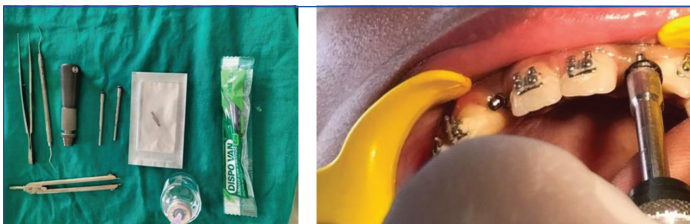
[Table/Fig-6]: After six weeks of treatment view. (Images from left to right)



[[Table/Fig-7]: Intraoral palatal and molars view after six weeks of treatment.

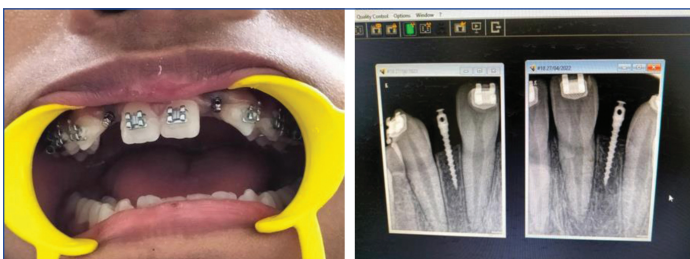
2nd Part: Placement of Mini Implants

Titanium mini screw implants selected were of size 1.5×10 mm (SK Surgical) [Table/Fig-8]. After local anaesthesia administration and by using a flapless procedure, mini-implants were placed with the help of a driver in 12 and 22 regions [Table/Fig-9,10]. Radiographic confirmation was done, to ensure that alignment of mini-implants placed were parallel to long axis of 11 and 21 [Table/Fig-11].



[[Table/Fig-8]: Armaterium for placement.

[[Table/Fig-9]: Placement done. (Images from left to right)



[[Table/Fig-10]: Placement completed.

[[Table/Fig-11]: Radiovisiography (RVG) after placement. (Images from left to right)

After Four Weeks Follow-up

After four weeks, an X-ray and clinical assessment [Table/Fig-12] revealed that the mini-implants were well positioned and that there was no inflammation of the soft tissues. So, all the bracket were removed, cleaned and crown build up with composites were done by the placement of strip crowns over the mini-implants [Table/Fig-13,14]. The patient was provided with a Hawley restraint plate that must be worn at all times except at night.



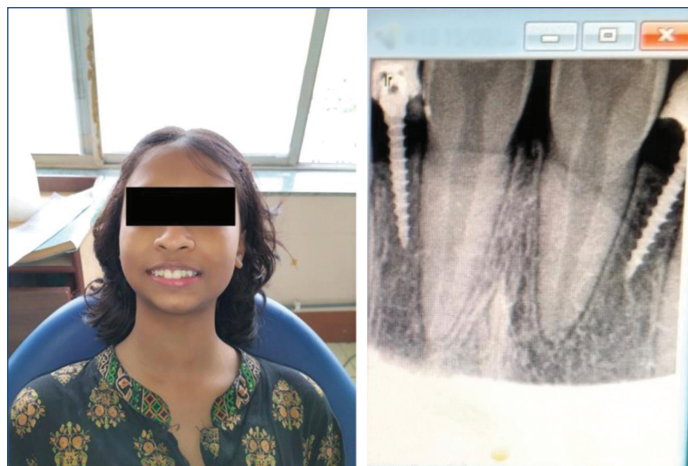
[[Table/Fig-12]: OPG after four weeks follow-up.

[[Table/Fig-13]: Intraoral view after placement of strip crowns. (Images from left to right)

The patient was kept on a regular recall schedule for six months and no implant mobility were observed [Table/Fig-15,16]. Patient was asked to maintain oral hygiene around the retained implant prosthesis using a toothbrush and mouth rinse. The patient's parents have been informed that this restoration is temporary and needs to be replaced with osseointegrated implant with permanent restoration when the period of active growth ceases. (15 years of age, in case of females).

After Nine Months Follow-up

Although the patient regularly wore a retention plate, during a 9-month follow-up, the authors found that, there was a 1 mm diastema



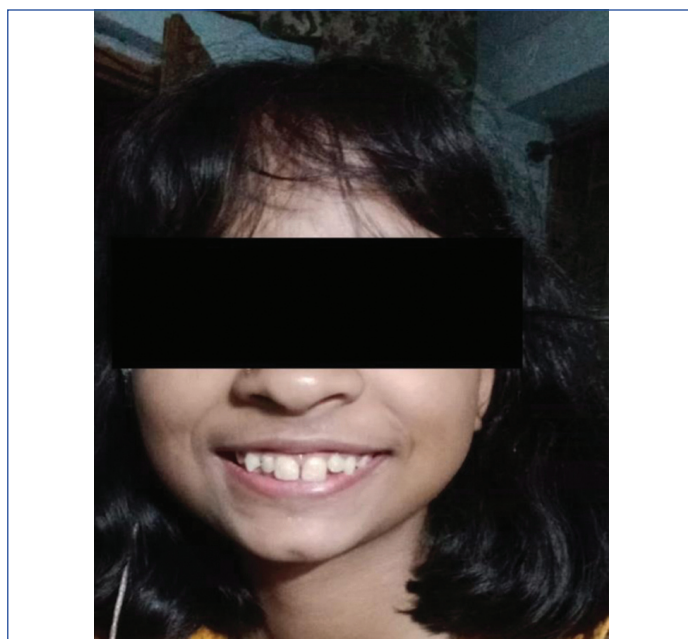
[[Table/Fig-14]: Post-treatment image of the patient.

[[Table/Fig-15]: RVG of mini implant at six months follow-up. (Images from left to right)

between the 11 and 21. The implant-based dental prosthesis was quite good. There was no swelling, pain and sensitivity around the teeth [Table/Fig-17].



[[Table/Fig-16]: Intraoral and extraoral view of patient at six months follow-up.



[[Table/Fig-17]: Patient at nine months follow-up.

DISCUSSION

The term "Dental agenesis" is described as congenital absence of any primary or permanent dentition. It is also known as hypodontia and is one of the most frequently encountered of all oral anomalies that affects a large population [2]. Various epidemiological studies reveal that one of the most common congenitally missing teeth is lateral incisor in maxilla causing aesthetic and functional impairments in the affected individuals [2,3]. Management of missing lateral incisors is challenging and involves a multi-disciplinary approach for rehabilitation of impaired aesthetics and function [2-4]. A meta-analysis stated that dental agenesis is more common in females (1.37 times) than males [5]. The prevalence of missing maxillary lateral incisors ranges from 0.95% in an American Caucasian sample to 2%

in an Icelandic sample [5], meta-analysis of 10 studies, totaling 48274 subjects, found the prevalence of missing maxillary lateral incisors to be 1.6% [5]. Dental agenesis has been attributed to both genetic and environmental factors. The genetic background is involved in the majority of cases [6]. It might be associated with non syndromic systemic conditions, syndromic conditions or other oral anomalies like ectodermal dysplasia, cleft lip with palate etc., but in the present case the patient had no such medical/dental history. Only her mother also, had the congenital absence of maxillary lateral incisors.

For making a treatment plan for a child with missing tooth some factors should be considered that are growth of the child, dentition present, the residual space between the teeth present in the arch, height of the alveolar bone, and the timing of implant placement. According to Graham JW, mini-implants used to hold a temporary crown restoration can be a better therapeutic option than a detachable partial denture or a Maryland bridge for replacing a single lost tooth [6]. But placement of dental implants required multiple visits which become troublesome for patients, mini-implants eliminate the need for surgery and multiple appointments. Mini dental implant is most commonly used for the stabilisation of over denture and some orthodontic treatments, but now they are also used in paediatric dentistry for congenitally missing teeth and tooth loss due to trauma. The orthodontic mini screw implant is a temporary anchorage device, constitutes of pure titanium or titanium alloy, as they are biocompatible and highly inert [7]. The miniscrew helps prevent ridge atrophy by stimulating the alveolar ridge and thus, prevents the drifting of the adjacent roots into the edentulous space [8]. The relatively small diameter allows the fixture to be placed even in the presence of transverse bone loss. The removal of the mini-implants is non traumatic and does not result in any additional deficits because they have minimal osseointegration and so allow the volumes of the soft and bone tissues to be maintained until growth is complete [9].

Brugnolo E et al., in their study showed that, all the patients who received implants in the anterior regions of maxilla had an implant crown in infra occlusion after 2.5-4.5 year [9]. Kalia AJ placed successfully a self-drilling one-piece orthodontic mini-screw implant as a temporary abutment for the replacement of the congenitally missing right lateral incisor. The main advantage of an orthodontic mini-implant temporary crown is that, it can serve as a permanent dental restoration for a growing child, if the mini-implant is well maintained throughout his or her growth period, without significant changes of skeletal morphology [10]. De Oliveira NS et al., had

shown that artificial tooth-supporting orthodontic implants can be successfully used to restore missing permanent teeth in children [11]. Placement of mini-implant is intended to temporarily satisfy the aesthetic needs of the patient and can be used as a space maintainer option, until the general growth of the patient is complete [12].

CONCLUSION(S)

Temporary restoration of congenitally missing teeth with mini-implant with strip crown can be an excellent alternative treatment option in young growing children. In oral rehabilitation of growing patient, mini-implant is becoming promising alternative for crown anchorage, especially in the anterior region due to its great biocompatibility and ease of application. A good temporary cosmetic and functional restoration based on a mini-implant, enhances the quality of life of the child, social integration and increases self-esteem.

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