

PRE-PROSTHETIC ORTHODONTIC IMPLANT SITE PREPARATION FOR MANAGEMENT OF CONGENITALLY UNERUPTED LATERAL INCISORS – A CASE REPORT

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Abstract

Congenital unilateral or bilateral absence of the maxillary lateral incisor teeth is one of the main reasons of concern for patients in addition to a challenge confronting the clinicians in terms of early investigations, accurate diagnosis and meticulous treatment planning. With growing patient demands for a functional as well as an esthetic treatment outcome, implant based oral rehabilitation has emerged as one of the most successful and predictable treatment approach in fulfilling both aspects of patient needs, provided the craniofacial growth in patients have ceased completely. An excellent implant site development by the approach of preprosthetic orthodontic treatment will ensure adequate alveolar ridge space availability for the successful execution of fixed prosthetic replacement. The integrated treatment approach towards the management of patients with congenitally unerupted teeth requires an interdisciplinary team involving orthodontist, periodontist, oral and maxillofacial surgeon and restorative dentists. This case report highlights the preprosthetic orthodontic space preparation and implant based oral rehabilitation of an adult male patient with bilateral congenitally unerupted maxillary lateral incisors.

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Introduction

Congenital absence in eruption of a component of the permanent dentition is a recurrent predicament faced by the clinical practitioners. And the maxillary lateral incisor is one of the most common congenitally absent teeth of the permanent dentition. The central incisors and canines adjacent to these

edentulous spaces often erupt to an unfavorable position in the arch. The two common treatment options include orthodontic space opening for future restorations or orthodontic space closure utilizing the adjacent permanent canine teeth.¹ With a paradigm shift in the patient expectations towards functional as well as esthetically appealing replacements for edentulism, the implant based oral rehabilitation has emerged as a sole winner in fulfilling all aspects of patient needs. The orthodontist plays a key role in determining and establishing space requirements for patients with congenitally missing maxillary lateral incisors.² However, the implant based treatment option in such patients requires an interactive and interdisciplinary management approach. This interdisciplinary approach may involve preprosthetic orthodontic treatment following consultations with an oral surgeon or

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periodontist and restorative dentist to ensure orthodontic alignment will facilitate the surgical, implant and restorative treatment.³ This case report exhibits the periodontic-orthodontic interrelated treatment approach in the management of bilateral congenitally missing lateral incisors in an adult after completion of the growth phase of life cycle.

Case report:

A 26 year old male patient reported to the Department of Orthodontics and Dentofacial Orthopedics with a chief complaint of spacing present between the upper front teeth. The spacing was reported to be present since the time of eruption of the permanent central incisor and canine teeth. The past dental and medical histories were non-contributory. The patient was a teetotaler with no reported parafunctional habits. Intraoral examination revealed the presence of a fully erupted set of permanent dentition with the exception of maxillary right and left lateral incisor teeth [Figure 1].



Figure 1. Pre-operative intra-oral clinical view depicting the bilateral absence of maxillary lateral incisors.

The maxillary right and left and the mandibular left third molar teeth also remained absent. The oral hygiene status of the patient was satisfactory and the gingival tissues clinically appeared to be in optimal health. In order to rule out the possibility of periodontal attachment apparatus breakdown and a resultant pathological migration of the maxillary anterior teeth, an intraoral periodontal tissue examination was carried out by measuring the six-point

probing pocket depth and clinical attachment level analyses of the remaining dentition. However, all the remaining permanent teeth appeared to be clinically healthy. A provisional diagnosis of congenital absence of bilateral maxillary lateral incisors resulting in the midline diastema was made. Orthopantomogram evaluation confirmed the bilateral absence of maxillary lateral incisor teeth.

The patient answered the question of a previous history of extraction of these teeth in the negative. The final and provisional diagnosis remained consistent. Considering the patient age as well as request for a combined functional as well as esthetic solution, an interdisciplinary treatment approach was ordained mandatory for achieving superior end results.

The patient was referred to the Department of Periodontology and Oral Implantology for initiating an integrated treatment. The intraoral and radiographic assessments of the patient was repeated and a tailor made treatment plan to suit this patient needs was formulated.

A fixed orthodontic treatment for space creation followed by implant based oral rehabilitation of the bilateral maxillary lateral incisor regions was decided as the treatment plan by the multidisciplinary team of clinicians. The stages of treatment protocol and the importance of stringent oral hygiene maintenance during the entire procedural period were explained in detail to the patient and a written informed consent was obtained.

The orthodontic treatment commenced by following the preadjusted edgewise technique of fixed orthodontic treatment based on the MBT principle. First stage of treatment was carried out utilizing a 0.016 inches round-oval nickel titanium wire secured within 0.018 inches slots. Second stage constituted the use of 0.016 × 0.022 inches stainless steel arch wire for achieving the final interspaces closure.

The orthodontic treatment was successfully completed with accomplishment of adequate ridge space in the bilateral maxillary lateral incisor regions, midline diastema closure and optimal alignment of the roots of the maxillary central incisors and canines [Figure 2].

A thorough oral prophylaxis and polishing of the remaining dentition was carried out and the patient was prepared for implant placement in the bilateral maxillary lateral incisor regions.



Figure 2. Intra-oral clinical frontal view after completion of pre-prosthetic orthodontic implant site preparation.

The surgical procedure for implant placement was initiated by the administration of local anesthetic solution of 2% lignocaine hydrochloride [LOX, Neon Laboratories Ltd., Mumbai, India] with 1:200,000 adrenaline. A mid-crestal incision was placed over the edentulous ridge spaces at the maxillary lateral incisor regions bilaterally and continued as crevicular incisions along the central incisor and canine regions to elevate two separate localized mucoperiosteal flaps on the buccal and palatal aspects of these regions. Osteotomy preparation was initiated using the pilot drill under copious irrigation and completed using subsequent osteotomy burs. Two self-threaded implants [4.3mm × 13mm, ADIN Dental Implant systems Ltd, Israel] were inserted into the prepared osteotomy sites and radiograph was obtained to ensure the accuracy of placement [Figure 3, 4].



Figure 3. Intraoral clinical view after implant placement at right and left maxillary lateral incisor regions.

Abutments were secured in position and impressions were obtained to fabricate temporary

prostheses for esthetic reasons for the patient. The temporary prostheses were delivered and patient was given post-operative instructions in oral hygiene maintenance. A prescription of 8mg of betamethasone was given jointly with 2g per day of amoxicillin for 10 days. The patient was asked to rinse the oral cavity with warm salt water for the first two weeks to promote healing without disturbing the wound. The patient was further instructed to use chlorhexidine gluconate 0.12% [Peridex, Zila Pharmaceuticals, Phoenix, AZ, USA] to facilitate plaque control⁴. The surgical sites were checked every 2 weeks for a period of 2 months. After 4 months of healing, the temporary prostheses were replaced with permanent crowns [Figure 5]. The success criteria used were: the implant was immobile, no signs of pain or suppuration were present, direct implant-to-bone contact were visible on the radiographs and vertical bone resorption was less than 1.0 mm in the first year after prosthetic loading.⁵

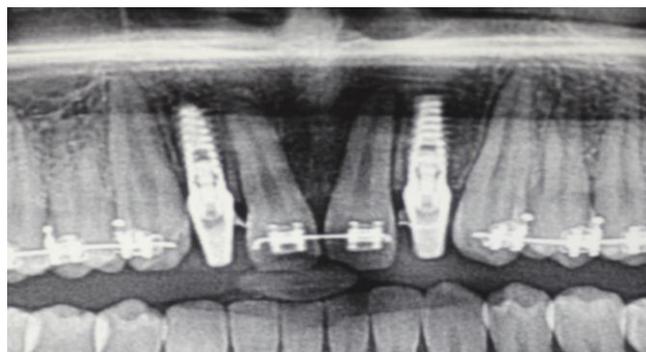


Figure 4. Radiograph after implant placement at right and left maxillary lateral incisor regions.



Figure 5. Intraoral clinical view after placement of final prostheses in relation to maxillary right and left lateral incisor regions.

Discussion:

Implant based oral rehabilitation of patients with congenitally unerupted lateral incisor teeth is one of the most esthetic and predictable procedures within the scope of modern dental practice. While implants have expanded restorative treatment options, treatment planning has become more complex for the dental practitioner and an interdisciplinary team approach is recommended by many authors³⁻⁷. Treatment alternatives for restoring edentulous spaces resulting from congenitally missing laterals include removable partial dentures, conventional fixed bridges, resin-bonded bridges, autotransplantation, orthodontic repositioning of canines to close the edentulous space and single-tooth implant⁸⁻¹⁰.

The advantages of implant based fixed prosthetic solution for management of edentulism in congenital missing teeth replacements is multiple. Implant placements facilitate in preserving the remaining alveolar ridge, enhance occlusal function and provide optimal esthetics⁸⁻¹¹. Also, these types of permanent fixtures do not necessitate "altering" or "removing" parts of the natural dentition, hence facilitating a conservative treatment approach for the patients⁸⁻¹³. A study by Thilander et al in 2001 evaluated the long term effect of implants installed in different dental areas in adolescents¹⁴. The results of the study concluded that dental implants are a good treatment option for replacing missing teeth in adolescents provided that the treatment subjects have completed their dental and skeletal development. The disadvantages of implant placement arising in the lateral incisor region may be due to the slight continuous eruption of the adjacent teeth and craniofacial changes post-adolescence. Shorter the distance between the implant and the adjacent teeth, larger is the reduction in marginal bone levels¹⁴. Hence, orthodontic space gaining and uprighting of the adjacent teeth is a mandatory step prior to implant placement.

There are three ways to determine the appropriate space in the regions of congenitally missing teeth. The first is the gold proportion method of evaluating a smiling or frontal intraoral photograph in a two-dimensional view¹⁵. Since the maxillary teeth are positioned in a curved arch, each tooth should be 61.8% wider than the tooth distal to it¹⁶. The second method is to use

the dimensions of the contralateral incisor, in cases of unilateral congenitally missing lateral incisor¹⁵. The third method of space appropriation is to conduct a Bolton analysis¹⁷. However the most predictable guide for determining ideal spacing is to construct a diagnostic wax setup. This simplifies treatment for the orthodontist and the restorative dentist².

Early investigation and accurate diagnosis are of prime importance especially when there are family histories of congenitally missing teeth, asymmetric loss of primary teeth, over-retention of deciduous lateral incisors and canines, lack of developmental canine bulge or impacted maxillary canine teeth¹¹. In the present case report, there was no contributing family history rendering this patient a first generation sufferer. The optimal time for placement of implants is after growth of the maxilla, mandible and alveolus is complete. If implants are placed before growth is complete, the surrounding alveolar bone may continue to develop vertically and adjacent teeth may continue to erupt. Thus a discrepancy between the gingival margins of the implant and the natural teeth is created and the implant appears to become submerged, thus creating an esthetic and functional problem¹⁵. If the growth is complete, dental implants can be placed as soon as the edentulous space has been created and the tissues have stabilized following orthodontic treatment¹⁵. In this case scenario, the patient had reported for the treatment well after the period of growth completion.

Conclusion:

The maxillary lateral incisor is one of the most common congenitally missing teeth of the permanent dentition. With the advent of implants in the field of restorative dentistry, a stable and predictable fixed prosthetic replacement has become a reality, especially for young adult patients who suffer from congenital absence of teeth. The dual goals of establishment of functional stability as well as enhancement of esthetic outcomes are made achievable by the placement of implants. A multidisciplinary team approach involving the triad of orthodontist, periodontist and restorative dentist will ensure the successful completion of the integrated treatment approach in these patients. The present case report achieved successful implant

based oral rehabilitation in a patient diagnosed with congenital absence of bilateral maxillary lateral incisors utilizing a preprosthetic orthodontic implant site preparation for the purpose of space gain.

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