



Esthetic Dentistry in Patients with Bilaterally Missing Maxillary Lateral Incisors: A Multidisciplinary Case Report

Bhaskar Mummidi, CH Hanumantha Rao, A Laxmi Prasanna, M Vijay, KV Baburam Reddy, MAKV Raju

ABSTRACT

Congenitally missing maxillary lateral incisors pose a difficult esthetic and treatment planning problem for clinicians. Age, location, space limitations, alveolar ridge deficiencies, uneven gingival margins, occlusion and periodontal factors often necessitate an interdisciplinary approach. Over the last several decades, dentistry has focused various treatment modalities for replacement of missing teeth. Treatment plans for patients with missing maxillary lateral incisors have traditionally included either space closure or space reopening. To remove healthy tooth structure of adjacent teeth to replace a tooth, for some patients and dentists, is a very aggressive treatment option which eliminates the option of three unit bridges. Removable partial dentures are also not preferred for its bulkiness and reduced esthetics. Presently, the single implant supported crown is a predictable method of tooth replacement in adolescents. The aim of this case report is to provide a conservative method for the management of bilateral missing lateral incisor.

Keywords: Anodontia/Therapy, Dental implants, Orthodontics, Corrective.

How to cite this article: Mummidi B, Rao CHH, Prasanna AL, Vijay M, Reddy KVB, Raju MAKV. Esthetic Dentistry in Patients with Bilaterally Missing Maxillary Lateral Incisors: A Multidisciplinary Case Report. *J Contemp Dent Pract* 2013;14(2):348-354.

Source of support: Nil

Conflict of interest: None declared

INTRODUCTION

Congenitally missing maxillary lateral incisors pose a difficult esthetic and treatment planning problem for clinicians. Age, location, space limitations, alveolar ridge deficiencies, uneven gingival margins, occlusion and periodontal factors often necessitate an interdisciplinary approach.¹ The incidence of congenitally missing maxillary lateral incisors has been reported to range from between 1 and 2% to as high as 5%. Maxillary lateral incisors are the most common congenitally missing teeth after upper and lower second premolars. Sex differences have been

found to be negligible, with slightly more females affected as compared with males.²

Over the last several decades, dentistry has focused various treatment modalities for replacement of missing teeth. 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 implant.³

The most common objections to orthodontic space closure are that the treatment outcome may not look 'natural', that retention is difficult and that the functional occlusion may be compromised. Many clinicians have therefore preferred to create space for missing lateral incisors with single-tooth implants or resin-bonded bridges.^{4,5} One esthetic consideration not frequently mentioned when canine substitution is attempted is the possibility of canine root prominence, which might be unsightly in a patient with a high smile line. Small first premolars might not produce esthetic replacements for canines that have been moved into lateral positions. Occlusal function might also be compromised by the lack of canine guidance which might not be acceptable to some.

When there is a family history 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 canines, the possibility of missing lateral incisors should be immediately investigated.⁶ Early investigation is especially important due to the higher association of congenitally missing or peg-shaped lateral incisors with these anomalies.⁷ In addition, early investigation will give time to the patient to explore all possible treatment options including implant restorations. A full set of orthodontic records including radiographs, models and clinical photographs are

recommended for the diagnosis of congenitally missing laterals and to plan the preprosthetic orthodontic alignment. A diagnostic wax set-up is also beneficial for planning treatment and esthetics.^{7,8} Participating clinicians—the orthodontist, periodontist, oral surgeon, restorative dentist, prosthodontist; should determine the patient’s treatment plan collaboratively and communicate throughout the course of treatment to ensure that all aspects of treatment are considered and the overall treatment objectives are achieved.⁹

The single-tooth implant has become the most popular treatment alternative for the replacement of missing teeth. Various studies have shown the successful osseointegration and long-term function of restorations supported by single-tooth implants. In addition to the high success rates, one main benefit of this type of restoration is that it leaves the adjacent teeth untouched. This is particularly important in young patients and unrestored dentitions. It is true that implant-supported restorations are not without potential problems. These problems range from mechanical complications to biologic changes that can impact their long-term predictability. However, if the proper surgical and restorative protocols are followed, potential complications or esthetic compromises are minimal. To achieve a stable esthetic and healthy outcome with dental implants, it is beneficial to understand their effects on the surrounding hard and soft tissues.

An interdisciplinary approach is necessary to provide the most predictable treatment results when single-tooth implants are inserted to replace congenitally missing lateral incisors. Osseointegration enables long-term stability of a prosthesis supported by a single-tooth implant.^{10,11} In the past, however, neither approach produced results that were entirely satisfactory from an esthetic and functional standpoint. Selecting the appropriate treatment option depends on the malocclusion, anterior relationship, specific

space requirements and condition of the adjacent teeth. The ideal treatment is the most conservative option that satisfies individual esthetics and functional requirements.¹²

The aim of this case report is to provide a conservative multidisciplinary approach for the management of bilaterally missing lateral incisors.

CASE REPORT

A 17-year-old female patient complains of spacing in the upper anterior region.

Extraoral Examination

Extraoral examination reveals a mesomorphic facial form, orthognathic facial profile with competent lips and acute nasolabial angle (Fig. 1).

Intraoral Examination

Angle’s class I molar relation on both sides and end on canine relation on both side with overbite of 5 mm and overjet of 4 mm. Spacing in the maxillary anterior region due to the absence of upper lateral incisors, with mild tongue thrust habit (Fig. 2).

Radiographic Examination

Panoramic radiograph examination shows congenitally missing maxillary lateral incisors bilaterally (Fig. 3). Cephalometric findings reveals orthognathic maxilla and mandible with mild proclined upper and lower incisors.

Diagnosis

A case of skeletal class I, average growth pattern with Angles class I molar relation on both sides and end on canine relation on both side, overbite of 5 mm and overjet of



Fig. 1: Pretreatment extraoral views



Fig. 2: Pretreatment intraoral views



Fig. 3: Pretreatment orthopantomograph

4 mm, spacing in the maxillary anterior region, congenitally missing upper lateral incisors.

TREATMENT OBJECTIVES

- To open up the spaces for the missing lateral incisors
- To achieve class I canine relation
- To replace the missing lateral incisors with implant prosthesis
- To maintain the class I molar relation on both sides.

TREATMENT PLAN

Treatment plan is divided in to two phases:

- Orthodontic phase
- Prosthetic phase.

Orthodontic Phase

Aim of the orthodontic phase is to open the space by distalizing the canines. The option of space closure by mesializing canine was not preferred due to class I molar relation well interdigitated posterior occlusion, and also for recontouring of canine to lateral incisor the morphology of canine with sharp cusp, need for intentional root canal treatment of a sound natural teeth.

Treatment Progression

Orthodontic treatment started with 0.022" MBT preadjusted edgewise appliance. The sequence of archwires started initial with 0.016" NiTi archwire followed by 0.018"SS, 16 × 22"SS, 17 × 25"SS and 19 × 25"SS archwires. In 19 ×



Fig. 4: Fixed orthodontic appliances—extraoral photographs

25"SS archwire canine was retracted on both sides by beneath method of retraction. Sufficient space was gained for replacement of lateral incisors by distalizing the canine to class I relation and also closing the mid-line space (Figs 4 to 6). Treatment period lasted for 12 months. After retraction radiographs were taken to assess the bone level and root parallelism for the implant placement. After final finishing and detailing of the occlusion the fixed appliance were debonded and upper Hawley's retention appliance were given.

Prosthetic Phase

The prosthetic phase includes the following:

Implant Selection and Template Fabrication

Template was fabricated for guiding implant placement during surgical procedures. Based on bone density, height and width implant was selected.

Surgical Stage

First stage surgery: In the first surgical stage, utilizing a surgical template prepared from a wax-up of the proposed implant-supported restoration, a 3.5 to 11 mm Bicon uncoated implant fixture was placed under local anesthesia. In accordance with the manufacturer's recommendation, the



Fig. 5: Fixed orthodontic appliances—*intraoral view*



Fig. 6: End of canine retraction—*intraoral view*



Fig. 7: Implant placement

implant fixture was placed 2.0 mm below the crest of the bone and the autogenous bone that was harvested during the osteotomy over the top of the implant.

Second surgical phase: The second surgical phase involved placement of the abutment and fabrication of a temporary crown. Under local anesthesia, a Bicon 4.0 to 6.5 mm angled abutment was installed and a temporary crown was placed. The Bicon abutment utilizes a locking taper for retention of the abutment to the implant fixture. The locking taper allows any sized abutment to fit onto any sized implant, improving prosthetic versatility. The abutment was prepped to provide ideal alignment and emergence profile of the crown. The tissues were allowed to mature for 6 weeks, and the patient returned for the impression appointment (Fig. 7).

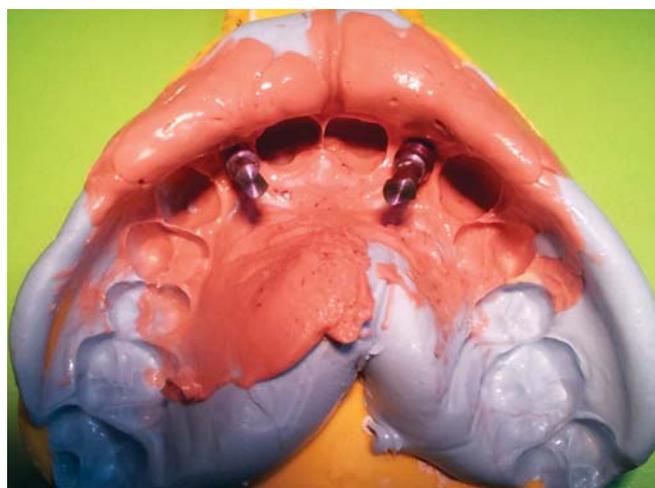


Fig. 8: Impression

Impression Making

After the fixture was placed, impression copings were placed and an open tray impression technique was used to transfer the exact position of implants to the cast (Fig. 8).

Prosthesis Fabrication

The completed prosthesis was given with all ceramic crowns for upper right and left lateral incisors and was cemented with resin cement.

Post-treatment

The post-treatment result shows an improved smile with better facial esthetic (Figs 9 and 10). The post-treatment radiographs show the implants replacing the maxillary incisors (Fig. 11).

DISCUSSION

Missing lateral incisor leads to an obvious asymmetry in the patients smile, shift in the dental midline. The use of



Fig. 9: Post-treatment extraoral photographs



Fig. 10: Post-treatment intraoral view



Fig. 11: Post-treatment orthopantomograph

dental implants in the esthetic zone is well-documented in the literature, and numerous controlled clinical trials show that the respective overall implant survival and success rates are similar to those reported for other segments of the jaws.

When maxillary lateral incisors are congenitally missing, permanent canines frequently erupt mesial to their normal positions. After the canine has erupted, it can be moved distally into its normal position by orthodontic treatment.

By moving the tooth distally, bone is laid down, forming an alveolar ridge with adequate buccolingual width to allow proper implant placement. Since implants are most suitable as a restorative option for adults after facial growth is complete, the need to maintain alveolar bone for several years until growth has ceased presents another challenge.^{13,14}

When planning for the placement of a single-tooth implant, the orthodontist must ensure adequate space between the crowns and roots. Both the quantity and quality of alveolar bone must be assessed before implant placement is considered.¹⁵ To accommodate a standard implant there should be a minimum of 10 mm of inciso-gingival bone and a minimum of 6.0 mm of facial-lingual bone.¹⁶ In cases where there is insufficient alveolar bone for implant placement, ridge augmentation may be necessary in addition to orthodontic repositioning of adjacent teeth.¹⁵ Adequate space for the implant is also required between the adjacent roots.^{17,18} The average dental implant fixture is 3.75 mm wide, and 1 to 2 mm of space is necessary between the fixture and the adjacent roots.¹² Typically, between 6 and 8 mm of bone between the central and canine roots is recommended. Creating adequate space between the roots must be specifically addressed since the central and canine roots may be brought into closer proximity when the teeth are initially aligned orthodontically.¹⁶ To create adequate space for the implant, further orthodontic treatment may be necessary to move the roots further apart. Space for the coronal restoration must also be assessed. The average implant platform, which is 4.0 mm wide, requires a space of 1.0 mm mesially and distally between the platform and the adjacent tooth to facilitate proper healing and the development of a papilla postoperatively.^{11,14} Thus, a minimum of 6 mm of space for the lateral crown is required.^{17,18}

Single tooth implants are a good treatment option for replacing the missing teeth provided that the subject's dental and skeletal development is complete and it has several improvements over resin-bonded prosthesis: Preparation of adjacent teeth is not needed; the tooth replacement will function individually; a conventional oral hygiene technique can be used; preservation and stimulation of existing bone and soft tissues occur, including recreation of the interproximal papillae; and stability and function are improved because of the implant supporting the crown. As discussed above, one goal of orthodontic alignment is to achieve sufficient bone between the roots to place the implant. The roots of the central incisor and canine should be parallel to slightly divergent to avoid complications resulting from root proximity. Usually, the tip of the central incisor is approximately 5° while that of the canine is 13°, which means that the roots are slightly divergent. There are additional mechanotherapy treatment options that can be used to orthodontically position the roots of the adjacent teeth and create adequate space for the implant. These include ideal placement of brackets to achieve the correct root and crown positions; bending the archwire to accentuate root divergence; or bonding a contralateral bracket on a central incisor (such as placing the maxillary right central incisor bracket on the maxillary left central incisor) to accentuate root divergence in the implant area¹⁹ (placement of the contralateral bracket on the canine is never indicated as this would cause the canine root to move into the edentulous area and compromise implant placement).

The esthetic advantage of a single tooth implant vs a three unit bridge is the most apparent one. A pontic for a three unit bridge simply sits on top of the soft tissue, whereas a single tooth implant restoration emerges from the soft tissue. When replacing a single missing tooth where diastemas are present, it is difficult to create an ideal tooth replacement using a fixed partial denture. With a single tooth implant it is easy to achieve an acceptable esthetic result. Maintenance of oral hygiene is not a major issue when a single tooth dental implant is placed as the patient can easily floss in the conventional fashion as with a natural tooth. Whereas with a three unit fixed partial denture, the patient will need to use a proxy brush, floss threaders, or superfloss to gain access beneath the solder joint area for proper oral hygiene.¹⁹

Advantages of single tooth implant include improved esthetics, improved hygiene accessibility, osseous preservation, and reduced future maintenance all at a comparable cost. The most important advantage of using implants to replace missing lateral incisors is that they leave proximal teeth untouched. Implants have become the

restoration of choice for most patients when the treatment option is to open space. For implant treatment to be successful there must be an adequate intercoronal and inter-radicular space opening and root paralleling of the adjacent teeth, including the apical areas, and the abutment teeth must be completely stabilized.¹³

Preprosthetic orthodontic measures are often an integral part of comprehensive oral rehabilitation. The individual aspects of treatment are aimed at optimizing dentofacial esthetics and at improving masticatory function and hygiene potential of prosthetic restorations. Placement of a dental implant is the most conservative approach from a biological standpoint as placing a dental implant in bone provides a functional stimulus to help preserve the remaining bone and prevent resorption while preserving the sound structures of the adjacent teeth.

CONCLUSION

Congenitally missing lateral incisors presents a challenging treatment dilemma for the clinician as they are usually associated with other malocclusions and abnormalities. For a successful outcome and patients satisfaction a coordinated orthodontic, prosthodontic, periodontal and restorative treatment approach, with careful concern toward patient expectations and requests are critical. For the replacement of congenitally missing upper lateral incisors single tooth implants should represent the treatment of choice. An implant will preserve tooth structure and alveolar bone and provide esthetics and function. As mentioned above successful restorative treatment involving implants depends on interdisciplinary treatment planning, especially if preprosthetic orthodontic tooth alignment is required. The roots of the teeth adjacent to the edentulous implant region must be parallel or slightly divergent to create sufficient bone for implant placement, and there must be sufficient space between the crowns to place an implant and restore.

REFERENCES

1. Mantzikos T, Shamus I. Case Report: Forced eruption and implant site development. *Angle Orthod* 1996;68(2):179-86.
2. Schweizer CM, Schlegel AK, Rudzki-Janson I. Endosseous dental implants in orthodontic therapy. *Int Dent J* 1996;46(2): 61-68.
3. Zuccati G. Orthodontics and implant therapy to replace a congenitally missing lateral incisor. *J Clin Orthod* 2004;38: 563-67.
4. Millar BJ, Taylor NG. Lateral thinking: The management of missing upper lateral incisors. *Br Dent J* 1995;79(3):99-106.
5. Bishara SE. Impacted maxillary canines: A Review. *Am J Orthod Dentofacial Orthop* 1992;101(2):159-71.
6. Turpin DL. Treatment of missing lateral incisors. *Am J Orthod Dentofacial Orthop* 2004;125:129.

7. Kinzer GA, Kokich V. Managing congenitally missing lateral incisors. Part III: Single-tooth implants. *J Esthet Restor Dent* 2005;17:202-10.
8. Polder BJ, Vant Hof MA, Van Der Linden FP, et al. A meta-analysis of the prevalence of dental agenesis of permanent teeth. *Community Dent Oral Epidemiol* 2004;32:217-26.
9. Graber LW. Congenital absence of teeth: A review with emphasis on inheritance patterns. *J Am Dent Assoc* 1978;96:266-75.
10. Rupp RP, Dillehay JK, Squire CF. Orthodontics, prosthodontics and periodontics: A multidisciplinary approach. *Gen Dent* 1997;45(3):286-89.
11. Balshi TJ. Osseointegration and orthodontics: Modern treatment for congenitally missing teeth. *Int J Periodontics Restorative Dent* 1993;13(6):495.
12. Phillips K, Kois J. Aesthetic peri-implant site development. The restorative connection. *Dent Clin North Am* 1998;42(1):57-70.
13. Kokich VG, Spear FM. Guidelines for managing the orthodontic-restorative patient. *Semin Orthod* 1997;3(1):3-20.
14. Spear FM, Mathews DM, Kokich VG. Interdisciplinary management of single-tooth implants. *Semin Orthod* 1997;3(1):45-72.
15. Aktas G, Canay S, Aktas A, El H, Bayramo I. Interdisciplinary approach for congenitally missing maxillary lateral incisors. *Int J Dent Sci* 2010;8(2):226-29.
16. Park JH, Kim DA, Tai K. Congenitally missing maxillary lateral incisors: Treatment. *Dent Today* 2011 May;30(5):81-82, 84-86; quiz 87.
17. Tuna H, Uzun G, Keyf F. The single-tooth implant treatment for maxillary central incisors loss after trauma: Case reports. *Clin Dent Res* 2011;35(1):47-52.
18. Hess D, Buser D, Dietschi D, Grossen G, Schonenberger A, Belzer UC. Esthetic single-tooth replacement with implants: A team approach. *Quintessence Int* 1998;29(2):77-86.
19. Orthodontic Diabogue. The role of the orthodontist on the maxillary anterior implant team. *Am Assoc Orthod* 1998;10(2) (www.aaojfo.org; accessed on 12/09/2013).

ABOUT THE AUTHORS

Bhaskar Mummididi (Corresponding Author)

Professor, Department of Orthodontics, Vishnu Dental College Bhimavaram-534202, Andhra Pradesh, India, e-mail: bhaskarortho@gmail.com

CH Hanumantha Rao

Assistant Professor, Department of Orthodontics, Vishnu Dental College, Bhimavaram, Andhra Pradesh, India

A Laxmi Prasanna

Reader, Department of Orthodontics, Panineeya Institute of Dental Sciences and Hospital, Hyderabad, Andhra Pradesh, India

M Vijay

Professor and Head, Department of Orthodontics, CSI Dental College Madurai, Tamil Nadu, India

KV Baburam Reddy

Professor, Department of Orthodontics, Vishnu Dental College Bhimavaram, Andhra Pradesh, India

MAKV Raju

Professor, Department of Orthodontics, Vishnu Dental College Bhimavaram, Andhra Pradesh, India