Interdisciplinary management of congenitally missing maxillary lateral incisors

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ABSTRACT

Objective: Missing maxillary lateral incisors is a common developmental anomaly and often creates a major esthetic problem due to their position in the dental arch. Treatment in such cases depends on either creation of space followed by prosthetic replacement or closing the space and replacing the missing lateral incisors by canines. In this report we highlight some of the key factors which should be considered for replacement of missing lateral incisors using single tooth implant.

Methods: This clinical report describes the treatment of a patient with bilateral missing maxillary lateral incisors. An interdisciplinary approach involving Orthodontist, implant surgeon and prosthodontist was used in the treatment.

Results: At the end treatment, the patient presented with class I molar and canine, normal overbite and overjet, and good facial esthetics with canine protected occlusion.

Conclusion: When indicated, space opening and replacement of missing lateral incisors with implant supported tooth substitution may provide excellent esthetics and functional results.

1. Introduction

Maxillary lateral Incisor is the second most common congenitally missing tooth and an integrated interdisciplinary approach is often required for its management.^{1,2} There are several treatment options available based on the opening or closure of the space for lateral incisor. Space opening involves orthodontic tooth movement to create space for missing lateral incisor and replacing it with tooth supported restoration or single tooth implant whereas space closers involves canine substitution.³ Number of factors which should be considered before treatment are occlusal relationship including overjet, overbite and molar relationship, facial type, facial profile and tooth size arch length discrepancies.⁴ Patient's expectations along with the size shape and colour of the canine are the other factors which can influence the treatment planning. The primary goal of the treatment should be conservation and the treatment of choice should satisfy the expected esthetic and functional objectives.

In unilateral cases space opening commonly recommended procedure as it preserve symmetry and improve aesthetics of the patient. Whereas in bilateral cases both space opening as well as space closures could be performed depending upon the patient related factors and expectation of the patient.^{5–8} Space opening and restorative options is

ideal in cases with retrusive profile or with class III molar relationship. Space closure in such cases may worsen the profile and it may be difficult to maintain appropriate overjet and overbite relationship. Space opening is also beneficial in deep bite cases as proclination of incisors and space opening also helps in deep bite correction. Restorative options could be implant supported or a tooth supported restoration. Tooth supported restoration options have a disadvantage that they require varying amount of tooth structure removal. An Implant supported restoration has advantage that no healthy tooth structure removal is required. Treatment by mesial movement of canines to close the space and reshaping it into lateral incisors (Canine Substitution) is indicated in patients with class I and class II malocclusion without severe crowding in lower arch. In the interdisciplinary management of missing lateral incisors orthodontist can play a key role in by creating space for missing teeth by positioning teeth in ideal position through orthodontic teeth movement. The present case report describes interdisciplinary approach in the management of congenitally missing maxillary lateral incisors using dental implants.

2. Case report

A 26 year old female patient reported to the outpatient department

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Fig. 1. Extraoral Photographs before treatment.

with chief complaint of congenitally missing maxillary lateral incisor and spacing in upper front region. On extra oral examination no abnormalities were detected, patient had competent lips, mesiofacial face with orthognathic profile (Fig. 1). Intra oral examination showed an angles class I molar relationship with bilateral missing maxillary lateral incisors and midline diastema with generalised spacing in the anterior maxillary segment. The estimated width of the maxillary mid line diastema was 4 mm. Maxillary right canine was in class I relation whereas left canine was in class II with 3 mm of space between left first premolar and canine (Fig. 2). Panoramic examination showed absence of maxillary lateral incisors bilaterally. The cephalometric evaluation showed a class I sagittal skeletal relationship.

The aim of the treatment was to improve the aesthetics, align maxillary labial segment and provide stable occlusal relationship. The treatment plan included opening in the space of maxillary lateral incisors for implant placement and correction of occlusion. A fixed multi bracket pre adjusted edgewise appliance (MBT prescription, slot size

0.022"x.028" with round 0.016" round Ni-Ti) was placed to achieve initial alignment in upper arch. After aligning the midline diastema was closed by applying intra arch elastics on 0.017 × 0.025 stainless steel wire. As the right maxillary central incisor was more away from the midline so it was retracted more towards midline by reinforcing the anchorage on left side. Mesial movement of both the incisors resulted in slight distopalatal rotation of incisors which was corrected by using 0.019 × 0.025 "TMA wire". After midline diastema closer distalisation of canine was achieved by using super elastics coil spring in between central incisors and canines. Niti coil spring was activated more on left side as the canine was more mesial on the right side. Ni-Ti coil spring resulted in distalization of left canine class I relation and also resulted in slight proclination of the incisors (Fig. 3a). After active orthodontic treatment of 14 months, panoramic radiograph showed good root parallelism (Fig. 3b). Patient was referred to implant surgeon for implant placement and after 6 months abutments were fixed with all ceramic crown. At the end of treatment class I molar and canine

Fig. 2. Intraoral Photographs before treatment.

Fig. 3. Treatment progress space opening for maxillary lateral incisors (a), OPG showing implant substitution for missing lateral incisors (b).

relationship with normal overjet and overbite was achieved (Figs. 4 and 5). The results achieved were maintained during retention period with fixed lingual retainer between maxillary central incisors.

3. Discussion

Congenitally missing lateral incisors can be replaced with many options. One of the most common treatment options for replacement of congenitally missing lateral incisor is single-tooth implant. With implant substitution main advantages is that it does not necessitate altering parts of natural dentition and leaves adjacent teeth intact. Creation of space for missing lateral incisor with midline diastema closer and distalization of canine into class I relationship using fixed orthodontic treatment leads to development of a stable residual alveolar ridge in the lateral incisor region. This procedure has a definitive advantage as it permits the canine to take its natural position and provides a canine protected occlusion.^{9,10}

Interdisciplinary management of missing lateral incisors with implants requires orthodontic treatment for opening of the space for implant placement. Before implant placement teeth adjacent to missing lateral incisor should have parallel roots and adequate space must be created coronally and apically. In cases of bilateral replacement the space required may be based on golden proportion, Bolton analysis or diagnostic wax set-up. For successful implant placement with development and preservation of papilla and at least 1–1.5 mm of space should be there between implant and adjacent tooth.¹¹ In cases with missing lateral incisors alveolar ridge in this area does not develop fully. In these cases early extraction of primary lateral incisors allow the permanent canine erupt adjacent to central incisors. When the permanent canine is moved in distal direction orthodontically an increased

Fig. 4. Intraoral Photographs after treatment.

Fig. 5. Extraoral Photographs after treatment.

buccolingual width is established in lateral incisor area.¹¹ It was reported that implant site developed by this procedure remains stable over time and leads to formation of papilla at mesial and distal side of the implant.^{12,13}

The gingival contour and interdental papilla are important in terms of esthetic perception of smile. Pini et al. reported that the gingival contour and architecture in patients of missing lateral incisors treated with implants showed better gingival contour than the patients treated with space closure and conversion of canine in to lateral incisor.¹⁴ In some cases over a period of time there may be progressive loss of marginal bone at the buccal aspect of the implant resulting in discoloration of soft tissue, gingival recession and exposure of abutment. These problems can be minimized with the use of narrower diameter implants. In the interdisciplinary management of missing lateral incisors both the canine substitution and replacement with implant may be done. However treatment with implants produced a more proportional smile than patients treated with canine re-contouring.

4. Conclusion

Restoring missing lateral incisors requires careful treatment planning. Although many treatment options are available for the replacement of congenitally missing lateral incisors, single-tooth implant is one of the most common treatment alternatives. The main advantage of this

type of restoration is that it leaves the adjacent teeth intact. To provide adequate space both in the coronal and apical areas, orthodontics is often necessary and the synergy of orthodontics and implant dentistry can manage this condition in an ideal manner.

Informed consent

Written informed consent was obtained from the patient.

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Declaration of competing interest

The authors declare there are no conflicts of interest.

References

1. Graber LW. Congenital absence of teeth: a review with emphasis on inheritance patterns. *J Am Dent Assoc.* 1978;96:266–275.
2. Dermaut LR, Goeyers KR, DeSmit AA. Prevalence of tooth agenesis correlated with jaw relationship and dental crowding. *Am J Orthod Dentofacial Orthop.* 1986;90:204–209.
3. Kokich Jr VO, Kinzer GA. Managing congenitally missing lateral incisors. Part I:

- canine substitution. *J Esthetic Restor Dent.* 2005;17(1):5–10.
4. Zachrisson BU. Improving orthodontic results in cases with maxillary incisors missing. *Am J Orthod.* 1978;73:274–289.
5. Rosa M, Zachrisson BU. The space-closure alternative for missing maxillary lateral incisors: an update. *J Clin Orthod.* 2010;44(9):540–561.
6. Richardson G, Russell KA. Congenitally missing maxillary lateral incisors and orthodontic treatment considerations for the single-tooth implant. *J Can Dent Assoc.* 2001;67(1):25–28.
7. Millar BJ, Taylor NG. Lateral thinking: the management of missing upper lateral incisors. *Br Dent J.* 1995;179(3):99–106.
8. Argyropoulos E, Payne G. Techniques for improving orthodontic results in the treatment of missing maxillary lateral incisors A case report with literature review. *Am J Orthod Dentofacial Orthop.* 1988;94(2):150–165.
9. Sabri R. Management of missing lateral incisors. *J Am Dent Assoc.* 1999;130:80–84.
10. McNeill RW, Joondeph DR. Congenitally absent maxillary lateral incisors: treatment planning considerations. *Angle Orthod.* 1973;43:24–29.
11. Kinzer GA, Kokich Jr VO. Managing congenitally missing lateral incisors Part III: single-tooth implants. *J Esthetic Restor Dent.* 2005;17:202–210.
12. Kokich VG. Maxillary lateral incisor implants: planning with the aid of orthodontics. *Int J Oral Maxillofac Surg.* 2004;62:48–56.
13. Ostler MS, Kokich VG. Alveolar ridge changes in patients congenitally missing mandibular second premolars. *J Prosthet Dent.* 1994;71:144–149.
14. Pini NIP, De-Marchi LM, Gribel BF, Ramos AL, Furquim LZ, Pascotto RC. Analysis of width/height ratio and gingival zenith in patients with bilateral agenesis of maxillary lateral incisors. *Dental Press J Orthod.* 2012;17:87–93.