

MAXILLARY LATERAL INCISOR AGENESIS OPEN SPACE VS SPACE CLOSURE: A REVIEW***Nada Aloufi**

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Abstract

The ideal orthodontic treatment for maxillary lateral incisor agenesis remains a controversial topic after more than five decades of debate in both academic and clinical settings. The central issue of this lack of consensus is the decision between opening space for prosthetic replacement of the missing teeth or orthodontic closure of the spaces. The indications for both opening and close the space were supported primarily by the patients' oral characteristics, specialist experience, the financial possibilities. However, when laypersons and dentists rated the attractiveness of the smiles of patients treated with canine recon touring or implant-supported prosthesis compared to untreated control groups, no significant differences were found in either group.

Keywords: Agenesis, dental agenesis, Maxillary lateral incisor agenesis (MLIA).

INTRODUCTION

The ideal orthodontic treatment for maxillary lateral incisor agenesis remains a controversial topic after more than five decades of debate in both academic and clinical settings.¹⁻³ The central issue of this lack of consensus is the decision between opening space for prosthetic replacement of the missing teeth or orthodontic closure of the spaces, followed by anatomic recon touring of the canines. Some authors have considered that certain clinical features must be analysed before deciding on the best therapeutic alternative, such as the age of the patient, the type of sagittal malocclusion, the presence or absence of crowding in both dental arches and the type of facial profile.⁴⁻⁸ Proponents of prosthetic replacement of missing incisors believe that canine guidance is ideal for long-term healthy occlusion.⁹⁻¹⁰ These authors have also reported the difficulty of achieving adequate aesthetics when the canine substitutes for the lateral incisor due to differences in colour, shape or root volume.¹¹⁻¹² In contrast, proponents of orthodontic space closure argue that the periodontal conditions are better than those that are observed in patients with fixed or removable prosthesis.^{4,13-14} In addition, the aesthetic outcome with space closure is more natural if the orthodontist performs a correct enameloplasty on the canine and adequately controls the lingual root torque.^{2,4,15-16} The indications for both opening and maintaining the space and for closure with movement of the canines in a mesial direction were supported primarily by the patients' oral characteristics, such as the intermaxillary and intramaxillary relationships, soft tissue features, the patient's facial aesthetics, and the size, shape, and colour of the teeth,¹⁵ all of which play an important role in the decision-making process. Other factors influencing the choice of treatment are the training of the specialist, the financial possibilities and the preferences of the patient and the practitioner. Clinical reports show satisfactory results with both space-closing and space-maintaining approaches with proper patient selection.¹⁷ A recent systematic review on this topic,¹⁸ concluded that there is no evidence at this time that one treatment approach is better than another for MLIA cases.

Therefore, clinicians should treat MLIA patients with extreme caution, based on their own clinical skills and experience, the clinical conditions of the individual patient, and patient expectations.^{12,18} Although both treatment approaches can be used to achieve predictable aesthetics, function and longevity, the end result could be less than ideal if a particular treatment option is not appropriate for the individual patient.

Open space vs close space:

Patients with tooth-supported dental prostheses, have a worse periodontal condition than patients with space closure where only natural teeth are present.¹³⁻¹⁴ Factors leading to bacterial plaque retention, such as pontics, clasps on removable dentures, and possible excessive contours and maladaptations to teeth abutting conventional fixed dentures, were cited as the main contributors to this condition. On the other hand, implant-supported dental prostheses showed a similar tendency to plaque retention as patients with space closure.¹⁹ Three major periodontal problems are associated with implants in the anterior maxilla, which has an unfavourable effect on aesthetics: vestibular gingival retraction,²⁰⁻²⁴ incomplete filling of the interdental space by the papilla,²⁵ and infraocclusion of the implant,^{20-23, 26} especially at 10-year follow-ups. In addition, there are reports of bone loss around the implants, which vary greatly from patient to patient.²²⁻²³ A comparison of gingival papillae between patients with space closure and those with implants showed less filling of the interdental spaces between the central and lateral incisors in the implant group.¹⁹ The shape of the papillae can be influenced by orthodontic movements and the distance between the implant and the adjacent teeth.⁷ In addition, one must expect that the levelling between the implant crown and the adjacent teeth is lost over time due to the continuous eruption of natural teeth,²⁰⁻²² even in adult patients.²⁶ The width to height comparison in the 6 anterior teeth showed a greater width of the canines displaced mesially and a greater height of the implants than that of the natural lateral incisors.²⁷ The adequate position of the gingival zenith of the lateral incisor in patients with space closure was apparently critical to achieve. The prevalence of the golden proportion was low in maxillary lateral incisor agenesis, regardless of treatment modality, and was similar to the

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prevalence in other studies that had investigated this in healthy dentitions.²⁸ This has been attributed to the fact that orthodontic treatment and the transformation of the canines into lateral incisors usually requires the recontouring of other anterior teeth, such as the central incisors, to achieve better smile harmony.²⁹⁻³⁰ In addition to recontouring, it is necessary to orthodontically extrude the maxillary canine and intrude the premolar to produce the natural-looking high-low-high marginal gingival contours of the maxillary anterior teeth.¹⁶

Space opening for treatment with implants is indicated for patients whose upright maxillary incisors need to be protruded, or tipped labially to correct the anterior crossbite or to support the upper lip and to achieve or maintain Angle Class I. Additionally, teeth adjacent to the MLIA should have parallel roots when implants are considered.³¹ In space closure, generally indicated in young patients with Class I or II malocclusions without severe crowding, a balanced or slightly convex profile and canines of sufficient size and shape to be converted into lateral incisors, without excessive exposure of dentin during the reduction of the cusp and mesiodistal dimensions, and the flattening of the buccal face. one may also choose to leave the crowns of the canines and first premolars unchanged and perform either dental recontouring or dental and gingival recontouring.^{6,32} Because of the differences in size, shape and appearance between lateral incisors and canines, different procedures may be indicated to achieve optimal treatment results.^{31,33} In terms of shape, lateral incisors are incisiform with smaller, flat tooth surfaces compared to sharp, pointed and conical canines.³⁴ This difference should be partially compensated during orthodontic treatment by reducing the eminence of the canines through increased palatal root torque and extrusion of the tooth along with its gingival margin.³² In terms of size, the cusp and the mesial and distal dimensions of the canines should be reduced before starting orthodontic treatment.³⁵ Finally, the canines are usually darker than the lateral incisors, and bleaching procedures can be performed to mask the colour differences before final restoration of the teeth with composite resin.^{12, 31,35} From a functional point of view, it has been assumed for many years that the ideal treatment of MLIA cases should result in an Angle Class I molar relationship.³⁶ The lack of a canine-protected occlusion would also be a disadvantage in cases treated with space closure, which could eventually lead to the occurrence of cervical abfraction lesions in premolars.^{32,37} However, previous prospective clinical studies have shown that the premolar can be considered a suitable replacement for the canine.^{14,36} One clinical study showed that there were no differences in occlusal function, prevalence of cervical abfraction or signs of TMD symptoms in patients treated with space closure and recontouring of the canines.¹⁹

In cases of maxillary lateral incisor agenesis with clinical indications to maintain the lateral incisor space, the most cost-effective long-term treatment modality for replacing the missing incisor was autotransplantation. The least cost-effective alternatives were single-tooth implants and full-coverage FPDs.³⁸ However, when laypersons and dentists rated the attractiveness of the smiles of patients with MLIA treated with canine recontouring or implant-supported prosthesis compared to untreated control groups using photographs of the lower third of the face, no significant differences were found in either group, suggesting that the treated smile had no negative influence on the aesthetic preference of the evaluators.³⁹ It has also been found that patients treated with canine recontouring

are more satisfied with the appearance of their smile than patients treated with implants. The reason for that may be in the fact that patients that choose space closure with posterior recontouring of canines into lateral incisors.³⁹

Conclusion

The ideal orthodontic treatment remains a controversial topic. Both treatment approaches can be used to achieve predictable aesthetics, function and longevity. Therefore, clinicians should treat these cases with extreme caution, based on their own clinical skills and experience, the clinical conditions of the individual patient, and patient expectations.

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