Case Report

Lateralization of Canines in Bilaterally Missing Maxillary Lateral Incisors – A Case Report

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Abstract

The maxillary lateral incisor is the second most common congenitally absent tooth. The management of missing lateral incisor was either closure using canine as substitution or creation of space orthodontically for prosthetic replacement or a single-tooth implant. The primary consideration among all these treatment options is conservation of tooth structure. Substitution of canine was the treatment of choice since it was the least invasive and satisfied the expected esthetic and functional objective. The objective was to treat a 26-year-old female patient having bilaterally missing maxillary lateral incisors with spacing in the upper front teeth and crowding in the lower front teeth region. Spaces in the maxillary front region were closed using fixed mechanotherapy by substituting maxillary canines in place of maxillary lateral incisors. The maxillary canines were then recontoured and restored with composite resin to give the esthetic appearance of maxillary lateral incisors. Substitution of canine in missing maxillary lateral incisors is an excellent alternative since the results are permanent, space closure provides a normal gingival topography and it is economical.

Keywords: Canine substitution, Composite restoration, Missing lateral incisor, Recontouring, Reshaping

Introduction

Dentists often encounter patients with missing or malformed teeth. The maxillary lateral incisor is the second most common congenitally absent tooth.[1] The management of missing lateral incisor was either closure using canine as substitution or creation of space orthodontically for prosthetic replacement[2] or a single-tooth implant.[1] A careful diagnosis and treatment plan are deemed essential to address the patient's needs as the spacing is present in the esthetic region. Such problem is very challenging for orthodontists, prosthodontists, and general practitioners.[2]

There may be multiple reasons for the agenesis of maxillary lateral incisor such as trauma, infection, medication, mutation of genes (MSX and PAX9), and some syndromes including ectodermal dysplasia, down syndrome, and cleft lip and palate.[3] The prevalence of missing lateral is more common in females compared to males.[4] When the teeth are congenitally missing, permanent canines frequently erupt mesial to their normal positions. Even when this does not happen, the need to maintain alveolar bone for several years until growth has ceased presents another dilemma. Psychosocial pressures are also of concern for parents who want an early resolution of their child's esthetic problems.[5]

Access this article online

Website: www.jrad.co.in

DOI: https://doi.org/10.53064/jrad.2022.13.3.185

The primary consideration among all these treatment options is conservation of tooth structure. Ideally, the treatment of choice should be the least invasive option that satisfies the expected esthetic and functional objective.[6]

Case Report

A 26-year-old female patient reported to the Department of Orthodontics with a chief complaint of spacing in the upper front teeth and crowding in the lower front teeth region. She was diagnosed with a Class III skeletal pattern with small sized retrognathic maxilla and average to vertical growth pattern. Patient has Class I molar relation bilaterally with congenitally missing 12 and 22. She had crossbite with 23 and 33, proclined upper anteriors and retroclined lower anterior teeth and spacing with respect to 13, 11, 21, and 23 (Figures 1

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Received: Mar. 02, 2022; **Accepted:** Mar. 27, 2022; **Published:** Apr. 18, 2022

How to cite this article: Akshaya K, Shetty V, Batni S, Mujumdar D, Karanjekar S. Lateralization of Canines in Bilaterally Missing Maxillary Lateral Incisors – A Case Report. J Res Adv Dent 2022;13(3):197-200.

and 2). Midline in the lower arch was shifted to the left by 2 mm. Patient has acute nasolabial angle, strained lips, and protrusive lower lip.

Treatment Alternatives

The consulting dentist had three treatment options:

1. Closure of spaces in the upper front region followed by esthetic reshaping of the canine.
2. Opening up space between the maxillary central incisors and maxillary canines on both sides followed by prosthetic restoration involving bridge placement.
3. Opening up space between the maxillary central incisors and maxillary canines on both sides followed by single tooth implant placement.

Treatment Progress

It was decided to go forward with the first treatment option. The patient's maxillary and mandibular teeth were bonded with passive self-ligating bracket. The patient underwent extraction of the lower first premolars to relieve crowding of the lower anterior teeth. The wires used were 0.016 NiTi to 0.019*0.025 NiTi wire for initial leveling and aligning stage. This was followed by 0.019*0.025 stainless steel wire which was used for retraction. Miniscrews were placed between First molar and second premolar on the lower right side for retraction of the anterior segment and for correction of the midline.

Figure 1: Pretreatment intraoral photograph frontal view

Figure 2: Pretreatment intraoral photograph left lateral view

After space closure, the patient was referred to a restorative dentist for recontouring of the canines to lateral incisors. A diamond bur in an air rotor was used for gross incisal and labial reduction. First, the tip of the canine was flattened to produce an incisal edge. Mesial and distal reduction was accomplished at the expense of bell-shaped distal surface. The distal incisal edge was slightly rounded to simulate that of a lateral incisor. The canine eminence on the labial surface was then reduced. Finally, the lingual surface is reduced at the incisal edge to establish an adequate overjet and overbite. The lingual contour was reduced to eliminate premature contact with the mandibular lateral incisors which was checked by extrusive movements. For enamel protection, topical fluoride is applied to the tooth immediately following the contouring procedure.

Since the gingival margins of the substituted canine and premolar were apical to that of the central incisor, a gingivectomy was performed to properly position the marginal gingiva.

After the cuspal equilibration, the mesial and distal surfaces which were still slightly convex after canine recontouring were corrected by composite resin restoration to give a more esthetic appearance of the lateral incisor. This was done by etching the tooth surface with 37% phosphoric acid which was left on the surface for 10 s followed by thorough rinsing of the tooth. The tooth was then dried such that a frosted appearance was clearly visible. A dentin bonding agent was then applied on the surface and was cured for 40 s. Composite resin was added to the surface of the canine and shaped accordingly to give the esthetic appearance of a lateral incisor. The mesial and distal surfaces were built using a matrix and the tooth was then cured for 40 s. Finishing of the surface was done using fine diamond burs and strips (Figures 3 and 4).

Discussion

Evaluation of the anterior tooth-size relationship is important when substituting canines for lateral incisors. The anterior tooth size excess that is created in the maxillary arch must often be reduced to establish a normal overbite and overjet relationship. Therefore, a critical step in the patient selection process is completion of a diagnostic wax-up. This enables the orthodontist and dentist to evaluate the final occlusion, measure how much canine reduction is necessary, and determine whether an esthetic final result is achievable.[1]

In general, a balanced and relatively straight profile is ideal. However, a mildly convex profile also may be acceptable. A patient with a moderately convex profile, retrusive mandible, and a deficient chin prominence may not be an appropriate candidate for canine substitution.[1]

Figure 3: Post composite build up frontal view

Figure 4: Post composite build up left lateral view

Careful correction of the crown torque of mesially relocated canines to mirror the optimal lateral incisor crown torque, along with providing optimal torque and rotation for the mesially moved premolars.[7] This will favor a better contact point and camouflage the premolars' flat mesial surfaces.[8] First premolars should be extruded relative to the adjacent teeth to simulate canines. Grinding of the palatal cusps also is recommended to avoid interferences during lateral movements.[9]

The shape and color of the canine are important factors to consider for canine substitution to be considered esthetic. Naturally, the canine is a much larger tooth than the lateral incisor, it will be replacing. With a wider crown and a more convex labial surface, a significant amount of reduction is often required to achieve a normal occlusion and acceptable esthetics.[1] In patients with a relatively longer upper lip, space closure is acceptable in spite of cuspid-central incisor color disparity. Conversely, in patients with short lip or with marked lip lifting during function, cuspid color incompatibility may contraindicate lateral incisor space closure.[8] Typically, the lateral incisor gingival zenith should reside approximately 1 mm coronal to neighboring central incisor and canine tooth.[10] Proper bracket placement is important when treating patients with canine substitution. The orthodontist should place the brackets according to the gingival margin height rather than incisal edge or cusp tip. Typically, the brackets on the canines should be placed at a distance from the gingival margin that will erupt these teeth into the appropriate lateral incisor vertical position.[1]

After the teeth have been aligned and the canines reshaped, there is frequently a need for restorative treatment to recreate ideal lateral incisor color and contour.[1] It is necessary to determine the appropriate space or size for the missing teeth. The three ways to determine the appropriate space for these teeth are as follows. The first is the "golden proportion." This method states that the perceived width of the anterior teeth as viewed from the direct anterior should have a ratio of 1:0.618 with the tooth adjacent to it. The second method to determine the appropriate restorative space is to use the contralateral lateral incisor. A third method of space appropriation is to conduct a Bolton analysis.[6] The canine's greater labiolingual dimension will interfere with the lower incisors. Therefore, composite build-ups, rather than extensive occlusal and palatal trimming, will have to be done.[11] This may be accomplished with bleaching, composite resin, or a porcelain veneer. In general, the treatment of choice is the most conservative restoration that satisfies the patient's esthetic requirements.[1] The most predictable guide for determining ideal spacing is to construct a diagnostic wax-up. This simplifies the treatment for the orthodontist and restorative dentist.[6]

Conclusion

Canine substitution is an excellent treatment alternative in cases of missing lateral incisors. A major advantage of space closure is that even though long-term continuous maintenance is required; the treatment result is permanent. Another advantage of space closure is that it produces a normal gingival topography around mesially relocated cuspids, which is especially crucial in patients with high smile lines. A third advantage of space closure is cost, since no implants or prosthetic replacements are needed. The orthodontist typically plays the key role in diagnosis and treatment of these patients. However, adjunctive restorative treatment is often necessary to recreate ideal lateral incisor shape and color. Therefore, interdisciplinary treatment planning is necessary to achieve optimal final esthetics.

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