

Management of Congenital Missing Unilateral Maxillary Lateral Incisor Treated with Begg's Mechanotherapy: a Case Report

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Abstract: To evaluate functional and periodontal aspects in patients with unilateral or bilateral congenitally missing maxillary lateral incisors, treated with orthodontically space closure and tooth re-contouring. most frequent kind among different populations. However, this prevalence varies according to ethnic background and population. Dental agenesis in the maxillary anterior region compromises smile balance and symmetry. Therefore, treating these patients requires an interdisciplinary approach aimed at rehabilitating the smile, both in terms of function and aesthetics. To help dentists plan for these situations, a number of studies have assessed the results of the different treatment options. This case report mainly focuses on space closer with Begg's appliance.

Keywords: Dental agenesis, Esthetic, hypodontia, Orthodontic treatment

I. Introduction

Maxillary lateral incisor agenesis occurs in 0.8 to 2% of the population in the permanent dentition phase. Except for the third molar, agenesis of the maxillary lateral incisor has been the most frequent kind among different populations^{1,2, 12}. 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 investigated³⁻⁸.

The incidence of bilateral absence of maxillary lateral incisors has been reported as being between 1% and 2% in white persons of Northwest European origin.^{1,2} The vast majority of these patients seek orthodontic care because of the unesthetic and socially unacceptable malocclusion that usually results when teeth are missing.³ It has been suggested that the absence of maxillary lateral incisors may be only one manifestation of a complex, multifactorial, craniofacial anomaly.⁴⁻⁶ Features that have been reported in association with the absence of lateral incisors include a higher incidence of absence of other teeth, more frequent impactions, and tooth size discrepancies in both arches.^{4,5,7,8}

When treating patients with congenitally missing maxillary lateral incisors, the orthodontist must decide whether to close the spaces or open them and place fixed bridges. Several authors have suggested that opening the spaces for prostheses and placing the canines in a Class I relationship results in a better occlusion and creates less flattening of the facial profile.^{3,4} Woodworth¹ found that little facial change occurs when the spaces are closed orthodontically, although resultant tooth size discrepancies frequently preclude the establishment of canine-guided occlusion.

Nordquist and McNeill²⁶ found that 89 percent of patients with prosthetic replacements exhibited a group function occlusion in lateral excursion. They also studied the long-term periodontal effects of prosthetic replacement and found that twice as much mechanical irritation existed in quadrants with prostheses as in quadrants with closed spaces. Also, greater gingival irritation and pocket depth occurred in the areas with prostheses.

Two etiologic theories have been suggested. The absence of maxillary lateral incisors may be an expression of an evolutionary trend of relaxed selection leading to the simplification of man's dentition through a reduction in tooth number.^{4,5} Alternatively, a disturbance in the fusion of the embryonic facial processes may result in the incomplete expression of a primary cleft which is manifest as the absence of the maxillary lateral incisors.^{6,9} At present, there is inadequate documentation to support either theory²⁰⁻²⁵.

Early investigation is especially important due to the higher association of congenitally missing or peg-shaped lateral incisors with these anomalies.⁹ In addition, early investigation will give the patient time 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 or kesling set up is also beneficial for planning treatment and esthetics.^{7,9} Participating clinicians — the orthodontist, Periodontics, oral surgeon, restorative dentist, Prosthodontics — should determine the patient's treatment plan collaboratively and communicate throughout the course of treatment to ensure all aspects of treatment are considered and the overall treatment objectives are achieved. Patients with congenitally missing maxillary lateral incisors present challenging problems with respect to treatment planning and mechanotherapy. The decision has to be made whether to hold

the spaces left by the missing incisors open for future bridgework or to attempt to close the spaces orthodontically. A comprehensive treatment plan will have to consider the potential effects of treatment upon the patient's profile as well as the need to estimate the amount and direction of any future growth. Superimposed on these criteria are such factors as the position of the maxillary canines, their inclination, size, shape, and color, as well as the need for extractions in the mandibular arch to provide optimum occlusion and tooth size relationships¹⁰. Space closure, combined with restorative procedures on the incisal edges of the maxillary canines, frequently provides a more permanent and esthetic result than opening the spaces and placing bridges. Most dentists agree that the replacement of maxillary anterior teeth is a challenging procedure. Most fixed bridgework breaks down with time and eventually needs to be replaced. Tuveson²⁹ suggested that prosthetic replacement of maxillary lateral incisors is less esthetic than their replacement with the maxillary canines. Increased understanding of the cause and clinical manifestations of cases with congenitally absent maxillary lateral incisors would therefore aid in their diagnosis and treatment planning.

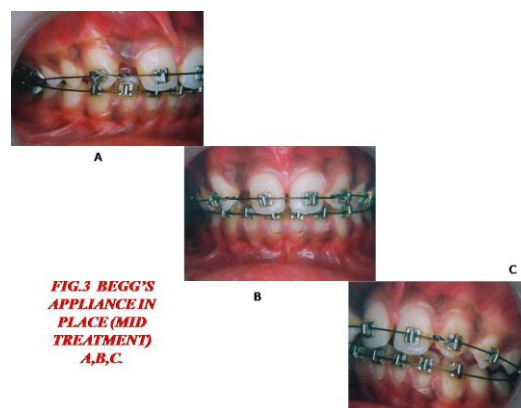
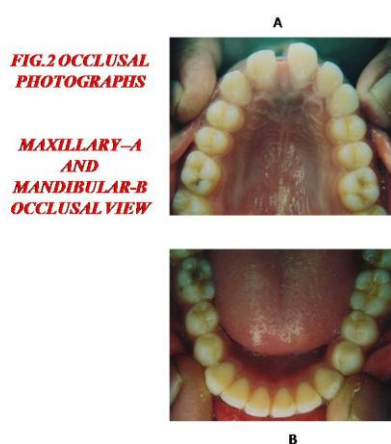
This case report mainly focused on the effects of bilateral orthodontic space closure on the facial profile.

Case port:

The female patient, 14 years and 3 months old, with congenitally missing maxillary lateral incisors and a Class II molar relationship reported our office with the complaint of spacing in maxillary arch. There was a Class II canine relationship that had resulted from mesial drifting of the maxillary canines (fig.1 A, B, C, D, and E). Generalized spacing was present in maxillary and mandibular arches (fig.2 A,B). Maxillary high frenum attachment was present resulting in midline diastema. There was spacing in the maxillary arch and is about 7mm and 2mm in the mandibular arch. She had a straight profile, with a flat upper lip.

Pre-Treatment Findings

Treatment planned with extraction of maxillary permanent lateral incisor to keep the mechanics simple (KISS principle). After a week time, Begg's appliance was bonded since the treatment objective was to close the spaces and use the maxillary canines as lateral incisors. An initial 0.016"NiTi wire was used to align. After the alignment over, 0.016" AJW archwire was placed and an elastic module was used to consolidate the anterior



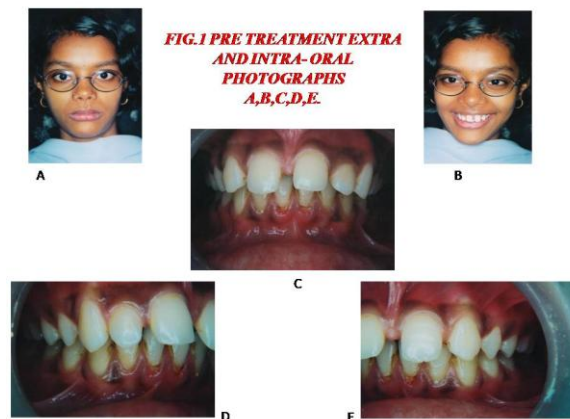
space (fig.3 A,B,C). After two months of treatment, class II Elastics (¼", 3.5 ounces) extended from hooks on the lower first molars to the inter maxillary circle in maxillary arch. The patient was instructed to change the elastics after three days. Two months later, the space mesial to the first premolars had been consolidated.

After seven months of treatment, maxillary spaces were consolidated and the molar relationship was Class II. The patient continued wearing the elastics for five more months. The archwires were then cut and removed distal to the canines. Finally 0.018 AJW wire placed with anterior torquing spur for 3 months to torque the roots of anterior teeth. Vertical interarch elastics were continued for one more month. Finally patient went for frenectomy in maxillary arch as suggested by Proffit. Bands and bonds were removed and a lower lingual arch was bonded from canine to canine for retention. The patient was given an upper removable circumferential retainer to be worn full-time. Total treatment time was 17 months (FIG.4 A, B, C, D).



Post-Treatment Findings (fig.4.A,B,C,D)

Maxillary spaces are consolidated and all rotations eliminated. The overjet and overbite relationships are within normal limits. Molar relationship in Class II and canine are in Class I relationship. Posterior teeth are in group function, with no premature contacts or balancing interferences present.



II. Discussion

The precise cause of congenital absence of maxillary lateral incisors has yet to be determined. Environmental influences, such as trauma, ionizing radiation, and hormonal influences, have been suggested as predisposing factors.²² Pedigrees have been elucidated, linking agenesis traits with several patterns of inheritance,^{1,23} while disturbances in the embryonic fusion of the midfacial process have also been implicated as potential etiologic agents in the agenesis of maxillary lateral incisors.^{6,24}

On the basis of extensive data showing decreased tooth size and increased frequency of missing teeth, LeBot and Salmon⁶ proposed a model for the morphologic simplification of man's dentition. Their theory suggested a generalized evolutionary trend toward a decrease in tooth size and dental arch dimensions. Initially, a delay in tooth eruption resulted in a simplification of dental morphology. Next, a reduction in both cusp number and tooth size occurred. The final stage of this model was represented by the agenesis of individual teeth.

Wolf,¹⁸ studying patients with generalized hypodontia, suggested an explanation for these findings based on the presence of an anteroposterior gradient for the alteration of tooth size. The greatest decrease in tooth size was found to occur anteriorly, with no change (or even an increase) in tooth size occurring posteriorly.⁸ A certain degree of sexual dimorphism in tooth size changes was noted in the present study.

An alternative theory concerning the cause of congenital absence of maxillary lateral incisors is related to a disturbance in the fusion of the median nasal process with the maxillary process in the 7- to 8-week-old embryo^{11,17}. Patients with cleft lip and palate frequently have lateral incisors missing⁹ and it has been suggested that congenital absence of maxillary lateral incisors may represent the incomplete expression of a cleft or part of a

larger craniofacial anomaly.^{6,24} Comparison of data from the present study and Dahl's⁸ report on patients with cleft lip reveals several similarities. Findings in common include a small but relatively normally positioned maxilla, decreased upper anterior face height, shorter posterior face height, and decreased mandibular length. However, the smaller mandibular plane angle seen in the present study was not noted in the cleft -patients.

Further support for the possibility that the congenital absence of maxillary lateral incisors may be related to developmental disturbances comes from the evaluation of patients with general hypodontia who do not demonstrate craniofacial anomalies of a similar nature or extent.^{24,29}

Considerable controversy surrounds the question as to whether it is better to orthodontically close the spaces left by the missing lateral incisors or to maintain the spaces for future bridgework.^{25,26} Advocates of maintaining the space suggest that a better occlusion and less flattening of the facial profile will result if the canines are left in a Class I relationship.^{28,29} The present study suggests that little facial change occurs with orthodontic space closure and that the presence of tooth size discrepancies will often preclude the establishment of a canine-guided occlusion. Indeed, Nordquist and McNeil²⁶ found that 89% of the patients who had received bridges exhibited a group function occlusion in lateral excursions. With the current sophistication of restorative techniques using selective grinding of the incisal edges, as well as composite materials where indicated, excellent cosmetic results can now be achieved routinely in reshaping maxillary canines to resemble lateral incisors.^{29,30}

In treating patients in whom maxillary incisors are congenitally absent, the clinician should be aware of the greater than normal predisposition of these patients toward a Class III skeletal relationship as well as an increase in the incidence of impactions and the absence of other teeth. Mechanotherapy should be directed toward opening the mandibular plane and increasing vertical facial proportions where indicated. Space closure should be attempted from the posterior to avoid incisor retraction with subsequent lip retraction and increase in the nasolabial angle. The judicious use of a facial mask or reverse-pull headgear may be an excellent treatment modality for this problem. Extraction decisions should be based on individual wax setups, and significant interdental enamel reduction may be necessary in order to overcome tooth size discrepancies that might otherwise prevent the establishment of a satisfactory static and functional occlusion.

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