

Orthodontic Management of Congenitally Missing Lateral Incisor Using Skeletal Anchorage System – A Case Report

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Abstract

Introduction: Congenitally missing maxillary lateral incisor is a most common anomaly that needs to be treated orthodontically in patients who does not prefer prosthesis. This case report will explain a novel approach to treat the agenesis of maxillary lateral incisor using skeletal anchorage system. **Method:** 20 years old female patients reported with a chief complaint of spacing and forwardly placed upper front teeth. On diagnosis, Angle's class I dentoalveolar malocclusion on a class I skeletal base was evident with congenitally missing 12. Patient preferred for space closure of 12 regions. Bollard plate was surgically placed on left maxillary tuberosity. 2 TADs were inserted between 14, 15 & 22, 23. Initial alignment of teeth, levelling of bracket slots and space closure in 12 regions were achieved. Brass hooks were soldered on 0.021" X 0.025" SS arch wire at 2 spots - between 11, 21; 22, 23. E chain was given from bollard plates to hook between 22, 23. Also force was given from TAD placed on left quadrant to the hook soldered between 11, 21 and another between TAD of the right quadrant to the 2nd molar to achieve complete skewing of the arch and mesialisation of molar on right side to achieve class II molar relation. **Result:** Angle's class II subdivision dentoalveolar malocclusion on a class I skeletal base was achieved with complete skewing of the dental arch to the left side using skeletal anchorage system.

Keywords: Orthodontic Congenitally Anchorage dentoalveolar.

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INTRODUCTION

Hypodontia is a dental anomaly, of which congenitally missing teeth can be a reason, accounting for 21.6%. The most common congenitally missing teeth is the maxillary lateral incisor next to the third molar, especially for females.^{1, 2} The incidence of bilaterally missing maxillary lateral incisor is twice than unilateral.³ In unilateral missing cases, the counterpart have a defective in shape and size [4-6]. Missing lateral incisor pose an esthetic problem for the patient if space is present in that region. In cases where there is physiological migration of canine into the lateral incisor space, aesthetics is less of a concern.

The causes for congenitally missing lateral incisor include: (a) Disturbances in the development of tooth, (b) Mild dysplastic expression of ectoderm, (c) Genetics – mutations in genes MSX1, PAX9, TGFA is associated with congenitally missing tooth, (d) Multifactorial like trauma, cleft lip & palate.[3]

Diagnosis involves both clinical and radiographic examinations. Patient age, periodontal

status, alveolar ridge morphology, bone support, esthetics, occlusion, gingival margins and availability of lateral incisor space necessitate the need for multi-disciplinary approach [7].

According to Kokich [8,9,10] treatment for congenitally missing lateral incisors can be either by substitution of canine for laterals or implants and fixed prosthesis in the space of the lateral incisor. Selecting the treatment modality depends on malocclusion, space requirement, tooth size, shape of canine and also patient's preference for prosthetic replacement. Ideal treatment option should be less invasive, conservative and also esthetically acceptable. Hence canine substitution is preferred.

This article will explain a conservative method of orthodontic management in a case of congenitally missing maxillary lateral incisor.

Diagnosis and treatment planning

A 20-year-old female patient working in media industry reported to the department of orthodontics in Meenakshi Ammal dental college with the chief complaint of spacing and forwardly placed upper front teeth.

On frontal extra-oral examination (Fig 1), patient had competent lips at rest. On smile, 80% of upper incisor and 3mm of lower incisor display was noticed with a flat smile arc and spacing in relation to 12. The upper dental midline was shifted to right in respect to the facial midline by 2mm and lower dental midline coincided with the facial midline. Whereas on profile view, she had a mild convex profile with small degree of posterior divergence, negative lip step, average nasolabial angle, average mento - labial sulcus and an ideal chin throat angle. On 45-degree oblique view, she had good cheek bone contour on smile and mild proclination of upper incisors.

On intra oral examination, patient had class I canine and molar relationship bilaterally with missing maxillary right lateral incisor and edge to edge bite relation. Both the maxillary and mandibular arch were ovoid with mild rotations in premolars.

Radiographically (Fig 2), OPG revealed congenitally missing maxillary right lateral incisor. Cephalometrically, patient had class I skeletal base attributing to orthognathic maxilla and orthognathic mandible, with an average mandibular plane angle, proclined upper and lower anteriors.

Treatment options

- Maintain class I molar relation on both sides, align the arches and prosthetic replacement in relation to 12 – implant/ FPD / RPD. Implants / FPD were preferred for esthetic reasons.
- Space closure of 12 regions by mesialising upper right quadrant to achieve class II molar relation on right side. Convert canine to lateral incisor and 1st premolar to canine by smile designing.

Patient did not prefer prosthesis, hence option 2 was decided.

Treatment progress

Bollard plates were surgically placed in the left buccal region of maxillary tuberosity. Two temporary anchorage devices – mini screws of 1.3 x 8 mm were placed on both the 1st and 2nd quadrant. On the right side, between the 1st and 2nd premolars and on the left side, between the lateral incisor and canine at the time of maxillary teeth strap up. 0.016” NiTi was engaged as the initial archwire. On the second visit, the lower posteriors were strapped up and 0.016” NiTi archwire

was engaged. In the maxillary arch, space was closed between the 11 & 13 using closed coil spring.

At the end of alignment and levelling, the rotations were corrected. During the phase of retraction, brass hooks of height equivalent to the level of the TAD were soldered between 11 & 21; 22 & 23 on 0.021”x 0.025” SS arch wire to derive bodily movement. E-chain was given from the bollard plates to the soldered hook between 22 & 23 and another E – chain was given between TAD on the left side to soldered hook between 11 and 21 (Fig 3). Force was given from right 2nd molar to the TAD that was placed between 15 & 16. This helped in complete movement of the upper arch dentition more towards the left side. A prefabricated arch wire would have caused crossbite on left side and scissor bite on right side as the dental arch skews completely. To avoid this, the arch wire was constricted on the right side and slightly expanded on the left side. Blue bites were bonded on the occlusal surfaces of lower first molars for disocclusion to facilitate asymmetrical arch movement. There was mesialisation of the right upper quadrant, thereby class II molar was achieved on right side and upper midline shift was corrected. Care was taken to maintain the class I molar on left side inspite of the unilateral skewing of the arch. Settling elastics were given (Fig 4).

The wire sequence used: 0.06” NiTi, 0.016” x 0.022” NiTi, 0.017” x 0.025” NiTi, 0.019” x 0.025” NiTi, 0.021” x 0.025” NiTi, 0.021” x 0.025” SS.

TREATMENT RESULT

After debonding, digital smile designing was done to convert maxillary right canine into maxillary right lateral incisor and maxillary right 1st premolar into maxillary right canine. Composite restoration was done on maxillary right 1st premolar buccal cusp tip to mimic the canine morphology. Canine was recontoured and reshaped to establish the lateral incisor morphology (Fig 5). Post treatment photographs revealed class I canine relationship on both side, class I molar on left side and class II molar on right side with ideal overbite and overjet.

There were no evidences of root resorption (Fig 7). Additionally, Begg’s wrap around retainer was given for the maxillary arch (Fig 6).

Post treatment OPG revealed that considerable amount of root parallelism was achieved except in relation to 15 (Converted 1st premolar). There are no evidences of root resorption (Fig 7).

The entire treatment duration was 2 years.



Fig-1: Pre - Treatment photographs



Fig-2: Pre - Treatment Radiographs



Fig-3: During treatment photographs



Fig-4: Settling photographs



Fig-5: Digital smile designing



Fig-6: Post - Treatment photographs



Fig -7: Post - Treatment Radiographs

DISCUSSION

The demand for orthodontic treatment in congenitally missing lateral incisor cases is high when patients don't prefer prosthesis.[11] Esthetics & occlusion must be the deciding factor in the final positioning of the anterior teeth. Application of golden

proportion leads to a need for recontouring the canine for lateral incisor. In patients with unilateral missing of lateral incisor, the esthetics and occlusion are dictated by the contralateral lateral incisor [12]. In patients with high smile line, demand on esthetic result is enhanced as the amount of teeth exposure increases. Unilateral

absence of lateral incisor is difficult to manage as achieving the midline symmetry which contributes to the dental harmony becomes a task [13].

Various studies have commented on the gingival esthetics in congenitally missing lateral incisors. Ideal gingival margin of central and canine are expected to be in the same level when compared with lateral incisor which is 1mm incisal when compared. This poses problem in case of orthodontic space closure and canine substitution [14].

This case demonstrates a novel approach for a congenitally unilateral missing lateral incisor using skeletal anchorage system. The introduction of skeletal anchorage system in the field of orthodontics paved way for various complicated procedures. Surgical insertion of mini – plates is the only concern for the patients. The force applied from the skeletal anchorage device was well established in this case. Skeletal anchorage system was used for rotation of entire maxillary dentition without tipping.

Orthodontists use asymmetrical arch-wires and asymmetrical elastics in correction of asymmetry. It has been reported that adjustments need to be made on arch-wire by skewing it to one side to maintain adequate arch form [15].

The benefits of canine substitution are avoiding prosthesis, treatment cost, solving any previous crowding. In case of Mesialisation, intrusion of canine and extrusion of first premolar is required in order to mimic the morphology of lateral incisor and canine respectively. In case of closure of lateral incisor space, crown torque of mesially relocated canine should be considered and the duration of treatment can also be more. The occlusion of patient with Mesialisation of posterior segment is satisfactory in both esthetic and functional point of view [16].

Araujo *et al.* suggests that, in patients with congenitally missing lateral incisors, if the canine erupts more mesially, then canine substitution is the best treatment of choice. In cases of congenitally missing lateral, where the orthodontic treatment involves Mesialisation of canine, the torque and intrusion of canine has to be dealt with. Such method of mesialising canine to replace lateral is considered more esthetic and functionally considered better. Long term studies have showed that there is not much on occlusal overload on the premolars. However, Bolton's would be of a concern. There might be mild increased overjet and overbite, but we were able to achieve ideal overbite and overjet as there was no discrepancy on the tooth size [17].

Paduano *et al.* suggests that, in average or high mandibular plane angle cases, space closure in the region of agenesis is preferred, as they preserve

anchorage and avoid clockwise rotation of mandible. Also reduced overbite facilitates space closure. The presence of 3rd molar also supports for the space closure and Mesialisation of molar on the right side [18].

CRITICAL APPRAISAL

Canines always have a darker shade. Hence converting canine into lateral incisor will have a mild compromise in esthetics. Colour matching or bleaching will enhance the esthetics.

As the patient had to leave the city, time was insufficient to achieve bodily movement of the 2nd premolar. Nevertheless, a good intercuspation was achieved.

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