

## Orthodontic Management of Dental Anomalies in Patients with Cleft Lip and Palate- A Case Series

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### Abstract

**Introduction:** Orthodontic management of patients with cleft lip and palate is a tedious process requiring meticulous treatment planning. However, in patients with a fairly good facial profile, non-surgical management using orthodontic treatment alone can produce astounding results in correction of malocclusion and to achieve a pleasing smile. A properly executed orthodontic treatment enhances not only the smile, but also the masticatory efficiency, speech and overall quality of life of the patients with cleft lip and palate. **Methods:** This case series describes orthodontic management of three patients with cleft lip and palate who have been treated by distinct treatment modalities. **Results:** An outline of the different orthodontic treatments along with possible interdisciplinary management has been explained in this case series. **Conclusion:** We therefore understand that in patients with cleft lip and palate who have a reasonably good facial profile, complete orthodontic therapy with individualized treatment plan is vital to provide good physiological, functional and aesthetic outcomes.

**Keywords:** Cleft lip and palate, orthodontics, orthodontic management, malocclusion, dental anomalies.

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## 1. INTRODUCTION

Cleft lip and/or palate are the most commonly occurring craniofacial birth defects and its etiology has been reported in many literatures previously. The influence of genetic and environmental factors remains a major threat pertaining to the management of patients with orofacial clefts. Cleft repair done by surgical procedures aim to restore proper functioning of the oro-nasal region and its associated soft tissue structures. However, management of the dental anomalies plays a vital role in order to establish proper functional harmony of the jaw structures notably the masticatory system. Few authors have suggested that patients with repaired cleft lip and/or palate usually exhibit decreased efficiency of the masticatory apparatus [1-5]. This is most commonly due to the anterior crossbite and missing/malformed teeth especially the lateral incisors in the cleft site.

A multidisciplinary approach with a team of doctors including surgeons, orthodontists, prosthodontists and restorative dentists is required for

complete restoration of the oro-facial structures. The team approach should begin as early as treatment planning to achieve a complete and harmonious restoration of the oro-facial structures.

The role of an orthodontist in the management of patients with cleft lip and/or palate is quite challenging since divergent malocclusions and dental malformations are exhibited in each patient. Every patient with cleft lip and/or palate requires discrete treatment plan and hence individualized treatment planning is essential in order to restore complete functional occlusion.

The aim of the orthodontic therapy in treating the patients with cleft lip and / or palate relies on improving the form and functioning of the dental structures and also to ameliorate the impaired masticatory efficiency. A well-restored dentition in turn enhances the overall quality of life of the patient.

In this case series, three patients with cleft lip and /or palate who have been treated orthodontically have been presented. All the patients presented in this case series have undergone surgical closure of the cleft lip and/or palate and have been referred to the Department of Orthodontics for correction of malocclusion. Consent has been obtained from all the patients for publishing their photographs and radiographs.

## 2. CASE REPORTS

### Case Report 1:

A 25-year-old female patient reported to the department of orthodontics with a complaint of spacing in her upper and lower front teeth. She had a class-I molar and class-I canine relationship on the right side and an end-on molar and end-on canine relationship on the left side with missing 12 and 22. She had severely rotated 21 with generalized attrition. On extra oral examination, a fairly good profile with straight divergence was determined. Generalised discoloration of the teeth could be appreciated.

### Treatment Progress:

Orthodontic therapy was initiated to align and level the maxillary and mandibular arches. The upper left lateral incisor (21) was rotated 90° in a mesial in - distal out direction. With the aiming of correcting the rotation, 21 was bonded along with a rotational wedge and a 0.014 NiTi wire was used. Upon achieving satisfactory derotation, 0.016 NiTi followed by 16x22 Niti, 19x25 NiTi were employed. On further treatment progress, 17x25 and 19x25 stainless steel wires were used. Space required for replacement of 12 and 22 were maintained by using passive open coil springs. The remaining spaces were closed using elastomeric chains in the further appointments. Class II elastics were given to correct molar relationship on left side.

The total duration of the treatment was 14 months. At the end of the treatment, bilateral Class I molar and canine relationship with well-aligned dentition was obtained. Space for prosthetic replacement of 12 and 22 was maintained. After completion of the orthodontic treatment, the patient was referred to the Department of prosthodontics for a removable partial denture (RPD) in relation to 12 and 22 (Figure 1). Since the patient was not willing for a fixed prosthesis using implants or Fixed partial dentures, removable partial denture was the only treatment choice and hence it was opted.



Figure 1: (A) & (B) pre-treatment extra-oral frontal and profile photographs; (C) – (E) pre-treatment intra-oral photographs; (F) – (J) post-treatment intra-oral photographs

**Treatment Results:**

The post – treatment photographs revealed that a harmonious facial balance and optimal intercuspation had been achieved. The severe rotation of 21 has been corrected to an ideal axial inclination. A well-co-ordinated and symmetrical maxillary and mandibular arch has been obtained.

**Case Report 2:**

A 21-year-old female patient reported with a chief complaint of collapsed bite and difficulty in mastication. On extra oral examination, patient had a concave facial profile with everted lower lips. She had a retruded maxillary arch and her nose was deviated towards the right. Intraorally, patient has bilateral cleft with bilateral crossbite. She had a collapsed maxillary arch due to severe constriction. Her pre-maxillary segment was in a positive overjet relationship with a complete deep bite. She had missing 12 and 22 with retained deciduous in relation to 62. Rotations were seen in all the teeth in both maxillary and mandibular arches with imbrications in lower anteriors.

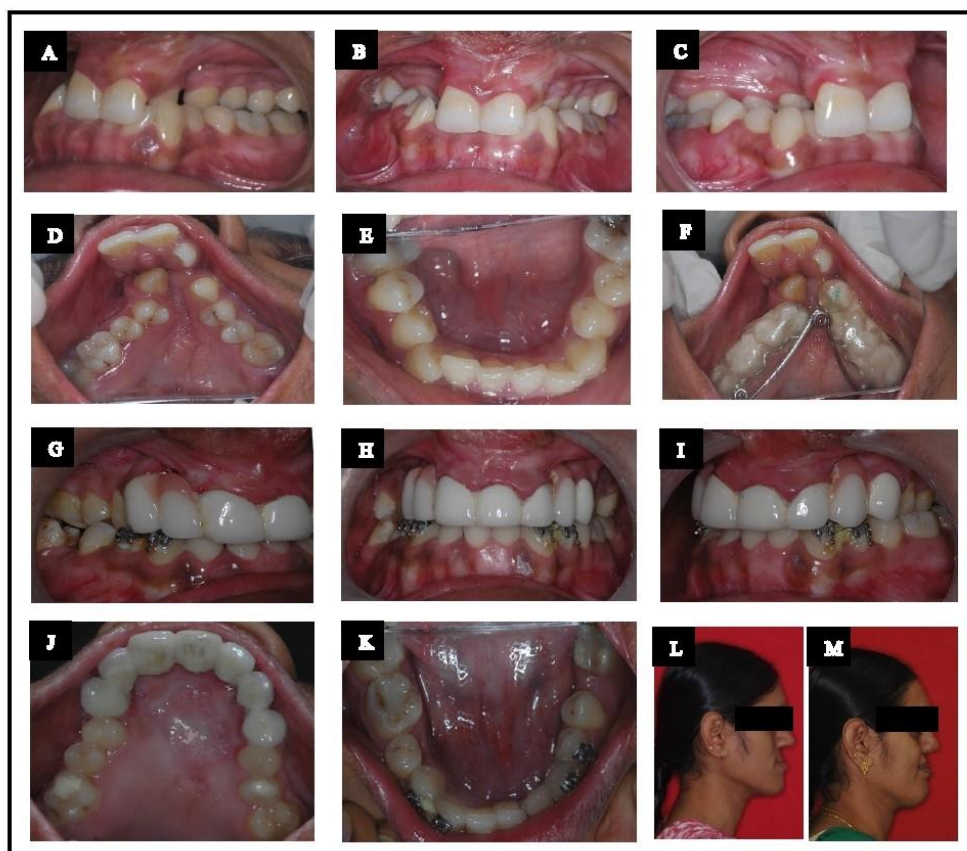
**Treatment Progress:**

Buccal crossbite correction was initiated by expansion of the constricted maxillary arch using a

trihelix. Two helices were placed in the posterior surface of the maxillary molars and a single helix was placed in the pre maxillary area. Posterior bite blocks were cemented in order to relieve the bite thus facilitating expansion. Once satisfactory expansion was achieved and the arches were in proper occlusion, bonding of both the arches were started using 0.016 NiTi arch wire. Retained deciduous 62 was extracted. Treatment was progressed with fuller sized NiTi arch wires followed by stainless steel arch wires such as 16x22 SS and 19x25 SS. Settling elastics were given for settling the bite. Once a positive intercuspation was obtained, prosthetic replacement of the anteriors from canine to canine was done using ceramic crowns thereby replacing the missing 12 and 22. Debonding had to be performed upon patient's request before completion of the entire treatment.

**Treatment Results:**

Post treatment photographs revealed an ideal overjet and overbite along with optimal intercuspation. Upon expansion and prosthetic replacement, the maxillary retrusion had improved compared to the pre-treatment stage (Figure 2). This has been achieved solely by orthodontic therapy. Patient was highly satisfied with the outcome and hence debonding was performed.



**Figure 2:** (A) - (E) pre-treatment intra-oral photographs; (F) – Trihelix used for expansion of maxillary arch (G) – (K) post-treatment intra-oral photographs; (L) pre-treatment profile photograph; (M) - post - treatment profile photograph

**Case Report 3:**

A 19-year-old male patient who had undergone surgical closure of cleft lip and palate reported to the Department of Orthodontics with a Class I molar relationship on the right side and a missing molar on the left side. He had an end-on canine relationship on the left side and the canine relationship on the right could not be established due to crowding. He had an asymmetric, constricted upper and lower arch with crossbite in relation to 22, palatally erupted 12, scissor bite in relation to 25, missing 12 and 26 and midline diastema. He had a straight profile and straight divergence. Hence, orthodontic therapy alone should suffice the dental anomaly.

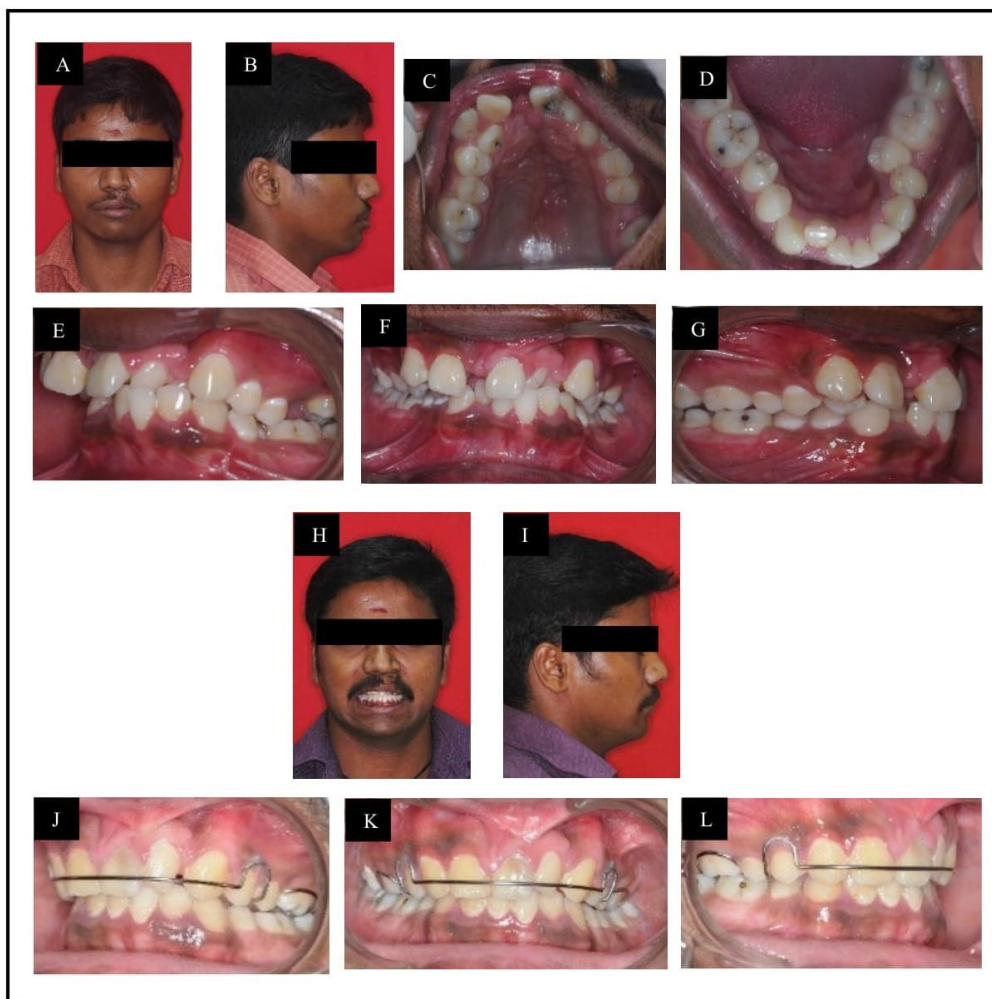
**Treatment Progress:**

Initial strap-up was done to level and align the arches. Expanded arch wires were used to relieve the crossbite. Bite blocks were placed in the molars to relieve the occlusion. Initially, 0.014 NiTi arch wire was placed until correction of the anterior crossbite. Once the

crossbite was corrected, 0.016 NiTi arch wire followed by 16x22 and 17x25 NiTi wires were placed. Extraction of 12 and 44 was performed in order to address the bolton's discrepancy. Stainless steel archwires such as 17x25 SS and 19X25 SS were placed. Extraction spaces were placed using elastomeric chains. Mesialisation of 27 in the place of missing 26 was done using Temporary anchorage devices (TAD). Canine substitution was done in order to replace 12. Settling elastics were given at the end of treatment.

**Treatment Results:**

The post treatment photographs reveal that an ideal inclination of all the teeth along with optimal intercuspation has been achieved. Cross bite has been corrected and mesialisation of 26 and 13 has aided in obtaining the final occlusion (Figure 3). The patient was debonded once a functional occlusion was obtained. Removable Beggs wrap-around retainer in the upper arch and bonded lingual retainer in the lower arch was given.



**Figure 3:** (A) & (B) pre-treatment extra-oral frontal and profile photographs; (C) – (G) pre-treatment intra-oral photographs; (H) – (I) post-treatment extra-oral photographs; (J)- (L) post - treatment intra-oral photographs with retainer

### 3. DISCUSSION

The primary goal of treatment for patients with unilateral or bilateral cleft lip and/or palate is to make the patient functionally habilitated including speech, mastication and appearance. The treatment phase for correction of malocclusion remains to be the most time-consuming procedure orthodontic of all the other phases. All the patients described in this case series have almost a straight profile and hence the correction of the dental malocclusion alone was sufficient to achieve a pleasing smile.

The most common problems arising in patients with cleft lip and/or palate has been described by various authors [6-8]. Most of the authors have concluded that the maxillary retrusion with anterior and lateral crossbites are the most commonly seen dental deformities. Because of these deformities, orthodontic treatment in patients with cleft lip and/or palate involves transverse and sagittal expansion of the dental arches. Dewinter *et al.*, (2003) [9] identified that the incidence of agenesis of the lateral incisor on the cleft side is more common in more than 50 percent of patients with a cleft. Many others have reported that malformed, peg-shaped, micro formed teeth are the most commonly occurring dental malformations in patients with cleft lip and/or palate [10-13]. The size of the tooth in patients with cleft lip and/or palate was found to be smaller than in normal individuals [14]. Peck *et al.*, in 1994 reported that the impaction of the permanent maxillary canine occurs in 1-4% of the general population [15]. However, there was no association between dental anomalies and gender of the patient [16,17]. Generally, the overall dental anomalies have found to be higher in patients with cleft lip and/or palate in comparison with the general population. The anomalies are generally located in the area of the cleft because of the improper fusion of the cells of the dental lamina.

A multi-disciplinary procedure by a team of specialists is an important factor in the treatment of dental pathology. Improving dental malocclusion not only helps in improving the occlusion of the patient but also boost psychological status and the overall quality of life. The development of any temporomandibular joint disorder is also prevented by the correction of the dental discrepancies.

In this case series, three completed cases have been discussed among which prosthetic replacement using removable partial denture (RPD) and fixed partial denture (FPD) have also been depicted. A functional occlusion was obtained in all three cases thereby improving the efficiency of mastication.

### 4. CONCLUSION

Despite recent surgical inventions in the management of patients with cleft lip and/or palate, the management of malocclusion using orthodontic therapy

remains to be the most crucial aspect in the entire treatment procedure. In all the completed cases presented in this case series, the masticatory efficiency and speech functions have been found to be improved remarkably. However, long term follow-ups and longitudinal studies are necessary to demonstrate good stability and prognosis of the orthodontic therapy. It can be concluded that in patients with cleft lip and/or palate who have fairly good facial profile, the correction of dental anomalies using orthodontic therapy alone should suffice the need for achieving a pleasing smile and ideal occlusion.

**5. Ethical Approval:** NOT APPLICABLE

**6. Declaration of Conflicting Interests:** No potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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