Customized Appliance for Intrusion and Retraction of Premaxilla in Bilateral Cleft Palate Patient

Siddharth Sanjay Phadkule, G Shivaprakash, Arun Kumar, Naveen Shamnur

ABSTRACT

Patients with bilateral cleft lip and palate have premaxillary displacement in up to three dimensions. Management of the protruding premaxilla and prolabium in bilateral cleft lip and palate can be a confounding problem. This report introduces an appliance system devised to retract and intrude the protruding premaxilla to a more favorable position for the surgeon to achieve a more functional and cosmetic repair of cleft palate deformity.

Keywords: Cleft lip and palate, Intrusion, Retraction.

INTRODUCTION

The cleft lip and palate is one of the most frequently encountered congenital malformations. Management of the protruding premaxilla and prolabium in bilateral cleft lip and palate can be a confounding problem. This article describes an intraoral appliance system for movement of premaxilla and prolabium to a more favorable position.

CASE REPORT

A 6-year-old male patient was referred to the Department of Orthodontics and Dentofacial Orthopedics by the plastic surgeon stating need for expansion of maxillary dental arch.

Patients reported with history of surgical closure of cleft lip at 2.5 months of age and cleft palate at 6 months of age.

Extraoral examination of patient revealed a mesoprosopic face with competent lips and a surgical scar evident on upper lip. He had a convex profile with a posterior divergence. (Fig. 1).

Intraorally, all deciduous teeth were present except 52. A protrusive premaxillary segment, with a closed bite was evident. Surgical scar seen in the midpalatal region with bilateral oronasal fistula in anterior palate. Upper arch was constricted in the canine region and crossbite was seen with 53 (Fig. 2).

Orthopantomograph revealed all permanent teeth except the congenitally absent 52 and 22 (Figs 3A and B). Occlusal radiograph showed bilateral cleft of palate and alveolus (Figs 4A to C).

This 6-year-old male patient was diagnosed as a case of bilateral cleft lip and palate with horizontal growth pattern, protruded premaxillary segment, bilateral naso oral fistula in anterior palate region, lower anterior teeth are retroclined, flush terminal plane bilaterally, crossbite with 53, competent lips and convex profile. There was associated severe deep bite causing trauma to the palatal aspect of deciduous incisors—the reason being a vertical decent of the premaxilla.

TREATMENT PROGRESS

The immediate orthodontic objectives, in this case, were to correct the constriction in upper arch and to improve maxillary alveolar alignment.

It was decided to expand the upper arch in the canine region using quad helix appliance designed by Ricketts. The needed expansion was achieved within 4 months. The expansion was maintained with the same appliance (Figs 5A and B).

After this, it was decided to align premaxillary segment. This needed intrusion and retraction of premaxillary segment. An innovative appliance was designed to create a favorable environment for the bone grafting as needed by the surgeon. The initiation of treatment was done to reduce the traumatic bite in the premaxillary region. For this, an
acrylic splint was constructed to hold the premaxillary segment together. Force was applied to this segment using cantilever springs made up of 0.017" × 0.025" TMA wire. This extended from molar tubes on 16 and 26 to the hooks extending gingivally from the acrylic splint (Figs 6 and 7). The deep bite was corrected and premaxillary segment was aligned after 8 months of treatment (Figs 6 and 7). After this, two brackets were bonded over the splint and a rigid wire was passed from molar tubes into the brackets to maintain the correction (Fig. 9). Total Treatment duration required was 12 months in which expansion was carried out for 4 months followed by retention of 4 months. After this, intrusion of premaxilla was carried out for 4 months.

Now, the patient is under retention and around 7 years and 6 months. The case would be re-evaluated periodically in the retention period till the bone grafting is done.

DISCUSSION

Management of protruding premaxilla and prolabium can be a confounding problem in treatment of cleft cases. Many a times, surgical correction of cleft lip would produce excessive tension and wound breakdown or a poor facial esthetics result. Many techniques have been proposed by different clinicians to deal with this problem, e.g. extraoral traction, oral pinning and traction, premaxillary surgical setback and premaxillary excision. This appliance was devised to retract and intrude the protruding premaxilla to a more favorable position for the surgeon to achieve a more functional and cosmetic repair of cleft palate deformity. As the patient presented with a premaxilla having deciduous teeth, whole premaxilla was treated as a unit and splinted together with an acrylic splint. Two hooks projecting from the ends of the splint into the vestibule acted like point of application.
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Figs 3A and B: (A) Pretreatment and (B) post-treatment OPG

Figs 4A to C: Occlusal radiographs comparison: (A) Pretreatment, (B) postexpansion and (C) postintrusion

Figs 5A and B: Quad Helix appliance: (A) Before expansion and (B) after expansion

Fig. 6: Customized intrusion and retraction appliance in position
Fig. 7: Biomechanics involved: the cantilever made of $17 \times 25$ TMA on either side engaging to the hooks arising from the splint had both intrusive and retractive components of force on premaxillary segment as shown (red arrows).

Fig. 8: The effective intrusion and retraction of the premaxilla

Fig. 9: The achieved intrusion and retraction of the premaxilla maintained with $2 \times 2$ appliance labially and modified quad helix palatally

of force. Force element was formed by two springs made up of $0.017'' \times 0.025''$ TMA extending from molar tubes to the hooks (Figs 6 and 7). An intrusive and retraction force was applied by these springs as shown in Figure 8. As the premaxilla was consolidated into an unit, absence of bone and periodontium in cleft region did not affect significantly. The innovative appliance design acted as an orthopedic corrector by taking the entire premaxilla as a unit with the splint. A simultaneous intrusion and retraction was achieved effectively as less resistance was observed because of reduced bone support.

The difference between pretreatment and post-treatment occlusal radiographs and orthopantomograph show the significant movement achieved in two planes (Figs 3 and 4). The drastic correction in facial esthetics and improved arch alignment was achieved (Figs 8 and 10).
CONCLUSION

To address the issue of protruding prolabium and premaxilla, an appliance system was designed. This custom made appliance system has helped to achieve retraction and intrusion of the premaxillary segment in bilateral cleft palate patients to a more favorable position.

The appliance enhanced the approximation of the premaxilla with palatal bones, providing favorable environment for the bone grafting. Further it also reduced the facial convexity and traumatic bite.

Further research and refinements are needed for this appliance design to be used frequently.

REFERENCES