

# Orthodontic Management in Cleft Lip & Palate: An Overview

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## Introduction

Clefts of lip and palate are common serious congenital anomalies affecting the orofacial region. A cleft lip or cleft palate is a defect in the lip or palate. These two entities can occur separately or simultaneously. The cleft lip can be unilateral or bilateral, it can be complete or incomplete. The cleft palate is divided into prepalatal clefts and postpalatal clefts, the incisive foramen being the dividing point. Prepalatal clefts involve the anterior palate, alveolus, lip, nostril floor, ala nasi. They can be complete or incomplete. Post palatal clefts are posterior to incisive foramen. They can be complete or incomplete depending on whether or not they extend all the way through the soft and hard palates to the incisive foramen.

The usual problems encountered in cleft patients are feeding, speech defects, ear problems, dental anomalies and malocclusion, nasal deformities and other associated anomalies. The management of cleft lip and palate presents a great challenge not only because it involves face, the most exposed organ of human body but also because of various associated anatomical and functional problems which continue to show up with age. The treatment approach must address the patients appearance, speech, hearing, mastication and deglutition. A comprehensive management requires a dedicated and experienced team of pediatrician, craniofacial surgeon, orthodontist, pedodontist, psychologist, speech therapist, otorhinolaryngologist and anesthesiologist. Because of their location cleft lip and palate deformities involve the various dental specialities their course of treatment.

## Management of Orofacial Clefts

Various surgical and orthodontics interventions have been advocated for management of orofacial clefts. These are prevention of cleft lip and palate, neonatal intervention and nursing care, presurgical orthopedic management, primary

periosteoplasty, primary alveolar bone grafting, lip repair, palatal surgery, pharyngeal flap surgery, secondary bone grafting, orthodontic management, maxillary protraction, rhinoplasty and fistula closure.

## Orthodontic Management of Cleft Lip And Palate Patients

Some cephalometric landmarks are difficult to identify in patients of the distortion of skeletal structure, so high kilovoltage X-ray equipments with a small focal is recommended in order to secure full control of the contrast, sharpness, and density of radiographic image.

Characteristic orthodontic problem in cleft lip and palate cases:

Maxillary retrusion of varying degree: in unilateral cleft cases evident at early age whereas in bilateral cleft cases it remains hidden in prominent premaxilla.

Varying degree of medial rotation and transverse dysplasias increase with eruption of permanent teeth.

Vertical skeletal dysplasias: reduced maxillary height and opening rotation of mandible.

Abnormal dental development: missing, hypoplastic, dysmorphic, and impacted teeth.

Occlusion and alignment: varying degree of cross bite becoming worse in permanent dentition, maxillary incisor rotation, and lingual inclination; arch asymmetry, and midline deviations.

## Treatment Procedures

**Primary dentition treatment:** Proposed benefits of this phase of treatment are

1. Improvements of alveolar developments by unlocking overlapped segments
2. Improvements in speech development and nasal breathing by expanding maxilla and providing more tongue space.
3. Improvements in masticatory function by elimination of cross bite.
4. Improvements in future permanent teeth eruption and alignment.

The dental service most frequently performed in primary dentition is the

placement of a small prosthesis to occlude oronasal fistula or alveolar defects.

## Mixed Dentition Treatment

Commonly performed procedures during this phase are maxillary expansion, incisor alignment, proclination, relieve of crowding, rotation correction, cross bite correction, maxillary protraction.

**Incisor alignment** can be accomplished by removable or partial fixed appliances. The most important issue involved in doing this prior to grafting is danger of perforating the thin lamina of alveolar bone covering the roots of teeth adjacent to cleft side.

**Maxillary expansion** is beneficial to expand the maxilla prior to grafting as it is easy to achieve skeletal movement and rotation even with the simple appliance like quad helix. This procedure increase the width of cleft and uncover the existing oronasal fistula. Expansion technique should induce more anterior than posterior correction causing a lateral rotation of buccal segments. An interim prosthesis is used to replace missing teeth, to retain orthodontic results, and to cover fistula.

Expansion will be followed by graft placement but exact timing be determined by stage of development of permanent canine. Alveolar repair in situations in which a Lateral Incisor is present requires additional bone support for further development and eruption.

**Maxillary protraction** orthopedics to improve developing maxillary retrusion protraction facemask therapy is recommended. Around 63% of cases form good response group showing only 0-1 mm of advancement. Finally a combination of maxillary protraction procedures with distraction osteogenesis has recently been proposed a removable protraction face frame or a rigid external distraction device with simultaneous corticotomy but in buccal cortex of maxilla.

## Permanent Dentition Treatment:

Prior to 1945 the permanent dentition phase was considered as prosthodontic phase

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but more recently, with the introduction of reliable bone grafting the current phase has been labeled as the non-prosthetic challenge.

Orthodontic problems in the permanent dentition might be listed as follows-

- Vertical jaw relation
- Anteroposterior jaw relation
- Lateral jaw relation
- Dental irregularities

#### Vertical Jaw Relation

- Most common problem is excess freeway space and over closure of mandible. Several methods of treatment are:
- Vertical elastics
- A vertical development plate for both local open bite closure (canine region) and forced eruption of teeth.
- Most satisfactory method is a mandibular acrylic bite opening plate in conjunction with vertical elastics. The premaxilla is often overdeveloped vertically, while the buccal segments are deficient. Intrude the maxillary incisors while simultaneously extruding the cuspids and bicuspid.
- If orthodontic treatment is contraindicated due to absence of many teeth or grossly underdeveloped maxilla or refusal by the patient then prosthetic treatment is indicated.
- Generalized vertical development by orthodontic treatment usually remains stable. Localized anterior vertical correction is difficult to retain and open bite in the cuspid and incisor region is most frequent form of relapse.

#### Anteroposterior Jaw Relation

- Normal incisor relation is usually easy to achieve with maxillary protraction and rotation correction & proclination of incisors. The buccal segments may be in Angle's class III or class I.
- The maxillary incisors can be advanced slightly beyond the basal bone support if the case is to be retained with an extensive bridge.
- When lateral incisor is missing maintaining the space is easier, more stable and esthetic than mesializing the

posterior.

- Orthognathic surgery can be planned for maxillary advancement, chin setback or some kind of mandibular osteotomy.

#### Lateral Jaw Relation

- Even cases where maxilla is expanded in mixed dentition show some constriction in permanent dentition, and particularly cuspid and second bicuspid often erupt palatally. These are also difficult to move due to insertion of supragingival fibers into scar. Expansion should therefore be overdone and maintained for several years.

#### Dental Irregularities

- In Unilateral clefts teeth adjacent to cleft are rotated towards cleft which needs to be corrected. Bilateral clefts usually have lingually inclined incisors, which must be torqued. However there is often unusual crown root angulations of that while the crown position indicates that the tooth is inclined lingually the root inclination may be reasonably normal. It is preferable to correct crown inclination by jacket crown.
- The maxillary incisors in complete Bilateral cleft may be hypoplastic or have poor bone support and may eventually be extracted but they serve as useful purpose during growth-maintaining the lip support, encourage growth and function.
- Prosthesis- Missing teeth, an alveolar defect, oronasal fistula remaining after surgery are several reasons why prosthesis is essential.

#### Retention of the Orthodontic Correction

Facial esthetics can be improved by supporting the upper lip with prosthesis. The method of choice wherever possible is fixed prosthesis either a bridge or splint. A partial denture is used where there is severe mid face retrusion and the maxillary segments have been widely separated.

#### Conclusion

The quality of care for patients with craniofacial anomalies and related disorders must be carefully monitored by the team providing diagnosis, treatment planning and

treatment services. This requires (1) Longitudinal assessments of the outcomes of treatment (2) Periodic team review of the clinical outcome data, and (3) Team adaptation of treatment procedures when clinical outcome assessments do not reach referenced criteria.

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