

## REHABILITATION OF CLEFT LIP AND PALATE PATIENTS WITH A SYSTEMATIC APPROACH

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### Abstract:

The oral rehabilitation of lip and palate patients is challenging and many of these patients are suffer if they don't receive sufficient dental treatment. Several techniques, including orthodontic appliances, surgeries, advanced prosthodontic rehabilitation and alveolar bone grafts have been proposed for the oral rehabilitation of these patients. There are still some difficulties in prosthetic rehabilitation of cleft lip and palate patients with conventional prostheses or implant retained prostheses because of insufficient alveolar bone quality and quantity, inadequate soft tissue, and abutment teeth. This paper is an attempt to review the systematic approach in management of cleft lip and palate patients.

**Keywords-** Cleft palate, hard palate, soft palate, complete denture

### Introduction

In cleft lip and palate rehabilitation, the prosthodontist has the same goals as any other professional person working in this habilitation area including to improve appearance and to provide adequate function. Prosthetic treatment of the cleft lip and palate condition is so wide in scope that one might generalize by saying that it starts at birth and ends with death. As an example of this, a marked asymmetry of the dental arch is often seen in the cleft palate new born and unless this is corrected before surgery commences, severe future problems

can be expected. This paper is an attempt to review the prosthodontic management phase in cleft lip and palate patients.<sup>1</sup>

### Systematic Approach

As noted the dentist is involved to provide indicated services at various intervals during the maturation of the cleft palate patient. The type of prosthesis required is determined by the stage of development, the nature, and the extent of the abnormality being treated. Representative chronologic modes of treatment and their rationale are discussed herein. The basic approaches to

care can be applied to more extensive problems as they occur.

### 1. Infant phase

The early alignment of malposed maxillary arch segments requires the construction of a baseplate type of prosthesis retained primarily by positive tissue adaptation to deliver a slight predetermined force for movement. Without teeth for retention and support, the infant must be kept under observation to ensure that the prosthesis remains in the intended position and is performing the desired function. Until the infant is acclimated to its presence, the prosthesis may require extra oral head-bow retention. As growth begins to accelerate after the first 4 to 6 weeks of life, a more aggressive force can be imposed to direct movement of the segments.<sup>2</sup>

A cast is obtained from an impression made with the clinician's choice of material. An irreversible hydrocolloid is commonly used in a tray fashioned from hard base-plate wax warmed and adapted in the mouth or in easily modified stock trays. The cast is duplicated, since one is retained as a record and the other sectioned for construction of the activating prosthesis. The surgeon and dentist (orthodontist or prosthodontist) determine the correction to be made, section the cast through the cleft as required, reassemble the segments with wax, block out as necessary, and duplicate the revised cast for construction of a prosthesis.<sup>3</sup> Some clinicians advocate the use of template to aid in the survey and resection of the cast, however, experience may obviate the need for this additional procedure and equipment.

Hard-or-soft-base materials, or a combination of both, can be used for the prosthesis. It is sometimes describable to use a resilient material such as silicone for the initial prosthesis, since a one piece design is easier to construct and can be readily replaced to increase the desired orthodontic force. Subsequently, a spring activator or

jack-screw device may be used to permit periodic adjustment in the office or at home without remaking the prosthesis. The parent can be instructed in making a judgment as to the need for increasing the pressure and may turn the adjustment screw to keep the force of the prosthesis active. When no longer adjustable, the prosthesis will need to be revised or remade. Should retention become an ongoing problem external bow assistance may be required.

Use of the prosthesis is continued until surgical closure of the lip is accomplished, usually 6 to 12 weeks after birth. After the lip operation continued use of the prosthesis may be indicated for segmental retention or feeding assistance. When teeth begin to erupt, problems in adaptation and stabilization become more frequent and use of the prosthesis may be discontinued. Further prosthodontic intervention probably will be unnecessary until deciduous dentition is more complete and the child is cooperative enough to understand and undergo further intraoral procedures.

A management decision becomes necessary when the speech process has developed enough to assess the level of palatopharyngeal competence. Even though it is possible to construct and place an obturator as early as 18 months of age, little benefit is likely, and other management problems may be created if the child cannot understand treatment rationale. The speech pathologist will play an important role in making collective judgments as to the type and timing of prosthetic or surgical intervention during this early period.<sup>4-5</sup>

To permit undisturbed growth, surgical closure of the cleft palate usually is delayed until the child is about 18 months of age. The procedure may be staged, depending on the problems anticipated in closure, quality and quantity of soft tissue available and expected results. An

alternative approach is to perform a primary closure to include operation on the soft palate and a pharyngeal flap in one procedure. When the hard-plate cleft is wide, closure of the soft palate alone may be indicated, and if insufficient palate length is anticipated, prosthesis is used to obturate the hard-palate defect and provide speech assistance in the palatopharyngeal region. Should it be determined that a palatal operation has resulted in palatopharyngeal incompetence, an obturator may be the adjunctive or transitional treatment of choice during the phase from 18 to 36 months.

## 2. Childhood phase:

At approximately 3 years of age, the average child should be capable of understanding and cooperating to the extent that indicated active treatment can begin. Children with cleft palates tend to score slightly lower on tests of intelligence and creativity when compared to noncleft peers. The significance of this conclusion is somewhat questionable since certain studies show that cleft children are not dull and that they have a normal range of intelligence quotients.

The primary dentition usually erupts by 3 years of age and a definitive occlusal relationship, good or bad, has been established. Most patients with complete cleft palates will require orthodontic treatment, which may have already been started if the maxillary orthopedics concept has not been espoused. At this time, attention is focused on arch alignment, not tooth alignment, to provide better occlusal function and to encourage a more favorable maxillo-mandibular dental relationship when the permanent teeth erupt. Although it is somewhat inconvenient and complicated, the coordination of orthodontic and prosthodontic treatment during this period is possible.<sup>6</sup>

Primary indications for prosthesis at this stage are the replacement of missing teeth, retention of arch alignment, and

speech assistance through the closure of nasoalveolopalatal fistulas and use of a pharyngeal obturator. To satisfy these objectives, the typical prosthesis will consist of anterior, palatal, and pharyngeal sections. Deciduous teeth seldom have natural contours that are conducive to the retention and stability of obturator prosthesis. Thus it is usually necessary to place orthodontic bands with attached tubes or lugs, cast or preformed crowns, direct bonded plastic brackets, or over contoured restorations on teeth essential for support and retention of the prosthesis. In most instances, the teeth involved will be maxillary cuspids, first or second primary molars, or first permanent molars if erupted. Single bilateral molar abutments are insufficient to prevent the rotary movement of the prosthesis around a mid-arch fulcrum, which often occurs with a pharyngeal obturator. An anterior indirect retainer or, preferably, abutment is needed to control such movement during mastication, deglutition and speech.<sup>7</sup>

With mouth preparation completed, preliminary impressions in well-formed and adapted stock trays are made with irreversible hydrocolloid. If sufficient attention has been given to tray selection and modification. A second or final impression may be unnecessary unless more accuracy is needed. In the latter situation, an autopolymerizing resin tray fabricated on the relieved stone cast obtained from the primary impression can be used with alginate, silicone, or Thiokol rubber impression material as desired. Small palatal or nasolabial perforations should be packed with petrolatum gauze or lubricated cotton to prevent the flow of impression material under pressure into inaccessible regions associated with the defect. The inclusion of the entire oronasopharyngeal area in the impression is unnecessary, since a more effective pharyngeal obturator can be developed using a secondary impression

technique with other materials. However, a reproduction of at least the velar portion of the cleft is desirable to aid in the placement of a retentive loop or grid for carrying the impression and retaining the final fabrication materials of the pharyngeal obturator.

Stainless steel or wrought 0.036-inch wire clasps, contoured and incorporated into a heat-cured acrylic resin base with required tooth replacements, form a satisfactory transitional prosthesis for support of a pharyngeal obturator in the young patient. Once the palatal section of the prosthesis is processed and finished, it is adjusted in the mouth for comfort and fit. If this is the initial prosthesis experience, a short period of use without the obturator may be desirable to accustom the patient to its feel and manipulation. Should the distal retentive loop impinge on the palate, it may require temporary coverage with wax or acrylic resin.<sup>8-9</sup>

### 3. Adjunctive or interim phase

Under current management schemes, the adolescent child probably has been providing with an adequate prosthetic or surgical mechanism for acceptable speech. With societal demands for an esthetic appearance, elective orthodontic treatment is commonplace and teenagers with the typical oral hardware are seen everywhere. Thus, orthodontic and prosthodontic treatment device worn by the cleft palate patient are not too dissimilar from those worn for esthetic reasons by normal peers and, therefore, are readily accepted. As the teenaged child grows to young adulthood, however, complications often develop relative to the orientation and dimensions of occlusion. Facial proportions, masticating performance, and personal hygiene become more relevant.

Interceptive orthodontic treatment shortens and frequently simplifies this phase of care, but because of midface

underdevelopment, the cleft patient usually requires solutions for difficult occlusal problems involving vertical and horizontal maxillomandibular relationships. A situation that is frequently seen is illustrated. A in this patient, despite a rather long and aggressive period of orthodontic treatment, it was impossible to bring the maxillary bicuspids and cuspids into a normal occlusal relationship. A large interarch distance persisted and definitive prosthodontic treatment included an anterior overly prosthesis to achieve a minimal end-to-end anterior relationship. Some provision must be made for the protection of overlaid teeth if they are to be considered as long term support for a definitive prosthesis. Treatment in the teenaged years most often involves some secondary operation to improve the premaxilla-lip relationship.

Gross underdevelopment in the midface of a patient who presented with complete crossbite of permanent teeth initially resulted in a closed vertical dimension of occlusion. The orthodontist expanded the arch to somewhat normal maxillomandibular alignment. The realigned arch was stabilized with fixed restorations to include a cross-arch 10-gauge gold bar. Removable overlay prosthesis preplanned with a temporary restoration.<sup>10</sup>

Distorted maxillomandibular jaw relationships frequently present more complex restorative problems. A severe intraoral problem is reflected in the collapsed facial appearance of the teenaged patient seen. A coordinated sequence of orthodontic, surgical, and prosthodontic procedures is required. With permanent teeth in place, malocclusion developed, displaying malrelated horizontal and vertical dimensions, poor orientation of the plane of occlusion, and malposition of the dental units. Preliminary orthodontic alignment prepared the patient for orthognathic surgery. After a period of postoperative

retention, definitive fixed and removable prosthetic restorations were constructed before carrying out secondary plastic surgical procedures involving the lip and nose. The use of prostheses as support or scaffolding for secondary operations requires coordinated preplanning by the surgeon and the prosthodontist if optimal results are to be achieved. The placement of teeth and the control of base bulk should be approved by both surgeon and prosthodontist before the restoration is finalized.

The cleft palate population is not without those who are prone to neglect. Faced with an inevitable edentulous maxilla and collapsed arch resultant from a complete cleft palate a patient is best served by providing the best denture foundation possible under such adverse circumstances. For example. A young man presented with a history of minimal dental care, poor dental habits, and little interest in embarking on a major restorative program with a questionable prognosis. A relative prognathism was ameliorated with a vertical ramus osteotomy to improve the maxillomandibular jaw relationship for construction of a prosthesis. Nonrestorable teeth were removed and complete maxillary and removable partial dentures were used to restore masticatory function and to provide facial support. The opportunity to achieve retention and stability of the complete maxillary denture in such situations is poor because of the V-shaped ridge, lack of hard palate, distorted arch form, and generally poor conditions for developing effective border seal. The improved jaw relationship partially offsets some of these deficiencies.<sup>11-14</sup>

Dental restorations involving fixed prostheses may need to be delayed because of pulp size, tooth position poor oral hygiene, or periodontal disease. Since the success of definitive restorations is directly

related to these factors, advancing the treatment timetable to accommodate the patient's demand without assurance that the conditions have been appropriately addressed can lead to failure.

#### 4. Adult phase :

Education of the patient, good evidence of cooperation in care and maintenance, and timely coordinated treatment are essential ingredients in the provision of lasting definitive restorations. Adult patients requiring treatment probably will have had too little or too much previous attention. The goals of treating these patients are the same as goals for any other age group, namely, intelligible speech, functional occlusion and acceptable cosmetic relationship. Because of compromising nature of the initial defect and possible intervening treatment the task of the prosthodontist involves not only the replacement of missing structures but also and more importantly, the preservation of that which actually remains.

The maintenance of natural teeth is critical to the success of any fixed or removable partial prosthesis. Since the remaining teeth usually must resist more stress, wide distribution is important. Mechanical stress breakers have been used by some clinicians, but generally are ineffective in complex prostheses involving sizable obturators. Minimizing stress to any one structure or area, however, is desirable and can be achieved through attention to prosthesis design. Changes in support and adaptation of the prosthesis require regular ongoing service. Therefore, the simpler the prosthesis design, the easier it will be for the prosthodontist to maintain and for the patient to care for and manipulate.<sup>15</sup>

Pertinent factors in the design and construction of a prosthesis related to ridge and palatal configuration. Soft-tissue health and response dentition, recording of jaw relationships, occlusal scheme, and use of

materials have been discussed elsewhere in this text and will not be repeated here. However, certain problems more common to the cleft palate patient need further elaboration.

### Soft palate architecture in cleft patients

The position and movement of the soft palate in relation to the pharynx changes with age. At birth and shortly thereafter, the soft palate at rest is roughly parallel to the roof of the pharynx so that the upper nasopharynx is only a narrow slot. Closure of the palato pharyngeal mechanism is accomplished by essentially a superior-inferior movement of the soft palate. As growth occurs in the pharyngeal area and as the adenoidal tissues regress, the movement of the soft palate takes on the characteristic anterior-posterior elevation displayed by most adults. When the adenoidal tissues are removed, the soft palate shifts to an anterior-posterior movement very abruptly. Palatopharyngeal closure is slightly below the level of the palatal plane upto 8 years of age and is consistently above the level of the palatal plane thereafter.

The extent of the closure of the soft with the posterior pharyngeal wall varies with head position. An extended head position results in a deeper nasopharynx than when the head is held in the Frankfort horizontal plane.

The pattern of soft palate movement varies between men and women. If the soft palate is longer, and have greater elevation, then amount of contact with the posterior pharyngeal wall will be less. The inferior point of contact with the posterior pharyngeal wall consistently found to be higher in men than in women.<sup>16-17</sup>

### Conclusion

Congenital defects of the mid facial region are not rare. It requires the team work of a large number of speciality it still remains a tricky task to accomplish but not impossible. It is better to treat the individual

right from birth rather than when he is older. Treating such individuals does not mean reconstructing their physical appearance alone but giving him a new life totally. For he is not affected physically, alone, but mentally too.

The prosthodontist plays his role to restore function esthetics and phonation. Various different prosthesis can be employed with regard to the type of defect and its extent. Thus it is essential to know what is normal to cure what is not.

### References

1. Esper LA, Kaizer RO, Fernandes JS, Gregghi SL, Carrilho GP. Surgical treatment of mucogingival alterations in cleft lip and palate patients: a clinical report. *Perio.* 2006;3:31–35.
2. Esper LA, Pegoraro TA, Valle AL. Gingival recession in individuals with cleft lip and palate: prevalence and severity. *Cleft Palate J.* 2012;49:92–95.
3. Madeira LC, Freitas KC, Gregghi SL, Pegoraro LF. Cross-sectional evaluation of the presence of gingival recession in individuals with cleft lip and palate. *J Periodontol.* 2007;78:29–36.
4. Pedro PF, Kogawa EM, Pereira T, Carrilho GP, Aiello CA, et al. Comparative evaluation of two different vestibuloplasty surgical procedures in cleft patients: a pilot study. *Cleft Palate J.* 2005;42:439–441.
5. Sbrana MC, Esper LA, Gregghi SL, Conti PC. Gingival recession in maxillary canines and central incisors of individuals with clefts. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2010;109:37–45.
6. Brasil JM, Pernambuco RA, Dalben GS. Suggestion of an oral hygiene program for orthodontic patient with cleft lip and palate: findings of a pilot study. *Cleft Palate Craniofac J.* 2007;44:595–597.
7. Ferreira SB Jr, Kaizer ROF, Almeida ALPF. The role of keratinized mucosa in

- peri-implant health. Cleft Palate Craniofac J. 2012;49:167–170.
8. Sbrana MC, Ribeiro IWJ, Siqueira EN, Almeida ALPF. Esthetic analysis of gingival components of smile and degree of satisfaction in individuals with cleft lip and palate. Cleft Palate Craniofac J. 2009;46:381–387.
  9. Ferreira SB Jr, Esper LA, Sbrana MC, Ribeiro IWJ, Almeida ALPF. Survival of dental implants in the cleft area - a retrospective study. Cleft Palate Craniofac J. 2010;47:586–590.
  10. Freitas AC Jr, Silva AM, Lima Verde MA, Aguiar JR. Oral rehabilitation of severely worn dentition using an overlay for immediate re-establishment of occlusal vertical dimension. Gerontology. 2012;29(1):75–80.
  11. Freitas JAS, Neves LT, Garib DG, Trindade-Suedam IK, Yaedú RYF. Rehabilitative treatment of cleft lip and palate: experience of the Hospital for Rehabilitation of Craniofacial Anomalies/USP (HRAC/USP) - Part 1: overall aspects. J Appl Oral Sci. 2012;20(1):9–15.
  12. Fukuda M, Takahashi T, Yamaguchi T, Kochi S, Inai T, Watanabe M, et al. Dental rehabilitation using endosseous implants and orthognathic surgery in patients with cleft lip and palate: report of two cases. J Oral Rehabil. 2000;27:546–551.
  13. Hickey AJ, Salter M. Prosthodontic and psychological factors in treating patients with congenital and craniofacial defects. J Prosthet Dent. 2006;95:392–396.
  14. Lopes JFS, Pinto JHN, Almeida ALPF, Lopes MMW, Dalben GS. Cleft palate obturation with Brånemark protocol implant-supported fixed denture and removable obturator. Cleft Palate Craniofac J. 2010;47:211–215.
  15. Verdi FJ Jr, Lanzi GL, Cohen SR, Powell R. Use of the Brånemark implant in the cleft palate patient. Cleft Palate Craniofac J. 1991;28:301–303.
  16. Watanabe I, Kurtz KS, Watanabe E, Yamada M, Yoshida N, Miller AW. Multi-unit fixed partial denture for a bilateral cleft palate patient: a clinical report. J Oral Rehabil. 2005;32:620–622.
  17. Zhou W, Li W, Lin J, Liu D, Xie X, Zhang Z. Tooth lengths of the permanent upper incisors in patients with clefts lip and palate determined with cone beam computed tomography. Cleft Palate Craniofac J. 2013;50:88–95.