Team Care for the Patient With Cleft: UCSF Protocols and Outcomes

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Abstract: To meet the medical, dental, and psychologic needs of the individual with a complex craniofacial birth defect such as cleft lip and palate, a team of specialists must be involved. The currently accepted standards of care can only be met if the appropriate specialists work together in the diagnostic workup and in the immediate and long-term planning and execution of the various treatment modalities required. This concept is clearly stated in the “Parameters” document published by the American Cleft Palate–Craniofacial Association in 2004 (Cleft Palate Craniofac J 1993; 30[Suppl]:S1–16).

Not only does the interdisciplinary team care provide the best overall outcomes for the patient but also is the most efficacious and cost-effective way of meeting the goals of treatment. Interdisciplinary cleft team members should also be a resource in educating parents, students, and other health care providers and may be participants in research on prevention, interception, or regeneration. We present in this article the protocols and treatment outcomes of the University of California at San Francisco.

Key Words: Team care, protocols, outcomes, cleft lip and palate

TREATMENT GOALS IN CLEFT LIP AND PALATE

After completion of treatment by a cleft team, the adolescent/adult with cleft should have intelligible speech, hearing within reference range, good facial profile, good lip and nose symmetry, attractive smile, good occlusion, healthy oral structures, and good self-esteem (Fig. 1).

Interventions are staged according to development of functions as well as structures.

Because treatment is not completed until the end of the growth period, it is important that interventions are designed to give the best outcome in the shortest time possible at the most critical stages of development. Experimental and clinical studies form the basis for the sequencing and timing of procedures used by our team.2–8

PROTOCOLS FOR TEAM VISITS AND INTERVENTIONS FROM INFANCY TO THE COMPLETION OF GROWTH

In our institution, approximately one-third of the newborn babies we see with a cleft are already known to us by the fact that the parents presented to our clinic for prenatal consultation after ultrasound showed the presence of a cleft. During the prenatal visit, information is given about clefting in general, how to contact us after delivery, and what to expect with regard to feeding, early interventions, and expected treatment outcomes. This visit has been very helpful for the expecting parents.

Immediately after birth, feeding instructions, counseling, diagnosis by a geneticist, and a pediatric consultation are provided. The newborn hearing test will already have been done in the hospital. If the cleft is wide, lip taping is started immediately. This is almost always done in bilateral clefts, but also often in wide unilateral clefts (Fig. 2).

Presurgical orthopedics or nasoalveolar molding is rarely done. Early manipulation of segments is done primarily to facilitate lip surgery.

The first team evaluation occurs within the first weeks of life. During this visit, the surgeon will explain the lip surgery and plan for scheduling at 10 to 12 weeks. The surgical technique is modified Millard.

Surgical repair of the palate is generally done around 10 months, and pressure equalization tubes are placed at that time. The surgical technique is Z-plasty or 2-flap palatoplasty.

A second team evaluation with emphasis on speech/language assessment is done 3 to 4 months after palate repair.

Between the age of 2 and 7 years, team evaluations are scheduled as needed. There may be need for speech therapy, fistula repair, soft palate lengthening for correction of velopharyngeal insufficiency, medical and behavioral intervention, treatment of middle ear disease, dental treatment, and so on. Currently, our fistula rate is less than 1%.

At 5 to 6 years, lip revision and/or columella lengthening in bilateral clefts may be indicated. Radiographs are usually obtained at this time, allowing assessment of jaw growth, dentition, and the alveolar cleft defect.

At 7 years or as maxillary first molars and permanent central incisors erupt, orthodontic maxillary expansion is started in preparation for alveolar bone grafting. The preferred expansion device is an expander with a posterior hinging to allow more anterior expansion or a quadhelix. This is often combined with maxillary protraction with a reverse-pull head gear. The maxillary incisors usually require alignment as well (phase 1 orthodontic treatment: Fig. 3).

Alveolar cleft bone grafting is done when the maxillary segments are in good position and there is no traumatic occlusion of the incisors. The graft is harvested from the ilium. Most often, our
FIGURE 1. An individual with a repaired complete unilateral cleft and palate and van der Woude syndrome after completion of orthodontic treatment and final lip and nose revision.

FIGURE 2. A child with a wide complete left-sided unilateral cleft lip and palate that had lip taping before initial lip repair.

FIGURE 3. Phase 1 orthodontic maxillary expansion and protraction in preparation for secondary alveolar bone grafting.
treatment plan is to replace a missing lateral incisor with the adjacent canine.

At the age of 12 years or older, after eruption of most of the permanent teeth, full orthodontic treatment is started (phase 2).

At the end of orthodontic treatment, implants are placed to replace missing teeth as needed (Fig. 4).

When growth is close to completion, surgical advancement of the maxilla is done if indicated\(^\text{10}\) (Fig. 5).

Final lip and nose revision is done when orthodontic and prosthetic treatment is completed.

OUTCOMES STUDIES

Speech

According to past and current studies, our expectation for normal velopharyngeal function for speech is approximately 90% after the initial palate repair in nonsyndromic clefts. In syndromic clefts, the expectation is considerably lower at 75%.

A retrospective study examined all palate repairs from 1987 to 2004, operated on by 1 surgeon. Clefts less than 8 to 9 mm wide were done by Z-plasty, whereas wider clefts were done by a 2-flap technique. When syndromes were excluded, 94% of the Z-plasty– repaired individuals had adequate velopharyngeal closure for speech, whereas the 2-flap had a 78% success rate after the initial procedure.

A recent study on clinically evaluated outcome after secondary Z-plasty palate lengthening showed that 79% of nonsyndromic individuals had velopharyngeal insufficiency correction, whereas the rate was 67% in syndromic clefts.

A study on patients with cleft with van der Woude syndrome documented an association between hypodontia and maxillary hypoplasia and confirmed our clinical observation that maxillary hypoplasia is more prevalent in individuals with this syndrome than in nonsyndromic clefts.\(^\text{11}\)

Jaw Growth—Maxillary Advancement Surgery (Le Fort I)

A recently published study on nonsyndromic unilateral cleft lip and palate patients in our database who required maxillary advancement surgery revealed that the factors most likely to result in maxillary hypoplasia were multiple missing teeth, many surgical procedures, and inconsistent or no team care.\(^\text{10}\)

Most of these individuals were referred to our team after initial repairs had been done elsewhere. Including these patients, the total number of unilateral complete cleft lip and palate individuals in our database born between 1971 and 1990 requiring maxillary advancement surgery was 14%. This number is lower than the 25% average reported in the literature.

A recent survey was conducted on all maxillary surgical procedures in all cleft types in our database.\(^\text{12}\) A total of 973 individuals with a diagnosis of cleft lip and/or palate born between 1970 and 1990 were reviewed. Three hundred twenty-five patients had an associated syndrome, and the remaining 648 patients were nonsyndromic. Of the 648 nonsyndromic patients, 105 had complete or incomplete unilateral or bilateral cleft lip with or without alveolar cleft (CL+/−A), 122 had cleft palate only (CP), 286 had complete unilateral cleft lip and palate (UCLP), and 135 had complete bilateral cleft lip and palate (BCLP).

Of the 648 nonsyndromic cleft individuals, 59 (9.1%) required surgical intervention for correction of maxillary hypoplasia. Two (1.9%) of 105 required surgical intervention for cleft lip (CL+/−A), 4 (3.3%) of 122 required surgical intervention for cleft palate (CP), 35 (12.2%) of 286 required surgical intervention for unilateral cleft lip and palate (UCLP), and 18 (13.3%) of 135 required surgical intervention for bilateral cleft lip and palate (BCLP).

It was concluded that the frequency of surgical correction for maxillary hypoplasia in nonsyndromic patients with cleft at the
UCSF Center for Craniofacial Anomalies at 9% was lower than the mean 25% reported in the literature.

**Alveolar Bone Grafting**

Recently, cone beam computed tomographic (CBCT) technology has been used to examine the cleft alveolar defect and to assess bone fill after 1 year. A mean of 15% bone volume was lost during the 1 year after grafting. In most of the cases, canine substitution for the missing lateral incisor was planned.

The CBCT technology also allows observation of tooth movement in all planes of space over time (Oberoi et al, unpublished data, 2008). The predominant movements of the canine on both the cleft and noncleft side were incisal, labial, and mesial.

**Osseointegrated Implants**

To successfully place an implant in the space of a missing lateral incisor, the area must have continuity of bone with adequate height and width. Therefore, in addition to the usual criteria for the success of alveolar bone grafting, use of implants mandates close attention to the volume of bone and the contour of the alveolar ridge. These criteria are better assessed now with the availability of CBCT (Oberoi et al, unpublished data, 2008).

**REFERENCES**