Cleft Lip and Palate: Current Status From the Literature and Our Experience

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Abstract: Many years after surgical correction, a complete unilateral or bilateral cleft is inclined to show an inaesthetism often associated with functional defects. This sequela disturbs the facial growth during childhood. Across the world, each surgical school uses its own protocol, but which is the best surgical protocol for patients with cleft? The aim of this study was to present a review of international literature concerning surgical techniques for the repair of cleft lip and palate (CLP) in children and to report our personal surgical techniques in this field. We focus on the main role of the primary surgery and propose a personalized protocol therapy, depending on the severity of the cleft. On 36 patients, most of them showed unilateral CLP at birth; only 4 showed bilateral cleft. In this study, we used 36 patients without cleft but with class I occlusion for comparison purposes. Analysis of the 2 groups regarding the development of the maxillary arch and the evaluation of palatal morphology was carried out using lateral cephalograms and dental casts. The main result showed 28 patients with acceptable teeth occlusion and speech quality, a valid nasal function, and a proper aesthetic aspect. Controversy still exists regarding the optimum timing and surgical technique for CLP repair. We propose the creation of a scientific database on internationally recognized protocol as a starting point depending on the severity of the cleft, thus avoiding controversies in CLP therapeutic treatment.

Key Words: Unilateral bilateral cleft lip and palate, 1-stage simultaneous repair, cleft lip and palate surgical protocol

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The safe treatment of patients with cleft palate is still a challenge for surgeons. Even many years after surgery, in patients with cleft, we often observe the same stigmata, namely, growth reduction of the upper jaw and a typical profile, especially from the side (Figs. 1A and B). For this reason, some patients with cleft complete their therapy by undergoing orthognathic surgery1 to improve the occlusion, the nasal function, and the aesthetic aspect. The aim of this study was to present a review of international literature concerning surgical techniques for the repair of cleft lip and palate in children, to describe our personal surgical techniques in this field, and to report our proposal.

Our final purpose was to reduce the secondary defects and the number of patients with cleft assigned to orthognathic surgery. In the schedules of surgical cleft procedures, one of the most important steps concerning facial growth is alveoloplasty, improving maxillary growth and supporting teeth eruption.2–3

We agree with this technique, but we prefer to use it simultaneously with palatoplasty (around the 39th mo of life), after deciduous molars eruption, to avoid interference with the first growth of the maxilla. Some authors4–7 have performed an early primary complete cleft closure in 1 stage or an early secondary gingivavoalveoloplasty8–9 in a multistage surgery protocol. Based on our experience, we are inclined to involve more specialists to personalize the surgical program according to the severity of the cleft and to minimize the number of surgical interventions, in order not to disturb bone growth with earlier and aggressive surgical procedures. We believe that numerous surgical interventions have a negative impact on maxillary growth, causing a contraction of the diameter of the upper jaw.10–12

MATERIALS AND METHODS

We selected 36 patients, consisting of 16 girls and 20 boys. Most of these patients showed unilateral cleft lip and palate at birth; only 4 showed bilateral cleft. Inclusion criteria were as follows: unilateral or bilateral cleft; age range, 37 to 42 months; mean age at lip and nose closure, 6 months; and mean age at closure of soft palate, 10 months. Additional inclusion criteria included white ethnicity. Patients were excluded if they were with syndrome, already treated in other hospitals, and submitted to another timing of surgical procedures. In this study, we used 36 patients without cleft but with class I occlusion for comparison purposes. The characteristics of the 2 groups are presented in Table 1. Analysis of the 2 groups regarding development of the maxillary arch and the evaluation of palatal morphology was carried out using lateral cephalograms and dental casts.

All surgery and presurgical/postsurgical orthopedic and orthodontic treatments were performed, respectively, by the same experienced surgeon and orthodontist.

We used different surgical techniques for cleft care:
• for unilateral cleft lip, the Tennison method for wide clefts (>10 mm); the Millard method for smaller clefts;
• for bilateral cleft lip, the Millard or the Pfeifer method;
• for cleft hard palate, the Widmaier-Perko method, associated with alveoloplasty; and
• for cleft soft palate, the Ortiz-Monasterio method.
We followed our personalized surgical protocol based on cleft severity and functional aspects.

The patients were submitted to:
- a presurgical orthopedic device (byte) for cleft alveolopalasty
- labioplasty, based on weight (not < 7.5 kg)
- veloplasty younger than the age of 12 months (for phonetic reasons)
- alveolopalatoplasty (mean [SD] age, 39 [2] mo); after deciduous molar eruption, no iliac bone graft was scheduled
- orthodontic treatment
- logopedics and ear, nose, and throat consultations
- septorhinoplasty after the completion of nasal growth (after the 16th/17th year of age)

These parameters could be subject to modifications (Figs. 2A and B, 3A and B, 4A and B, and 5A and B).

**TABLE 1.** Distribution by Age (mo) and Sex in the Groups With and Without Cleft

<table>
<thead>
<tr>
<th>Group With Cleft, n (%): Age at Surgery, Range, mo</th>
<th>Group Without Cleft, n (%): Comparison of Age With Control, Range, mo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls 16 (44.4) 38–42</td>
<td>14 (38.8) 37–41</td>
</tr>
<tr>
<td>Boys 20 (55.5) 37–41</td>
<td>22 (61.1) 37–41</td>
</tr>
<tr>
<td>Total 36</td>
<td>36</td>
</tr>
</tbody>
</table>

**RESULTS**

Forty-two months after alveolopalatoplasty, we evaluated the patients. The mean age at the time of the evaluation was 6.9 years. Width and symmetry of the maxillary arch and the morphology of the hard palate were assessed in the deciduous canines and molars and were compared in both the cleft and the control groups.

Dental cast analysis revealed a small but significant constriction of the upper arch (molar area) different from the children to be compared probably due to the medial shift of the soft tissue flaps used for palatoplasty. Lateral cephalometric analysis revealed no significant intergroup differences in the sagittal and vertical craniofacial dimensions.

Of the 36 patients, only 8 displayed a light contraction of the alveolar bone. We corrected the malocclusions with orthodontic therapy. With the exception of the 8 patients with malocclusions, only 4 should probably be included in an orthognathic surgery treatment plan, if the orthodontic treatment does not prove successful. They presented an anteroposterior jaw size discrepancy and they snore during sleep. This suggests that corrections will be necessary. The main result showed 28 patients with an acceptable teeth occlusion and speech quality, a valid nasal function, and a proper aesthetic aspect.

**DISCUSSION**

So far, a single internationally recognized surgical protocol has not been established. It should not be forgotten that the cleft...
appearance may conceal a congenital disease or a syndrome. Many variants and many different protocols exist in the world!

There are advantages and disadvantages inherent in all repair techniques. More options are now available for surgical techniques that may help to protect growth. But which is the best surgical timing and protocol?

There are principles that can be universally applied and that will improve the results of most approaches. The surgical goals in repairing cleft lip deformities are to address the deficiencies due to the cleft lip, to restore static and dynamic anatomy, to reshape the cleft nasal asymmetry, and to leave a naturally appearing scar that mimics the contours of the philtrum.

An early alveoloperiosteoplasty creates a mucoperiosteal bridge with limited dissection and direct closure across the alveolar cleft associated with the cleft lip and palate. The subperiosteal tunnel allows for bone generation in the absence of bone grafting in young patients. Early secondary alveoloplasty could reestablish the continuity of alveolar bone and prevent upper dental arch collapse after presurgical orthopedic upper maxilla expansion; it might also give a good bone support for teeth facing the cleft and allow the eruption of permanent elements. To correct the deformity and to allow interaction of various functions relating to nasal ventilation and masticatory efficiency, the cleft surgeon must perform a not-too-broad subperiosteal and subperichondral elevation. We also therefore avoided, during orbicular reconstruction, tension of the muscle, which might compromise the sagittal projection of the upper jaw’s growth. We took advantage of the orthopedic forces of the orbicularis pull to achieve improved alveolar alignment. We believe that most surgical periosteal approaches tend to produce a worse scar, causing an elasticity defect, which, again, has a detrimental effect on the growth of the local area and of the surrounding tissue, that is, disturbance of bone growth in a cleft maxilla.

Most centers using alveoloperiosteoplasty do so in conjunction with primary lip closure after initial treatment of the cleft with presurgical orthopedics.

Nowadays, the general story goes like this: “… the delayed cleft palate repair led to worse speech outcomes; thus, some authors abandoned this technique in favor of a single-stage repair. In addition, their data showed that the delayed cleft palate repair led to deleterious maxillary growth.”

Otherwise: “…when considering surgical treatment, the advantages of the delayed hard palate closure must be weighed against criteria favouring the early one-stage closure of the hard and soft palate.”

Several years ago, the general opinion was that, “…an early closure or an anomalous scar may cause secondary deformities of the skeleton of the medium third of the face.” Already, in 1966, Ortiz-Monasterio et al concluded from their examinations, “…that growth defects of the middle third of the face are caused by early or repeated and aggressive surgery.”

The number of prior operations, according to DeLuke et al, does not significantly affect the later need for orthognathic surgery. Despite varied options, there is 1 certainty: the sagittal projection of the upper jaw is compromised by severe scarring produced during primary surgery, particularly scarring due to secondary epithelialization of denuded palatal bone or closure of the cleft in 1 layer.

FIGURE 3. A, Bilateral cleft lip; these are both incomplete. B, The child 3.5 years later.

In contrast to the poor maxillary growth after incorrect primary surgery in infancy, adult patients with cleft lip and palate who did not undergo surgery are known to have good facial growth.\textsuperscript{18,20}

Maxillary growth is also influenced by oral breathing.\textsuperscript{22} Nasal breathing is one of the most important functions promoting facial growth. It is therefore essential to restore this function in the first operation.\textsuperscript{21}

On the basis of these facts, surgical determination to respect the aesthetics during childhood is not a primary issue for us. We prefer to delay alveolopalatoplasty until around the 39th month of life. Our preliminary data suggest that bone growth is capable of supporting tooth eruption without significant growth disturbances in most patients treated.

Therefore, with efficient initial surgery and successful secondary repair, the objective is almost achieved, and the final surgery (after completion of physical development) is performed just for the sake of harmonization. Now, we were unable to demonstrate, with our data, any clear impairment of facial growth in the patients treated with alveolopalatoplasty when compared with patients treated with other kinds of the procedures.

**CONCLUSIONS**

We must remember that facial growth in children with a cleft lip and palate is inevitably different from that in healthy children\textsuperscript{23} and that reposition of the periosteum in the same place is different from the periosteum transposition associated with cleft surgery. Although the procedure has no negative effects on a healthy maxilla, it may still be harmful when used to treat a cleft maxilla.\textsuperscript{24} Palatoplasty may significantly affect maxillary alveolar arch growth\textsuperscript{25} or alter hard palate morphology, particularly in the posterior area.\textsuperscript{26}

Alveolopalatoplasty at a mean age of 39 months does not seem to create much disturbance on bone growth of the upper jaw. For the primary treatment, there must be a rational selection of the age at the time of the first operation, of the successive procedures, and their chronology, so as to benefit from the growth spurt of the maxilla and avoid worse scars resulting from secondary epithelialization.\textsuperscript{27} Meazzini et al\textsuperscript{27} said that early secondary gingivoalveolo-plasty seems to have an inhibiting effect on maxillary growth (approximately 17%); it is fair to note, however, that early secondary alveoloplasty, done together with closure of the hard palate, avoids secondary bone grafting. The total number of operations needed is 2, and it becomes 3 (as in the bone-grafted sample) only if an additional Le Fort I is needed. We believe that numerous surgical procedures performed on the same patient can adversely affect the growth potential of the bone.

In recent years, we have read many authoritative opinions regarding the surgical approach for cleft lip and palate.\textsuperscript{28,29} We are convinced that the first operations must be performed with skill to preserve the integrity of very fragile structures.

Depending on the severity of the cleft, we suggest the following:

- minimizing the surgical aggression;
- personalizing the therapy protocol;
- limiting the surgical sequelae; and
- correcting the secondary defects after completion of the physical development.

The personalized approach should be seriously considered because every patient with cleft has her/his own particular characteristics. Further clinical and experimental studies are certainly required to confirm our results.

Our preliminary results, 42 months later, seem to be more than satisfying, but a long-term follow-up is still taking place. The patients' speech and articulation remain to be explored.

We propose the creation of a scientific database on an internationally recognized protocol as a starting point depending on the severity of the cleft, thus avoiding controversies in the cleft lip and palate therapeutic treatment.

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**REFERENCES**