Primary Bilateral Cleft Lip Repair With Management of Premaxilla Without Preoperative Orthopedics

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Objective: In developing countries, children with cleft lip and palate present at various age for primary repair. Even if they come at an appropriate age, logistic and financial problems prevent us from providing preoperative orthopedic treatment for children with bilateral complete cleft lip and palate (BCLP). We present our protocol and technique of primary repair for BCLP without preoperative orthopedics at different ages.

Setting and Design: We operated on 240 children with BCLP from 2001 to 2003. One hundred ten children younger than 1 year were operated on for primary surgeries, 99 children were between 2 and 10 years, and 40 were older than 10 years. Of the 110 patients who had primary repairs for BCLP without preoperative orthopedic before age of 1 year, seventy children were studied for dental occlusion and premaxillary position at age of 5 to 7 years. Children operated on after the age of 1 year had palate repair before lip repair. Children operated on after 10 years, the protocol was modified to tackle protruding premaxilla at the time of palate repair.

Outcome: Of 70 patients operated on before 1 year of age, 83% had an occlusion with anterior and deep bites of the premaxilla of variable degree at age of 5 to 7 years. Thirteen percent had buccal bite, and these patients had small premaxilla before lip repair.

Conclusions: Modification of protocol was necessary for children with BCLP who approached later than 1 year of age for primary treatment. Bilateral cleft lip repair without any preoperative orthopedic in young babies will mould the premaxilla. The size of premaxilla can predict the growth potential of maxilla.

Key Words: Cleft lip repair, premaxilla, dental arch, bilateral cleft lip

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The protruding, twisted premaxilla adds to the problems of surgical management of bilateral complete cleft of lip and palate (BCLP) in older patients. Premaxilla is unrestrained by either of the maxillary alveoli and only attached to nasal septum by septomaxillary ligament. In normal children, the cartilaginous septum must slide forward in relation to the premaxillary region owing to the restraint on the premaxilla by the lip and lateral maxillary segments. In bilateral cleft, the premaxilla is carried forward at the same rate as that of the growing septum to which it is firmly held. The premaxilla has only 1 restraining connection, the vomer. This restrain is realized as a tension between these bones borne by the vomeropremaxillary suture, thus creating the condition for bone formation.

Mulliken2,3 wrote that the outcome of infants born with bilateral cleft lip is equal to and can surpass that of its unilateral counterpart. He also added that given the preoperative advantage of nasolabial symmetry, these children require very few revisions. How many centers are privileged to provide preoperative orthopedics for cleft children? In a developing part of the world, most patients with cleft dwell in the rural areas and have to travel long distance to seek medical advice and treatment. The awareness about cleft treatment is minimal, and patients do not reach early for treatment. Hence, we come across many older children requiring primary surgeries. These patients are too poor to afford medical care, and the very existence of these people with their untreated deformities indicates a serious social problem. The problems are compounded in BCLP by protruding premaxilla.4 Various appliances for premaxillary setback such as extraoral head cap, elastic straps, tapes, Latham appliance, Burston plate, etc have been successful in infants but have shown minimal success in older children. In most of the younger patients, the preoperative orthopedic is either not available or not possible owing to logistic and financial reasons. The literature has mentioned about the lip adherence as the treatment of protruding premaxilla; it is not always successful to mold premaxilla without muscle repair. In addition, it adds to 1 more surgery in financially constrained situations and also adds scars to the lip making the next repair more difficult.

SURGICAL PROCEDURE

While following the principles as described by Mulliken,3 we modified our technique to suit the local circumstances. The principles of bilateral techniques are (1) achieve symmetry, which is not a difficult proposition except in asymmetric bilateral cleft lip, (2) create a narrow age-appropriate philtrum from prolabium, (3) good muscle repair that may need wide subperiosteal dissection, (4) create a central tubercle from lateral segment vermilion, and (5) primary nose correction using either a close or open-tip approach.

We follow the principles of achieving symmetry, keeping a narrow age-appropriate philtrum, and reconstructing a central tubercle from vermilion flaps of lateral segments. A wide subperiosteal dissection of perioral and cheek muscle up to zygoma is essential. The inferior orbital pedicle is dissected from foramen to provide mobility to the soft tissue envelope. Thealar bases were separated from the underlying nasalis and orbicularis oris muscle to achieve differential movement. In open-tip rhinoplasty, the risk of injuring the descending branch of anterior ethmoidal artery that supplies narrowed philtrum is high. In addition, wide bilateral cleft lip repair...
under tension adds to compromised vascularity of the created narrow philtrum. Therefore, only a close nose dissection is done to separate the skin envelop from underlying alar cartilages. To repair anterior palate and nasal floor, vomer flaps were raised on either side, leaving mucosal strip of 4 to 6 mm intact at the inferior border of the vomer. Earlier, we incised in the midline on the inferior border of the vomer, which compromised the vascularity of premaxilla. Perinasal muscles were sutured to the anterior nasal spine, which defines the alar grooves and rotates alae medially toward the anterior nasal spine. Alar bases were then sutured to the anterior nasal spine, synching both alar bases together. These also support the columellar base, and a better length of the columella is visualized. With these steps of medial movement of the nose and soft tissue envelop, the muscle repair is possible in most patients. Occasionally, the approximation of muscles is difficult at the upper border of the lip. It is essential to ensure that no tension is transmitted to the overlying skin with proper muscle repair. Bilateral c-flaps are used to support and lengthen the columella in the sides and to reconstruct the nasal floor. The redundant tissue of the c-flap is trimmed. The orbicularis muscle of the vermillion flaps from the lateral segment is separated from mucosa and sutured in the center. The dissected mucosa was then draped, and tubercle was created. The premaxillary mucosa was used to deepen the buccogingival sulcus.

**MATERIALS AND METHODS**

We operated on 240 children with BCLP from 2001 to 2003. One hundred ten children younger than 1 year were operated on, 99 children were between 2 and 10 years, and 40 were older than 10 years. In children older than 1 year, palate was repaired first followed by lip repair 6 months later. Early palate repair helps to gain on speech and nutrition, and patients are likely to come back for lip repair later. In children older than 10 years and if premaxilla is protruding more than 10 to 12 mm from lateral segment and have a significant rotation, they will undergo premaxillary setback at the time of palate repair (Fig. 1).\(^5\) However, if the premaxilla is in good position with less protrusion, no premaxillary setback is done. In children operated on for bilateral cleft lip repair younger than 1 year without any preoperative orthopedic, the size of the premaxilla was documented clinically and confirmed on the dental models. These children had cleft palate repair 6 months later. Of the 110 patients, 10 were excluded because of associated anomalies and syndrome, whereas 30 were lost to follow-up. Seventy children were followed up, out of which 41 were boys and 29 were girls. None of the children had undergone any orthodontic treatment after primary repairs or any additional procedures except perialveolar fistula closure in 3 patients. We examined the dental arch and position of the premaxilla clinically and documented photographically at age of 6 to 7 years. Mars et al\(^6\) mentioned that at age of 5 to 7 years, about the anteroposterior assessment and degree of overjet, it was not a molar relationship that was found to be the more significant predictor of outcome. Atack et al\(^7\) followed this work by developing a subsequent index that allowed for the assessment of treatment

\(^5\) Mars et al.

\(^6\) Mars et al.

\(^7\) Atack et al.
results of unilateral cleft lip and palate in 5-year-old models. Seventy percent of patients at 5 years of age remained in the same index classification or deteriorated by 10 years of age.

RESULT AND OUTCOME

Of 40 patients operated on after the age of 10 years, 10 patients have undergone premaxillary setback at the time of palate repair followed by lip repair (Fig. 2).

In children who were operated on for cleft lip before age of 1 year, 6 patients had a premaxilla smaller than 10 mm, 23 had between 11 and 15 mm, and the remaining had more than 16 mm at the time of lip repair. Clinical examination result of dental arch in these children at age of 5 to 7 years showed that the premaxilla was flexed and rotated downward. The twist and rotation of premaxilla before lip repair persisted with minimal improvement. Fifty-eight (83%) of the children had an anterior bite with a variable deep bite of the premaxilla. The deep bite varied from a few millimeters up to the gingival margin of the lower teeth (Fig. 3). Three children (4%) showed a premaxilla in edge-to-edge occlusion, whereas 9 children (13%) had shown a buccal bite. A more detailed study of the 9 children with buccal bite showed that 6 children had a small premaxilla (<10 mm; Figs. 4 and 5). The other 3 children had compromised premaxillary vascularity owing to midline incision on vomerine mucoperiosteum to close anterior palate repair. Because we changed the technique of leaving the mucosal strip to 4 to 6 mm at the inferior border of the vomer, we did not have an ischemic episode. Three children with edge-to-edge occlusion had a premaxilla of 11 to 15 mm at the time of lip repair.

DISCUSSION

The difference between a surgical principle and a surgical technique is wisely underscored by Chase and Mulliken. The surgical principle, once born, does not change greatly, although it continues to evolve and may require modification or refinement. In contrast, operative techniques change regularly, depending on specific circumstances, retrospective analysis of results, and new methodology. Many treatment variables on midfacial growth of patients with complete cleft lip and palate have been studied including surgical techniques, protocols, and influence of preoperative orthopedics. Controversy still remains as to whether pre-surgical orthopedic treatment should be performed.10 With limited information in the literature about follow-up studies of BCLP without any preoperative orthopedics, this study showed the outcome of dental arch and position of the premaxilla. The surgical protocol was modified to suit the age of patients and position of the premaxilla.

Midfacial growth deficiencies in patients with clefts of the lip and palate are considered to be the result of an interaction between intrinsic developmental deficiency and iatrogenic factors.11 Lioa et al12 demonstrated in their study that the size of the premaxilla in infants with BCLP varied greatly. The size of the premaxilla in infants with BCLP can be used to predetermine subsequent craniofacial morphology at the age of 5 years. Children with BCLP with a large premaxilla demonstrated a more favorable maxillary growth, in length, than those with a small premaxilla. The same finding is reinforced in our study. The size of the premaxilla varies from 6 to 24 mm at time of lip repair in our study. Therefore, we have taken that a premaxilla less than 10 mm as a small-sized premaxilla. A similar finding has been found by Ross and Johnston13 who mentioned of underdevelopment of the maxilla, and an intrinsic developmental deficiency is the reason of a poor dental arch after lip and palate surgery.

Da Silva Filho et al14 showed the restraining effect of anterior maxillary growth because lip repair is selective and located within the alveolar bone. The cephalometric measurements suggest a clockwise rotation of the premaxilla as a long-term result of the muscular pressure caused by lip repair. Such a rotation causes a lingual tipping of the incisors. This study was done in an older nonoperated group, which also showed similar effect of lip repair as in younger patients. We have also found a similar finding in older patients but not in all patients. Some of these patients with severely
protruding premaxilla did not mold with lip repair and needed premaxillary setback at a later date. Clinical experience and scientific studies (Pruzan sky 1957) 13,15–18 have shown that early cleft lip repair dramatically reduce facial convexity by retro-positioning the premaxilla. It seems that the pressure created by the repaired lip and palate is enough to correct the position of the projected premaxilla. The ventroflexed premaxilla with anterior cross and deep bites will improve from 6 to 16 years and easy to correct in a vertically growing face. 19 Berkowitz et al 10 has reported that early preoperative orthopedics leading buccal bite of the premaxilla with concave facial profiles worsen with time. Of patients treated from our center who were younger than 1 year with no preoperative orthopedic treatment, 13% had a buccal bite, and 4% had an edge-to-edge bite at 5 to 7 years, which is similar to what Berkowitz noted that non–presurgical orthopedic-treated patients had a buccal bite in 18% at age of 6 years compared with 57% in the group treated by preoperative orthopedic.

CONCLUSIONS

Dentoskeletal abnormality is both an inherent aspect of cleft lip/palate and a possible consequence of intervention. The size of a premaxilla may give indication of growth potential of maxillary growth. Currently, there is no single technique and protocol that can be applicable widely in most centers. However, we present our protocol, which can be practiced in many centers of developing countries.

As Sir Harold Gillies quoted in 1920, “Time is the plastic surgeon’s greatest ally, and at the same time, his most trenchant critics.” We will follow up these patients for the long-term outcome of growth and nasolabial appearance of our protocol and modified technique, which is feasible to do in most developing countries where large numbers of patients with cleft are present.

REFERENCES