Vertical Excess of the Premaxilla in Bilateral Cleft Lip and Palate Patients: A Protocol for Treatment

MariaCostanza Meazzini, DMD, MMSc,*† ‡ Lara Lematti, DDS,‡ Fabio Mazzoleni, MD,† Dimitri Rabbiosi, MD,* Alberto Bozzetti, MD,‡ † and Roberto Brusati, MD*

Abstract: Bilateral cleft lip and palate patients may present a vertical excess of the premaxilla, which is a severe aesthetic and functional problem. Early surgical correction may lead to secondary growth impairment. We present a suggested protocol based on the severity of the vertical excess and on the age of the patient, which includes orthopedic, orthodontic, and surgical corrections. Patients are presented to elucidate each different approach.

Key Words: Bilateral cleft lip and palate, premaxilla, vertical excess, orthopedic intrusion, orthodontics, premaxillary osteotomy

Vertical excess of the premaxilla has been a major challenge for both orthodontists and surgeons. Both vertical and sagittal excess are induced by overgrowth at the premaxillary vomerine suture.1,2 Sagittal excess is physiological in bilateral cleft lip and palate (BCLP) during childhood and usually does not need any correction until the end of the growth spurt, as demonstrated by Smahel,3 Vagervik,4 and Trotman and Ross5 who all showed a progressive and spontaneous decrease of maxillary protrusion (SNA angle) during growth in BCLP patients. Therefore, it is not advisable to correct a sagittal protrusion during growth, unless there are severe psychologic problems or difficulty in performing a bone graft with potential risk of periodontal damage of the erupting teeth.6 On the other hand, vertical excess does not reduce spontaneously with growth and, therefore, can and should be corrected. It usually is a severe aesthetic problem and can make bone grafting more difficult.

In the 1960s to 1970s, a large number of osteotomies were performed to intrude and set back the premaxilla. In 1972, Friede and Pruzansky,7 and later Vagervik in 1983, warned against the severe growth impairment induced by the premaxillary osteotomy.

Padwa et al8 in 1999 suggested that premaxillary osteotomies performed between 6 and 8 years do not harm subsequent growth, although the longest follow-up of the study reached approximately 11 years, which is too far from the end of growth to draw any conclusion in CLP patients. Therefore, the majority of the literature advises not to perform a premaxillary osteotomy during early growth, ideally not before the age of 9 and 11 years.

The literature does not provide clear guidelines on how to approach vertical premaxillary excess. In this article, we present our philosophy for the treatment of the vertical excess of the premaxilla based on the dental age of the patients and on the severity of the vertical excess. The protocol proposed is summarized in Table 1. We shall describe and explain the various steps in the protocol through a series of case reports.

ORTHOPEDIC INTRUSION (LIOU’S Technique)

This method is suitable especially in the deciduous dentition, even after early secondary gingivoalveoloplasty (ESGAP),9,10 or in the mixed dentition, but only before bone grafting. It is based on the opposite principle of bone distraction, inducing an actual bony contraction.11 The technique was developed by Liou et al.12 They published an article showing the use of an intraoral tooth-borne appliance, which delivers intermittent heavy intrusive forces to the premaxilla. The author demonstrated that nasal bones were brought forward and upward, whereas the height of the vomeronasal septum was shortened without bending or deviation. The premaxillary den- toalveolar height was significantly decreased. The author concluded that “what occurred during orthopaedic intrusion was similar to a surgical contraction osteogenesis/osteolysis in the vomero-premaxillary suture, combined with a slight vertical displacement of the vomero-nasal complex and nasal bones.” We therefore applied the same technique to patients, aged 4 to 5 years before ESGAP, but also already subjected to ESGAP. The appliance constructed was soldered to bands on the second deciduous molars. It consisted of a palatal bar, to consolidate the molar bands, to which the intrusion devices were attached. These were formed by 2 rigid bars that are gradually lifted by activating a screw 0.3 mm/d. This technique was performed in our center on 4 patients, 1 after ESGAP and 3 before alveolar closure. The patient with a longer follow-up will be shown.

Patient E.G.

Patient E.G. was affected by complete BCLP. The patient had undergone a cheiloplasty and a soft palate closure at 6 months of age and an ESGAP together with hard palate closure at 20 months of age (R.B.) following the Milan protocol.13 At 4 years, in full deciduous dentition, the patient presented a severe aesthetic disharmony during smile (Fig. 1A) with an 11-mm overbite (Fig. 1B). It was decided to intrude orthopedically the premaxilla. The rate applied was slower than the protocol of Liou et al because the child had been subjected to ESGAP. The screw was therefore turned 0.3 mm every 2 days. The effect obtained was a flattening of the occlusal plane (Figs. 1C and D). The anterior nasal spine was lifted 20% of the total intrusive movement, although 80% of the intrusion was actual bone contraction. There was also a mild extrusion of the posterior segments of
2 mm, which is usually desirable in these patients, who have a vertical maxillary defect, as noted in the pretreatment and posttreatment lateral radiograph (Figs. 1E and F). Interestingly, the nasolabial morphology was improved by the lifting of the nasal spine. Patient E.G. was followed 9 years after intrusion and showed a stable occlusal result, with no further need for orthodontic intrusion (Fig. 1G).

ORTHODONTIC INTRUSION

This method is suitable in the mixed dentition, after bone grafting or GAP, with a vertical excess that does not exceed 7 to 8 mm. The orthodontic techniques applied are typical intrusion mechanics. This method, although usually more time consuming, is applicable in some cases with adequate results. We show here a typical case.

Patient A.S.

Patient A.S. is a 10-year-old patient affected by BCLP and amniotic bands syndrome, whose primary treatment had been performed elsewhere. There was an overbite and a vertical excess of the premaxilla of 7 mm relative to the posterior occlusal plane (Fig. 2A). The incisal overbite was actually even more severe owing to the overereption of the mandibular incisors. The posterior segments were collapsed; therefore, a fan expansion was performed to allow secondary bone grafting in a better condition (R.B.; Fig. 2B). Spontaneous eruption of the permanent canines occurred. The intrusion of the frontal teeth was performed orthodontically. The left canine was brought into the lateral space (Figs. 2C and D). As can be seen on the lateral cephalometric radiographs, a combination of intrusion and growth control allowed for the correction of the double maxillary occlusal plane (Figs. 2E and F). The actual intrusion was obtained by keeping the premaxilla in position, whereas the hypodeveloped posterior segments were stimulated to grow vertically. Mandibular growth occurred vertically and anteroposteriorly during 2.7 years of treatment.

SURGICAL INTRUSION

This method is suitable in the mixed dentition, after GAP, bone grafting, or simultaneous to it, when the vertical excess is larger than 8 mm. It is usually the method of choice in the permanent dentition (11–13 y). Two representative cases are shown.

Patient N.M.

Patient N.M. is a 10-year-old boy with BCLP with a severely overgrown premaxilla (>15 mm overbite). Only 1 central incisor was erupted (Figs. 3A and B). Uncovering of the other incisors was needed (Fig. 3C). The incisors were then aligned with great attention to the positioning of the roots of the lateral incisors in a bony area (Fig. 3D). A splint was then prepared after a presurgical setup on study models to reposition the premaxilla, leaving an overjet proportioned to the age of the patient and the space for the eruption of the permanent canines. Bilateral alveolar bone grafting and premaxillary surgical intrusion were carried out in the same surgical step (A.B.). The permanent canines had an ectopic eruption and later needed to be uncovered and orthodontically guided to the arch. Then a traditional orthodontic treatment was carried out, which has led, in less than 3 years, to a good functional and aesthetic result.
Patient A.P.

Patient A.P. had complete BCLP at the end of growth (16 y), with hypertelorism and broad nasal tip (Tessier 0–14 cleft type). The premaxilla was both vertically and sagitally protruded with an overbite of approximately 9 mm and a overjet of approximately 17 mm. The patient was already in orthodontic treatment elsewhere. Surgery was carried out in 2 surgical steps (R.B.). In the first step, a transversal osteotomy of the premaxilla was performed, ensuring good vascularization through the vestibular mucosa. An ostectomy of the subspinal area of the premaxilla and of the anterior portion of the vomer with intrusion of the premaxilla was performed, and a simultaneous bone graft, harvested from the iliac crest, was carried...
out to fill the gap in the right alveolar cleft. Premaxillary positioning was performed without a splint, but a postsurgical tempered wire was inserted to maintain the position of the premaxilla. Internally, the fixation with wires was held for 4 weeks to ensure stability. The change in the position of the premaxilla is clearly demonstrated in the presurgical and postsurgical lateral radiograph (Figs. 4A and B). After 4 months, the left cleft area was grafted with bone collected from the mandibular symphysis. It was chosen to perform the alveolar bone grafting in 2 steps in order not to compromise the premaxillary vascularization.

**DISCUSSION**

The aim of this clinical article was to suggest a systematic protocol to approach premaxillary vertical excess according to the age of the patient and severity of the defect as well as in relation to the previous type of treatment (Table 1). The orthopedic intrusion technique of Liou et al. has certainly made a great change in the tools any cleft lip and palate team has to correct a severe aesthetic problem without harming subsequent growth. It is an effective nonsurgical method that should be preferred to surgery in many cases.

In some instances, orthodontics alone can be sufficient to correct a vertical excess of the premaxilla (patient A.S.), but in our opinion, it should not be applied in extreme cases (overjet = 7–8 mm) because this would imply both a high risk of root resorption and a long treatment time and, therefore, an excessive burden to the patient.

Furthermore, orthodontic intrusion during growth uses low forces and allows to improve the relationship between the anterior teeth and the upper lip by controlling premaxillary growth and permitting posterior maxillary growth, often deficient in BCLP patients. Patient N.M. is a good example of an excessive overjet during growth, but not so early as to concern the surgeon for future growth impairment. The good cooperation between surgeon and orthodontist has allowed for the positioning of the premaxilla, taking into account some further forecasted mandibular growth. This has ensured a good end of growth result.

Although we hope this protocol might be of help to other clinicians in planning treatment of BCLP patients with severe premaxillary vertical excess, we have to remind that it was drawn from a small series of patients because such cases are rare even in large centers, and therefore, it might not be appropriate in all instances.

**CONCLUSIONS**

The tools a craniofacial team has to correct a vertical excess of the premaxilla in BCLP are orthopedic, orthodontic, and surgical. These tools should be appropriately applied depending on the age of the patient and the severity of the vertical disharmony and the surgical treatment previously performed.

**ACKNOWLEDGMENTS**

The authors thank Dr. Cordaro for the orthodontic collaboration with R. Brusati in patient A.P.

**REFERENCES**


502 © 2010 Mutaz B. Habal, MD

---