

Management of Secondary Maxillary and Nasal Deformities in Adolescent Cleft Lip and Palate Patients

Fernando D. Burstein

Division of Plastic Surgery, Emory University, Atlanta, Georgia, U.S.A.

INTRODUCTION

Management of secondary maxillary and nasal deformities in the adolescent cleft patient can present a formidable surgical challenge. The functional as well as aesthetic needs of each patient must be given careful consideration. A team approach can optimize the preoperative planning, procedure selection, and postoperative management. Team members include Speech and Language Pathologist, Orthodontist, Dentist, Prosthodontist, and Psychologist. The author's management protocol for surgical correction of deformities of the midface and nose in adolescent patients is presented. This has been successfully used at Children's Healthcare of Atlanta for over 17 years.

MANAGEMENT OF CLEFT/MAXILLARY DEFORMITIES

Approximately 15% to 20% of adolescents with unilateral or bilateral cleft lip and/or palate will have some degree of maxillary hypoplasia. The underdevelopment of the maxilla may be noted soon after birth and is often progressive. In many cases correction requires a combined orthodontic and surgical approach. The results of maxillary hypoplasia include Class III malocclusion with abnormal wear and tear on the teeth, masticatory difficulties, nasal and nasopharyngeal airway obstruction, and aesthetic facial deformity. Dental deformities often accompany the maxillary deformities and can include missing dental units, supernumerary teeth, hypoplasia of dental enamel, and deformed teeth (Fig. 1).

I consider the nose and maxilla to be a single aesthetic unit when considering planning for surgical correction. The position and size of the lower jaw and chin are also assessed aesthetically. The midface appears to be concave rather than convex, which decreases nasal base projection, as well as tending to make the ala somewhat splayed. The upper lip is poorly supported and there is often inadequate dental show. The underlying skeletal deformity magnifies the cleft nasal deformity (Fig. 1). As part of the treatment planning process cephalometric radiographs, facial and dental photographs are taken. The cephalometric data can be digitized to allow for precise treatment planning (1,2). Computerized facial imaging which simulates both the maxillary procedure and the subsequent nasal surgery is often helpful in explaining the treatment challenges and goals to the patient and family (3,4). The ultimate aesthetic and functional goals are discussed with the patient and their family. Each step in the process, including dental and orthodontic preparation, surgical correction of the maxillary and nasal deformity, finishing orthodontics, prosthetic dentistry, and if necessary psychological evaluation are presented. The patient, family and multidisciplinary team have to agree on the process, timeline, and goals prior to the start of treatment. Reasonable expectations are discussed and agreed on by all participants. I prefer to correct the maxillary deformity first, thus establishing a bony base for future definitive nasal reconstruction. At least nine months are allowed between maxillary advancement and the definitive internal and external nasal

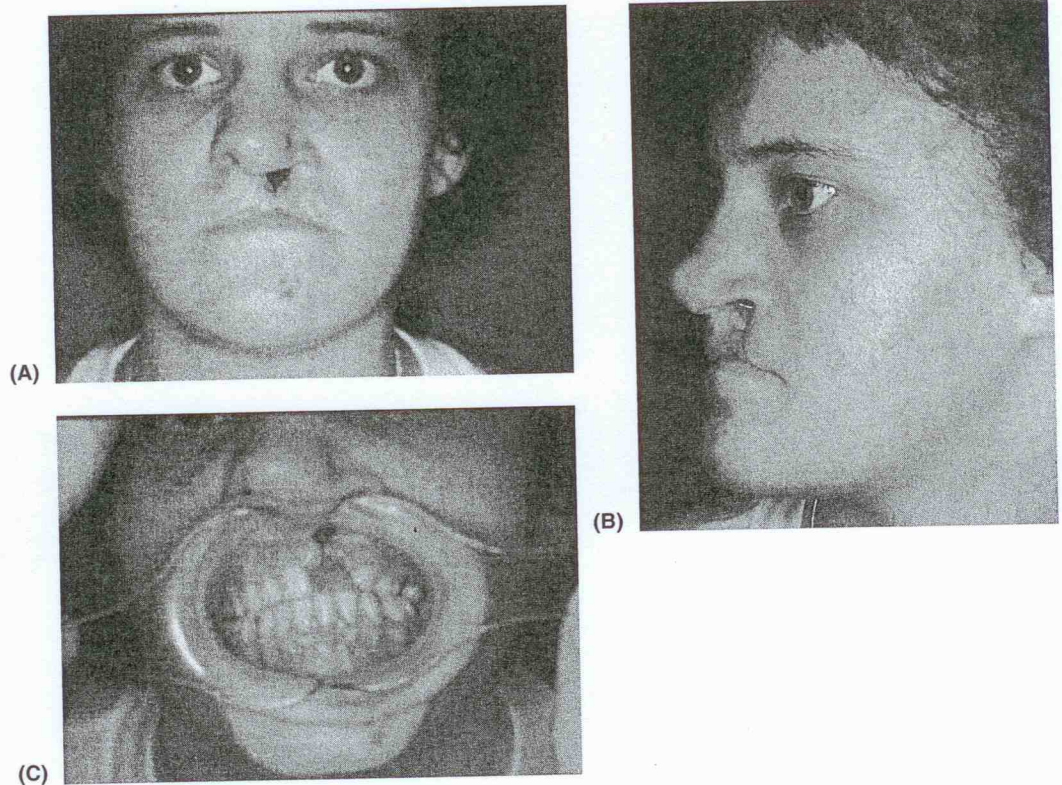


FIGURE 1 (A-C) Fifteen-year-old patient when she presented after repair of unilateral cleft lip and palate elsewhere. Note oral nasal, oral cutaneous fistulas, alveolar cleft, maxillary hypoplasia, and severe cleft nasal deformity. Note absence of central and lateral cleft side incisors.

reconstruction. I do not recommend simultaneous nasal reconstruction at the time of maxillary advancement.

Maxillary Advancement

Planning for surgical correction of severe maxillary hypoplasia in the cleft patient has to begin early in life. Ideally, I perform a gingivoperiosteoplasty at the time of lip repair. In some cases this will suffice and avoid alveolar bone grafting in the future. Even when there is not enough alveolar bone after gingivoperiosteoplasty, it often helps to align the maxillary segments and avoid chronic oral/nasal fistulas. If a child does need alveolar bone grafting, this is coordinated with his/her orthodontist. Orthodontic preparation for bone grafting includes maxillary expansion and, if necessary, aligning the teeth adjacent to the cleft. My bone graft technique includes a minimal incision, utilization of a bone harvesting mill, and packing the donor site with a bupivacaine impregnated resorbable implant (5). I have found that this routine makes the procedure relatively painless and allows for 23 hour stay in the hospital and resumption of normal activity within two to three days. Orthodontic treatment is resumed within three to four weeks after the alveolar bone grafting, but the palatal expansion device is left in place for four to six months to allow bony consolidation. Maxillary advancement can proceed after 12 to 18 months of bone consolidation. This approach allows for a single piece maxillary advancement rather than multiple segments with simultaneous bone grafting to the alveolar cleft at the time of maxillary advancement.

Orthodontic preparation for maxillary advancement begins approximately one year prior to the time of the scheduled surgery (6). This includes aligning and leveling the occlusion, as well as any dental extractions that may be necessary to get proper dental spacing.

Approximately two weeks prior to the planned maxillary surgery heavy orthodontic wires are placed, along with hooks. At the same time, mounted models are taken for model surgery (7,8). During the same visit, a complete speech and language evaluation, including nasal endoscopy, air flow, and articulatory studies, are performed. This allows us to identify the patients at high risk for velopharyngeal incompetence after maxillary advancement. The patient and parents are informed, if this is the case, preparing them for the possibility of a pharyngoplasty or pharyngeal flap in the future if velopharyngeal incompetence does occur. Model surgery is performed using articulated models, to achieve optimal occlusion, and intraoperative splints are made.

Special considerations at the time of surgery include preoperative antibiotics and intravenous steroids. Hypotensive anesthesia is preferred and all patients are asked to donate a unit of autologous blood or donor-directed blood. The preoperative nasal endoscopy will reveal the location and portal size if a previous pharyngeal flap is present. The design of the osteotomies can vary according to the patient's aesthetic needs (9). In patients with hypoplastic malar regions, the osteotomies are made quite high, just under or including a portion of the inferior zygomatic arch under the inferior orbital nerve, in order to get maximal bony fullness with the advancement. Vertical measurements are taken from the medial canthus to the incisor brackets on both sides to assure that the occlusion stays level and to determine the vertical dimensions. Care is taken to dissect out the mucosa of the medial and inferior nasal cavities and to protect the nasotracheal tube. Once the osteotomies have been completed, the maxilla is mobilized with a combination of Rowe disimpaction forceps and Wolfe disimpaction devices. If there is a restrictive pharyngeal flap, it is taken down at this time to allow full mobilization of the maxilla. In many cases scar tissue will make mobilization difficult requiring considerable force. The color of the gingival should be carefully monitored during mobilization to avoid devascularization. The patient is then put into the pre-fabricated occlusal splint, from the model surgery, and then into intermaxillary fixation. Once the patient has been put into intermaxillary fixation with both rubber bands and wires, the final vertical dimensions are determined. This is done from preoperative analysis and photographs. Bony interferences are taken down if an impaction is required. If necessary, the Golden Rule, as popularized by

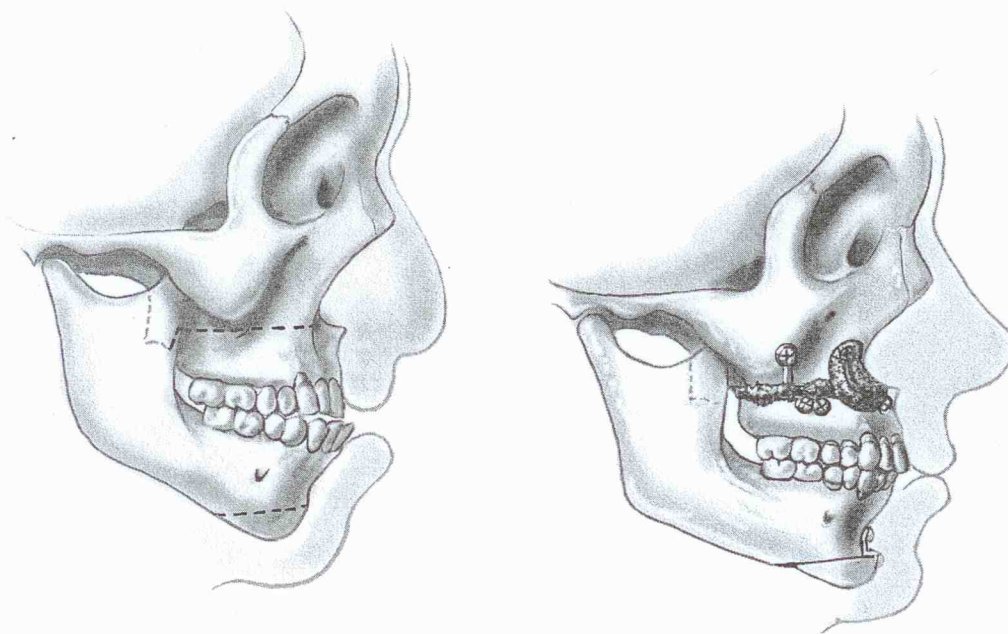


FIGURE 2 Drawing of maxillary advancement and horizontal osteotomy of mandible. Note placement of rigid fixation plates at medial and lateral buttress and bone grafting of advancement gap.

