

## The Late Nasal Problems Due to Inadequate Nasal Floor Closure in Cleft Lip Repair

FOUAD M. GHAREEB, F.R.C.S. (Ed), M.D.; DALIA M. ELSAKKA, M.D. and MOHAMED MEGAHEDE, M.D.

The Department of Plastic Surgery, Faculty of Medicine, Menoufiya University, Egypt.

### ABSTRACT

**Objective:** Satisfactory correction of cleft lip-nasal deformity is achieved by successful and early correction of the cleft lip and nose deformity; this complex deformity should be considered as one entity and the first step in nasal correction is closure of the nasal floor during the primary repair of the cleft lip. The components of the nasal deformity are well described in literature, but one important additional component is not given attention in literature which is the fibrous band between the inner surface of splayed cleft side alar base and the anterior surface of the alveolar margin. Failure of identification and division of this band during primary correction of the cleft lip nose deformity hinders closure of the nasal floor; causes future sinking of the cleft side lower nasal elements and preventing the nasal expansion with growth, which eventually undermine the results of future rhinoplasty and in the same time it increases the incidence of peri-alveolar oronasal fistulae. The pathological effects of this anatomical observation are to be proven in this study.

**Design:** To prove this fact a comparative study was done between 2 groups of patients, the first have not undergone division of this band during primary cleft lip repair known by open nasal floor and absence of scar in this area, while the second group have undergone nasal floor closure by after division of this band during the primary repair of the deformity.

**Results:** In the first group the nasal deformities are severe in 60%, moderate in 25% and mild in 15%, while in the second group the nasal deformities are severe in only 25%, moderate in 17% and mild in 58%. Also the incidence of perialveolar oronasal fistula is higher in the first group of patients (10%) compared to (0%) in the second group.

**Conclusion:** This indicates that failure of nasal floor closure and division of this band leads to continuous pull on the cleft side half of the nose leading to sinking of the cleft side half of the nose and more displacement of the alar base leading to severe deformity of the tip and nostrils. In addition this also leads to higher incidence of perialveolar oronasal fistula.

### INTRODUCTION

The stigmata of the primary cleft lip-nasal deformity on the cleft side (CS) were summarized by Clark, et al., as slumping of the dome, foreshortening of the columella, medial crus of the caudally

displaced lower lateral cartilage, nasal bone and upper lateral cartilage, displacement of the caudal septum and nasal spine to the non cleft side (NCS), inferior posterior and lateral displacement of the alar base, recurved long lateral crus of the lower lateral cartilage, insufficient vestibular skin at the CS dom, presence of ala-columellar band and posterior and inferior displacement of the nasal floor [1] (Fig. 1).

Later, these primary nasal deformities are greatly modified to present the secondary cleft lip nasal deformities which can be summarized as follows: The nasal tip is deviated to the NCS, the CS alar nasi joins the face at obtuse angle, the alar-facial groove is absent, the CS ala has inward buckling, there is apparent or true maxillary deficiency posterior to the CS alar base, the CS nostril has larger circumference than the NCS and displaced more dorsally, the columella is shorter on the CS, the medial crus of the CS lower lateral cartilage is posteriorly displaced than the NCS and the angle between the medial and lateral crura is excessively obtuse than in the NCS [2-4] (Fig. 2).

These secondary anatomical deformities can be minimized by adequate nasal repair during primary correction of the cleft-lip nose deformity. This is a very important step not only to facilitate future rhinoplasty but also for satisfactory lip repair. Proper nasal repair necessitates adequate understanding of the anatomical derangement of the cleft lip nasal deformity. This can be achieved by proper description of the full range of stigmata of the nasal deformities to allow its identification and correction.

Some authors prefer to achieve primary rhinoplasty performed at the time of the initial cleft lip repair by addressing reconstruction of the nasal floor and sill, columellar lengthening, repositioning of the alar base, and repositioning of the skin and

mucosa of the lower lateral cartilage, then following alveolar bone grafting, an intermediate rhinoplasty is often performed at 6 to 10 years of age through an open approach to correct the cartilaginous lower nasal deformity. A delayed rhinoplasty is then performed in the later teenage years to correct the bony dorsal deformity and the various causes of nasal obstruction [5].

## PATIENTS AND METHODS

### *Anatomical observations:*

The author has identified a band between the CS lateral nasal wall and the anterior surface of the upper alveolus and maxilla in all children with cleft lip nose deformity, this band is an avascular fibrous band under the deficient mucous membrane causing shortening of the lateral nasal wall (Fig. 3).

This band has its posterior attachment on the anterior surface of the upper alveolus and maxilla in a point which pulls the lateral nasal wall and alar base in a more posterior, inferior and lateral position than the NCS. Also it is continuous with CS lateral lip elements which are pulled upward, laterally and posteriorly toward this point.

This naso-alveolar band (NAB) is responsible for the collapse of the CS half of the lower part of the nose and it continues to do so if this band is not identified and divided. In older patients with repaired cleft lip in whom the band is not divided, the collapse of the lower part of the CS half of the nose becomes more severe due to failure of this part of the nose to develop and become prominent. Failure of division of this band during the primary repair is known by absence of scar in the mucous membrane in the upper sulcus or if the nasal floor is found unrepaired, as division of this band is mandatory for reconstruction of this part.

Also, the author has found out that there is increased incidence of peri-alveolar oronasal fistula in patients with repaired cleft lip with undivided naso-alveolar band. The collapse of the CS half of the lower nose in adulthood is not entirely due to this band but in some cases due to ipsilateral maxillary hypoplasia. The delirious effect of maxillary hypoplasia on nasal development is more prominent if NAB is not divided, due to inward pull of the hypoplastic maxilla on the lower nose through this band (Figs. 4,5).

### *Clinical application:*

Since the author has recognized the importance of the NAB in 1994, more attention was given to its identification and division. Retraction of the

CS alar base and lateral lip allows the NAB to become more prominent (Fig. 6). Its upper limit and lower limit are identified and injection of adrenaline in concentration of 1 in 200000 is done, then the NAB is divided completely by scalpel in a supraperiosteal plane from its upper limit to its lower limits, then dissection is done as superiorly and laterally as required by the lip repair avoiding injury of the infraorbital neurovascular bundle. On completion of the NAB division the lateral nasal wall can be brought medially to reconstruct the nasal floor by 4/0 vicryl continuous or interrupted sutures. Additional sutures are added to reconstruct the base of the nostril and help to round it up. The bony reconstruction of the alveolus and floor of the nose is postponed to a later age by bone grafting and mucoperiosteal flaps.

### *Patient evaluation:*

During the period between July 2002 and December 2005 the author has examined 32 consecutive patients with unilateral cleft lip nasal deformity coming for follow-up and secondary procedures like revision of the cleft lip or palate repair, alveolar bone grafts or rhinoplasty. The age of the patients ranged between 3 years to 24 years.

Clinical examination, photographing (front and occlusal views).

*These patients were divided into 2 groups according to the condition of the nasal floor:*

- 1- Group A (20 patients): Are those who have open nasal floor either partial or complete (Figs. 6,7).
- 2- Group B (12 patients): Are those patients with repaired nasal floor.

Data obtained about the nasal deformity, oronasal fistula are recorded and compared between the two groups. The nasal deformity is categorized into mild, moderate and severe by studying the photographs of the patients by 2 plastic surgeons other than the authors depending on the degree of collapse of the CS half of the nose, the alar deformity, the nostril and the tip deformity.

## RESULTS

### *Results of the anatomical data:*

The study of the patients has shown that the nasal deformity is more pronounced in the first group (60% severe, 25% moderate and 15% mild) while in the second group it is less severe (25% severe, 17% moderate and 58% mild). The oronasal fistula is 10% in the first group and none of the cases had oronasal fistula in the second group.



Fig. (1): The cleft lip nasal deformity in infant.



Fig. (2): The cleft lip nasal deformity in adulthood.

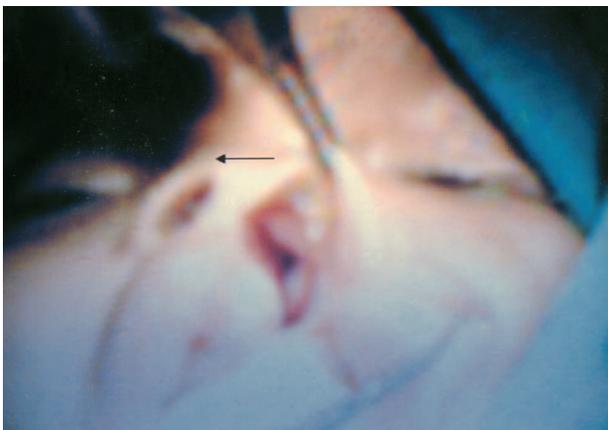


Fig. (3): The Naso alveolar Band (NAB).



Fig. (4): Occlusal view shows sinking of the CS lower part of the nose by NAB.

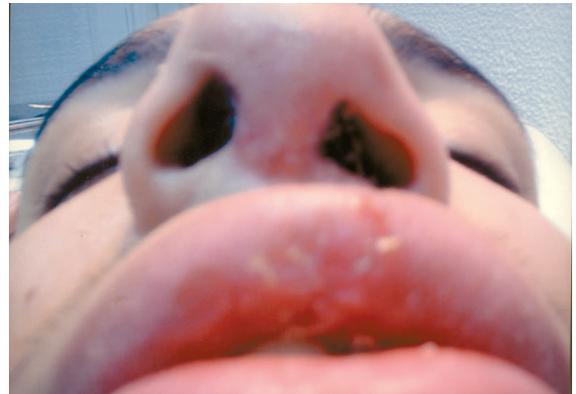


Fig. (5): Occlusal view shows no sinking of CS lower part of the nose in a case where the NAB was divided during primary cleft lip repair.

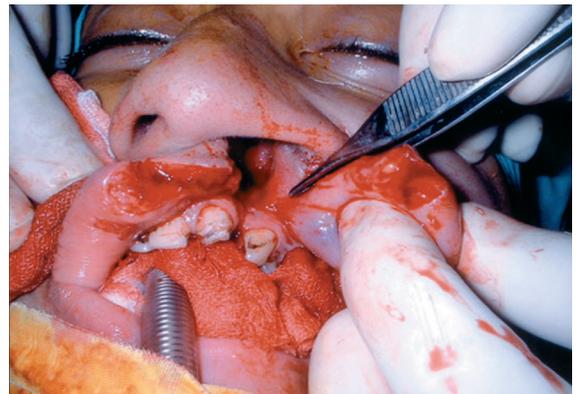


Fig. (6): Intra operative picture showing non division of the NAB and open nasal floor.



Fig. (7): Pre alveolar oronasal fistula of the previous patient.

Table (1): Results of the study.

	Mild nasal deformity	Moderate nasal deformity	Severe nasal deformity	Oronasal fistula
Group 1: 20 patients with undivided NAB	15%	25%	60%	10%
Group 2: 12 patients with divided NAB	58%	17%	25%	Zero%

## DISCUSSION

The repair of cleft lip nose deformity is a challenge to a plastic surgeon due to the fact that repair of this complex deformity should not only consider achievement of immediate satisfactory cosmetic and functional outcome but also guarantee future minimization of the secondary deformities. These secondary nasal deformities are influenced by two factors; first the mode of growth of the inherently deranged nasal skeletal and soft tissues elements, secondly the primary surgical intervention which might affect negatively or positively the growth of these structures. The treatment of the cleft lip nasal deformity should begin as early as left lip repair. In adulthood, the cleft lip nasal deformity may be the only remaining stigma that refers to the anomaly. Identification of the components of the pathological anatomy of the cleft lip nose have been described in literature and well recognized by surgeons and this contributed to the success of the corrective surgery. The inferior, lateral and posterior displacement of the CS alar base is well recognized in literature however; failure of repositioning that part of the nose during primary cleft lip repair not only undermines the result of the lip repair but also cause severe nasal deformity which defies future rhinoplasty. Periosteal musculoaponeurotic reconstruction of the nasolabial region during primary cleft lip repair may positively influence growth and development of the nose in unilateral cleft lip and palate patients better than modified rotational advancement flap [6]. The different techniques of lip closure can be used simultaneously with the nasal correction. But different methods of lip repair without primary nasal correction also influence the nasal form. It seems that the reconstruction of the nasolabial muscles (including the orbicularis muscle) is an important factor to gain a symmetrical nose after the primary operation [7].

The author describes a submucous fibrous band which spreads between the anterior wall of the upper alveolus and the alar base on the cleft side which if left without division leads to failure of normal growth and prominence of the CS nasal half and aggravates the cleft lip nasal deformity. On this study the author has found out in the group of patients where the NAB was not divided that most of the nasal deformities are severe (60%), while in the second group where the NAB was divided that most of the nasal deformities are mild (58%). This indicates that failure of division of that band leads to continuous pull of the band on the CS half of the nose leading to a more sunken nose, more displacement of the alar base, more nostril deformity and more tip deformity. Also the incidence of perialveolar oronasal fistula is higher in the group of patients where the NAB is not divided (10%) compared with 0% in the other group and this can be explained by failure of closure of the nasal floor which always necessitates mobilization of the cheek and division of the NAB.

We conclude that identification and division of the NAB is necessary in cleft lip nose correction to properly reconstruct the nasal floor, round up the nostril, facilitate future nasal correction and decrease the incidence of oronasal fistula and apparent midfacial atrophy.

## REFERENCES

- 1- J. Madison Clark, Judith M. Skoner and Tom D. Wang.: Repair of the unilateral cleft/ Nose deformity. *Facial Plast. Surg.*, 19 (1), 2003.
- 2- Huffman W. and Lierle D.: Studies on the pathologic anatomy of the unilateral hare-lip nose. *Plast. Reconstr. Surg.*, 4: 225, 1949.
- 3- Stenstrom S.J.: Alar cartilage and nasal deformity in unilateral cleft lip (follow-up clinic). *Plast. Reconstr. Surg.*, 55: 359, 1975.
- 4- Michael J. Sundine and John H. Phillips: Treatment of the unilateral cleft lip nasal deformity. *J. Craniofacial Surgery*, 15 (1), 2004.
- 5- Dutton J.M. and Bumsted R.M.: Management of the cleft lip nasal deformity. *Facial Plast. Surg. Clin. North Am.* Feb., 9 (1): 51-8. 2001.
- 6- Horswell B.B. and Pospisil O.A.: Nasal symmetry after primary cleft lip repair: Comparison between Delaire cheilorhinoplasty and modified rotation-advancement. *J. Oral Maxillofac. Surg.*, 53 (9): 1025, discussion 1031-2. 1995.
- 7- Farmand M.: Lip repair techniques and their influence on the nose. *Facial Plast. Surg.*, 18 (3): 155, 2002.