Cleft-Rhinoplasty constricted nasal floor reconstruction

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ABSTRACT

Introduction: Widening of alar base width is often required in the postcleft lip/palate rehabilitation. This manuscript aims to present the author’s design for such a procedure describing the qualitative outcome of such a correction. Materials and Methods: This is a retrospective study from the author’s center. All cleft cases requiring alar base widening using author’s approach were analysed, and the outcome presented at the baseline, end of 3rd and 6th month. Author used a typical superomedially placed nasolabial full thickness flap to correct the alar base width simultaneously replacing the nasal lining. Results: A total of nine cleft patients underwent the procedure. Qualitative observation of the outcomes and postoperative changes with the resultant nasal alar base width are presented. Discussion: The efficacy of this type of nasolabial flap for the alar basal widening and nasal lining reconstruction is presented. The esthetical, functional and anatomical consideration in such a flap design is presented with the experience gained from this cohort.

Keywords: Alar base reconstruction, nasal floor, nasolabial flap, rhinoplasty

INTRODUCTION

Alar base defects could be due to several causes including trauma and developmental defects. The lesser common causes include infections (syphilis, leprosy, tuberculosis and chickenpox), iatrogenic trauma (abnormal nasal packing-cotton wool injury, chemical spillage and poorly performed anaesthesical/surgical maneuvers), burns and or complex lacerations. The developmental defects include congenital syphilis, cleft lip and palate. In the latter condition, postrhinoplasty, there is a restricted alar base being created by the stress created by the surgical repositioning of the orbicularis oris and the circumoral musculature.

This unique condition poses a tough challenge to the maxillofacial surgeon. Besides the aesthetic requirement, need for considering nasal lining mucosa and provision to accommodate and serve as a base for a strong, curvy alar margin is required. In addition to these requirements, recreation of a base that resembles the contralateral alar base is the most daunting challenge. Often such cases would have undergone multiple previous surgeries, and their expectations are varied. The nasal alar base widening is performed as the last step at completion of nasal reconstruction.

Like other openings of the facial cavities, the alar base mucosa has an innate tendency to rescar and contract in spite of the best of the surgical flap designs and postoperative follow-up. In addition, a defective lobule-ala-columella complex, loss of healthy vestibular lining, defective-ala, circumferential scarring of the alar base aid the distortion of the alar base. Often the medial aspect, one nearer to columella are resistant to distorting forces as they are held in place by the medial crura and the insertion of the connective tissues (that form the floor of the nares) into the septal region. In addition, the reduced opening of the nares leads to the development of negative pressure caused by the inspiratory actions cause further reduction of the space. Several strategies have been reported in the literature to correct this deformity. When there is a scar tissue, the dictum is to remove the scar tissue and replace with new healthy lining. When there is no scar as in cleft cases, substitution of the defect with new tissues and lining mucosa would be the norm. There are several types of flaps and designs to rehabilitate the condition. This manuscript intends to present the authors personal experience in isolated alar base widening with recreation of nasal lining in cleft rhinoplasty patients.
MATERIALS AND METHODS

This retrospective study was conducted in the period between August 2009 and December 2012. All cases treated for isolated nasal alar defect with the superiorly directed nasolabial flap with at least 6 months follow-up were included for this study. Only cases with adequate records were included for the study. In total, nine cases fulfilling the criteria were retrieved.

Surgical method

The surgery is done under general anaesthesia. The entire area involved is infiltrated with an adequate amount of lignocaine with vasoconstrictor adrenaline (1:80,000) to achieve minimal bleeding at the site of surgery.

Flap design

From the base of the involved alar, along the dome, a ‘wedge and sill type’ of release incision is placed to release the flare from the nasal floor. This will allow the repositioning of the alar base and this incision serves to prepare the recipient site. A peri-alar flap, superiorly (to alae) and medial to the nasolabial fold is raised. The flap is made as thin and long as required but with a wide base. The flap is checked for the length and flexibility. This flap is then transposed into the floor of the nostril. If the flap is bulkier, the flap is rendered thin by preserving the subdermal plexus and removal of unnecessary adnexial structure without compromising the vasculature. This would help in the future to reduce the bulk of the future nasal floor. Care is taken to ensure the preservation of skin adnexial structures. This full-thickness skin graft will cause two benefits: (i) It recreates the vestibular lining, and (ii) causes lateralizing of the preexisting contracted alar base. This also ensures the proper curvature of the naris, which is often repositioned during the cleft rhinoplasty or during the closure of the orbicularis oris [Figures 1-5].

When the flap is placed in a position along the floor of the nose, it is secured by sutures. The dog ears are cut, and appropriate approximations performed. The now free tip of the released dome ala is approximated with the distal most incision placed for the flap while the mesial part is approximated with the inner part of the nasal flares. The ends are approximated and secured tightly. Adequate antibiotics, nonsteroidal anti-inflammatory drugs, were prescribed as required.

Measurements

Presurgically, the internasal width along the floor was measured thrice with a vernier caliper. The average value of this was taken as the length of the nasal floor (LN) for the normal side and LNA0 for the affected side. At the immediate peri-operative period, it was LNA1. After 3 months, in the involved side, the length was measured as LNA3 and LNA6 at end of 6-month period. The difference was expressed as a ratio of the LN and expressed in percentage.

RESULTS

There were two males and seven females with age ranging from 25 to 36 years (mean 29.23 years). All nine cases were unilateral cleft lip and palate cases. Of these, two cases had no previous rhinoplasties while seven cases had undergone rhinoplasties. In all cases, the grafts were adequately tolerated resulting in complete flap survival. There was no complication with the donor site survival too.

At the baseline, the mean ratio of the LN - the [LNA/LN] *100 was 80.23 ± 7.37%. The same after surgery, the [LNA/LN] *100 was 96.57 ± 1.29% and at the [LNA/LN] *100 and the [LNA/LN] *100 were 94.82 ± 1.54% and 93.98 ± 0.58% respectively.

DISCUSSION

The goal of any nasal correction would be to: (1) Restore an ideal symmetrical nasal contour suited to the patient’s face. (2) The defective nasal part is reconstructed in its three-dimensional form layer by layer. (3) Scars at the donor site should be minimal or could be camouflaged. (4) Modify the nasal aesthetic unit without affecting the function. (5) Use appropriate subcutaneous tissue modulation to refine the result.[11]

The history of alar base correction reveals several diverse surgical designs catering to several types of clinical situations and condition.[9-11] There are simple designs that require only soft tissue correction to complex grafts that might require skin, subcutaneous
Figure 3: (a) Preoperative appearance of alar base defect. (b-e) Nasolabial flap used to reconstruct left alar. (f) Postoperative appearance

Figure 4: (a) Preoperative appearance of alar base defect. (b and c) Width of the nostrils measured and the amount of discrepancy marked at nasal floor. (d) Design of the nasolabial flap

Figure 5: (a-c) Right alar defect reconstructed with nasolabial flap. (d) Postoperative appearance
tissues and even cartilages. The most prominent difficulty encountered in such maneuver is ear notching deformity.\textsuperscript{[6,12]} The place of incision is a crucial factor in the occurrence of this deformity. This design, to the best of my knowledge offers the best result with little complications as this is a salvage surgery that corrects residual defects and produces predictable results with simple maneuvers.

The technique mentioned herein, as per experience of Peck et al.,\textsuperscript{[12]} is resistant for such dog ear formation.\textsuperscript{[12]} The involvement of triangle of tissue along the cutaneous part of the nasal base, postsurgically results in an intranasal ‘dog ear’, however accurately planned. This extraneous tissue, remodels and flattens over time, leaving a nasal closure that is resistant to notching. The depth of the muscle modulation also could contribute to notching.\textsuperscript{[10]}

As this technique does not involve muscle manipulation per se, inherently this technique could minimize the notching. This is vital in cases of cleft lip/palate as the alar cinch process, which is often used in cleft closure involves deep circum oral muscle manipulations.

The present technique remotely resembles the ‘sill excision and an alar bunching technique’ as reported by Kridel and Castellano.\textsuperscript{[10]}

Placing the skin incision for the nasolabial flap about 1 mm anterior to the alar-facial groove involving dense concentration of sebaceous glands and the visibility, often creates aesthetic disharmony with the normal side. For this purpose, the careful placement of the early sill incision and proper eversion of the alar margins is needed. The natural alar groove remains unaffected with this surgery. An enhancement effect is observed as a large portion of the lateral ala is unaffected by this surgery and in the process is shifted laterally too.\textsuperscript{[10]}

Frequent measurement (preoperative and intraoperative) often helps to minimize the asymmetry. But the care must be borne that exact symmetry is always not possible. This is reflected by the mean $[L_{a}/L_{n}] *100$ score of 96.57 ± 1.29% in the present study. Deep sutures could minimize the same but could cause notching after healing. Hence, a delicate balance is needed. An additional benefit of this surgery is the lateralisation of the base of the ala, caused by the closure of the donor site.

Usually, all surgery is subject to several complications. In nasal floor reconstruction, partial necrosis of intranasal lining flaps is often the complication.\textsuperscript{[9,11]} As tobacco use is often related to this complication, as none of the cohorts were tobacco users, these patients did not encounter these problems. The success of this flap rests on its blood supply. The superior labial artery is a major arterial supply to this nasolabial flap. No interference with flap circulation was noted with the thinning, clinically. Thinning of the flap may have an impact on the vascularity of the flap, but this could not be measured. However, several studies have claimed its efficient application and graft survival which is consistent with the present observation.

Widening of the alar base is an essential and probably the last part of the cleft rhinoplasty. This is essential as the constricted alar base in this situation causes, reduced inspiratory volume, poses a difficulty in cleaning of the nostrils besides reduction in other physiological functions of the nares. By this surgery, the alar base is widened, the nares and nasal floor morphology is symmetrically matched with that of the normal side. In addition, the resultant defective area is covered with a lining that is adjacent and is a local flap. As the flap is supplied by the labial artery and its branches, the supply is always ensured. The increase in postoperative alar floor length ratio and the maintenance of the same reflects that the results of such a surgery attempt is permanent and lasts for long.

**CONCLUSION**

A simple way to widen the alar base in cleft lip/palate patients with reconstruction of the defect using a local flap is described. Its success and long-term results have been reported. The results of this flap have to be tested using a larger sample size and more time gap. In the intermittent period, this design and approach would serve as the last resort to give a perfect functional and aesthetic result.

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