Algorithmic Approach with Hybrid Techniques for Secondary Corrections of Unilateral Cleft Lip Nasal Deformity

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ABSTRACT

Background: Rhinoplasty for correction of unilateral cleft lip nasal deformities is still considered one of the most challenging types of rhinoplasty. Numerous techniques have been described to address this complex deformity, each with its advantages and disadvantages.

Material and Methods: This paper is a review of secondary cleft lip rhinoplasty cases operated in the last two and half years with a suggestion of algorithm for technique selection to be used based on combination of previously described and other modified techniques. 18 secondary unilateral cleft lip rhinoplasty cases were reported and included 3 in the primary dentition age, 5 in the mixed dentition age and 10 in the skeletal maturity age.

Results: Good results are obtained with the currents algorithm and techniques combination which suggest the safety and reliability of our hybrid techniques.

INTRODUCTION

Rhinoplasty for correction of unilateral cleft lip nasal deformities is still considered one of the most challenging types of rhinoplasty. Achieving the exact nasal symmetry is still a difficult task for the optimum cosmetic satisfaction [1].

Understanding the complex anatomy of the unilateral cleft lip nasal deformity is essential for obtaining better results of the surgical correction. The main feature of the unilateral cleft lip nasal deformity is the malpositioning of the alar cartilage on the cleft side. The genu of the alar cartilage is displaced in both a caudal and posterior position, carrying with it all of the medial crus and a variable portion of the lateral crus. The depressed cleft side alar cartilage causes the nasal tip to be flat with the nostril being horizontally oriented [2-4].

Due to the complexity of the deformity and the continuous trials to obtain reliable excellent results, there are many reported techniques trying to address

this complex deformity. The Potter's, Dibbell's and Tajima's techniques are among those techniques that have stood the test of time with each has its different concept. Potter in 1954 described a technique that advances the lateral crus of the lower lateral cartilage medially in a V-Y fashion as a chondromucosal flap [5]. Dibbell in 1982 advanced the medial crura by creating a bipedicle flap chondro-cutaneous flap of medial crus by incisioning below and above the crura in the membranous septum and in continuity with the nasal floor skin so the alar base is medialized and the medial crura is elevated [6]. The Tajima's technique, which was described in 1977, used an inverted U incision on the dorsum of the nostril which looks identical in shape to the nostril of the non-cleft side. Then he used three sutures placed between the depressed alar cartilage to the contralateral alar cartilage, contralateral and ipsilateral upper lateral cartilages. After repositioning and correction, the nasal cartilages are fixed with bolster sutures for about 2 weeks [7].

Authors are still searching for a better outcome. Recently, the literature started to have reports using hybrid techniques which combine and mix some of the previous originally described techniques and concepts in order to further improve results [1]. In the current paper, we are reviewing our secondary rhinoplasty cases in the last two and half years, reporting our special hybrid techniques used and their outcome and proposing an algorithm for techniques selection.

PATIENTS AND METHODS

A retrospective review of unilateral cleft lip cases who underwent secondary rhinoplasty by the author in the period between April 2011 and November 2013. The patients are grouped according to the age of presentation into: primary dentition group (3 patients); mixed dentition group (5 patients); and skeletal maturity group (10 patients). A proposal of algorithms for techniques used for each group is outlined.

Techniques:

- Closed rhinoplasty approach:

The alar cartilage is dissected through the lip redo incisions. Closed interdomal and alar transfixation sutures are done to support the lower lateral cartilage in the new position. The cartilage is dissected free from the skin bilaterally. The cleftside cartilage is mobilized superiomedially and then fixed through interdomal, and alar transfixation sutures. Also suspension sutures between the cleft side lower lateral cartilage and the contralateral and ipsilateral upper lateral cartilages were used when required. 4/0 polydioxanone (PDS) sutures were used with trial of slightly overcorrection. It is based on the technique described by Change et al., 2010 for primary unilateral cleft lip rhinoplasty [8].

- Semi-open approach without or with Tajima's rim incision on the cleft side:

The nose is opened with small infracartilagenous incision bilaterally (or the cleft-side is opened by Tajima's inverted U incision instead). Then the same technique desribed in the closed rhinoplasty is employed.

- Definite rhinoplasty techniques:

Through the conventional or Trott's open rhinoplasty approach, Tajima incision was used in the cleft side as an inverted U shape identical to the shape of the nostril of the non-cleft side. The medial end of the Tajima incision is connected with the transcolumellar incision and the standard open rhinoplasty incision in the non-cleft side. The domes are exposed and separation of the medial crura of the lower lateral cartilage was done. At this point, a trial of mobilization of the of the cleftside lower lateral cartilage superiomedially was done in order to match the level and shape of the non-cleft side lower lateral cartilage. If the lateral crura is tethered laterally, a modified Potter's release is done by incising the lateral crura as an incomplete V-Y incision without completing the incision in the upper edge of the lateral crura. If the medial crura is tethered inferiorly and cann't be elevated freely to match the non-cleft side, a modified Dibbell's method is used by incising only the anterior component of the Dibbell incision across the nasal floor and connected to the lateral corner of the transcolumellar incision and completes its dissection as the usual Debbell's method with

dissection of the nasal sill floor creating a composite flap of mucosa, floor of nose, and medial crura up to the alar base to separate it from the underlying bone for medialized.

Cases with mild deformity may need neither Potter's nor Debbell's techniques for release the alar cartilage but severer cases might need one or both techniques for achieving symmetry. Sometimes suspension of the cleft side lower lateral cartilage to the ipsilateral and/or contralateral is needed to achieve symmetry as described by Tajima [5]. Correction of the deviated septum is done by excision as usual in septorhinoplasty techniques if needed. Osteotomy is needed in cases of bony deviation. The displaced lower edge of the septum from the anterior nasal spine and vomer grove is repositioned with 4/0 PDS suture after scoring of the curved side of the cartilage. Tip definition is achieved by intra- and interdomal sutures. Cartilage grafts were sometimes needed as columellar strut, spreader grafts, alar strut graft or tip grafts.

RESULTS

18 patients were identified to the study. Each age group has its specific techniques used (Fig. 1). The primary dentition group (3 patients); all had closed rhinoplasty with alar transfixation sutures with lip re-do. Only one case needed additional Tajima's rim incision in the cleft side (Fig. 3).

The mixed dentition group (5 patients); all had the same techniques used in the previous group with 2 cases needed additional Tajima's rim incision in the cleft side. All cases had concomitant alveolar bone grafting, 3 cases had complete lip redo and 1 case was a primary one. Fig. (4) showing a case example of this group where the patient had lip redo, closed rhinoplasty and alveolar bone graft.

The skeletal maturity group (10 patients) in which all cases had open rhinoplasty with tip defining sutures (interdomal, intradomal) and Tajima sutures (upper lateral cartilages to ipsilateral and contralateral upper lateral cartilages). For achieving symmetry, 4 cases had additional Dibbell's technique, 2 cases needed Potter's technique, 1 case only needed both Potter's and Debell's technique, and 3 cases didn't need either Potter's and Debell's technique. Tajima's rim incision was used in all cases. 4 cases had septal correction with 2 conchal reductions. 1 case had spreader graft, 9 cases had reposition of the free septum to the anterior nasal spine. Columellar strut grafts were used in 6 cases, tip grafts used in 2 cases only. Alar base resection of the normal side was needed only in 2 cases where there was severe reduction of the cleft-side alar. The technique selection protocol based on the age of presentation is shown in Fig. (1) and the algorithm for the definite secondary rhinoplasty technique selection is outlines in Fig. (2).



Fig. (1): Algorithm for technique selection according to the age of presentation.



Fig. (2): Algorithm for technique selection for definite rhinoplasty.



Fig. (3): Example of intermediate early secondary cleft lip rhinoplasty in a 1 year, 9 months old female. Immediate postoperative pictures after Semi-open rhinoplasty with Tajima's rim incision, interdomal and alar fixation sutures.



Fig. (5): Example of definite secondary cleft lip rhinoplasty in a 22 year old female. A month postoperative pictures after conventional open rhinoplasty incision with Tajima's rim incision, interdomal and alar fixation sutures. Minor vermilion correction were done.

DISCUSSION

Unilateral cleft lip nasal deformity is still challenging procedure. This may be attributed to the complexity of the primary anatomical malformation. Beside the previously mentioned classic unilateral cleft nasal deformity which is the malpositioned alar cartilage. There are other anatomical deformities should be dealt with during the correction. These included the interruption of the muscle ring across the nasal sill, fixation of the alar base by fibrous connections to the piriform margin, soft-



Fig. (4): Example of intermediate late secondary cleft lip rhinoplasty in a 9 year old female. A week postoperative pictures after, Semi-open rhinoplasty with Tajima's rim incision, interdomal and alar fixation sutures and alveolar bone graft.



Fig. (6): Example of definite secondary cleft lip rhinoplasty in a 28 year old male. Immediate postoperative pictures after conventional open rhinoplasty incision with Tajima's rim incision, Potter's and Dibbell's techniques were employed and the upper part of orbicularis oris is dissected and rerepaired. Minor vermilion correction were done.

tissue deficiency at the nasal floor, septal deviation and abnormal muscle insertions at the alar base to the cheek and lip [9].

There was a debate whether the cleft-side alar cartilage is hypoplastic or just malpositioned. It is now accepted that the cleft-side alar cartilage is essentially normal in size and just malpositioned. Park et al., examined the lower lateral cartilages during secondary rhinoplasty and found both sides to have the same size and dimensions [10]. Moreover, Sadova et al histologically examined the lower lateral cartilages of the cleft and non-cleft sides and found no significant differences between both sides as regards to chondrocytes, perichondrium and cartilage thickness [11]. We did not used cartilage grafts to augment cleft-side ala, it was possible to achieve symmetry just with good release of the cleft-side lower lateral cartilage in all cases. The medial crura is the only part which sometimes is hypoplastic [9]. We used only columellar struts from the septum to give more stability to the tip.

Primary cleft nose rhinoplasty during the initial lip repair becomes a well accepted practice. It is proved that this type of rhinoplasty which includes dissection of the perichondrial surface and suture repositioning of the alar cartilages did not have negative effect on growth. In the same time it improved nasal shape with resulting improved the psychosocial impact during the critical developmental years [12,13]. If this primary repair is conducted well with the primary repair, the secondary definite rhinoplasty will still be needed but with be less complexity and less interventions required [1]. Also vice verse, it is expected that if there is no intervention to replace the lower lateral cartilage in the correct position, with growth the deformity will be accentuated and getting more complex [14].

During the primary dentition age, we prefer to wait for rhinoplasty at least to be combined with the alveolar bone grafting at the age of mixed dentition. This is to decrease the number of surgeries the patient will be subjected to. We called the secondary rhinoplasty at the age of primary dentition as "early intermediate rhinoplasty". Our indication for such early intervention is the major nasal deformity that leaves significant psychosocial distress for the children and the family. The other indication is the very bad primary lip repair with lack of muscle continuity. "Secondary late intermediate rhinoplasty" is done during the mixed dentition age and combined with alveolar bone grafting. It has the advantages of combining two procedures and adding the positive effect of alveolar bone grafting on the nasal symmetry specially the alar base [15].

Numerous techniques have been described to address the complex secondary nasal deformities and especially for the definite repair after the complete skeletal growth. Each technique has its concept and merits with its disadvantages. Recently, trials to combine different previously described techniques in a trial to add the advantages and avoids the disadvantages were conducted. One of the new hybrid techniques which showed excellent results is the combined Dibbell/Tajima technique

described by Flores et al., In our series, we used Tajima's inverted U incision technique in most of our secondary rhinoplasties. This technique corrects very well the classic caudal shift of the cleft-side alar cartilage and in turns improves the obliterated soft triangle and nostril apex overhang, recontours the soft-tissue envelope of the nose and creates the soft triangle [16]. Tajima's technique didn't address the need for medialization of the alar base. Tajima's technique is originally closed or semi-open approach. But because of the complex nature of the deformity, we preferred the open approach for the final rhinoplasty (skeletal maturity group). Open rhinoplasty offers wide exposure for more accurate procedure and achieving symmetry. Also it allows for easier and flexible placement of cartilage grafts if needed [17].

The Dibbell's technique includes the creation of a double-pedicled composite flap of the medial crura of the lower lateral cartilage, mucosa, and nasal floor. This composite flap is rotated superiorly and medially which resulted in correction of the displaced lower lateral cartilage and tip correction and medialize the laterally displaced alar base [6]. Also it has the advantage of creation of the nasal sill and improving the depressed nasal floor scar if present [18]. We used this technique in 5 cases (50%) in the skeletal maturity group.

Potter described a technique that advances the lateral crus of the lower lateral cartilage medially in a V-Y fashion as a chondromucosal flap [5]. We used the Potter's technique in 3 cases (30%) where the lateral crura couldn't be brought medially to achieve symmetry. One of the disadvantages of the Potter's technique is the loss of continuity of the lateral ligamentous connections, which can produce valving and a cosmetic depression in this region. Another disadvantage is the lining deficiency at the tip of the advancement flap which may be corrected by filling with an attached strip of turbinate mucosa [18]. In one case we used alar strut grafting extended to the pyriform aperture to support the ala.

Our hybrid technique for correcting the definite secondary rhinoplasty is an algorithmic approach. Preoperatively, the decision should be made whether the lip will be opened for redo or not which is depending mainly on the status of muscle repair, and accordingly the choice of the open rhnipolasty approach will be chosen (conventional or Trott's respectively). Trott's described an open rhinoplasty technique for primary cleft lip rhinoplasty where the C-flap lip incision continued with the lateral columellar incisions at the base of the columella of the open rhinoplasty [19]. We used this technique in the secondary cases where the lip is decided to be opened and redo is needed. Later, after the nose is opened and the lower lateral cartilages are dissected, intraoperative assessment of the symmetry of the lower lateral cartilages symmetry is done. The aim is to completely free the cleft side lower lateral cartilage to match symmetrically the shape and mobility of the other side to be sutured to it for tip definition. According to the site of tethering, either medially or laterally, the additional technique will be selected (with either Dibbell or Potter respectively).

It is known that each cases of secondary cleft lip rhinoplasty represent a special unique challenge. Our technique allows for individualizing the technique to match each case need for the final goal of achieving symmetry.

In conclusion, primary cleft lip rhinoplasty should be encouraged in the cleft caregivers community in Egypt which will improve the psychosocial satisfaction during the developing ages of the patients, decrease the need for intermediate rhinoplasties and decrease the magnitude of the deformity complexity presented for definite rhinoplasty with less needed interventions. It is also confirmed that combining many techniques is safe for improving the results of this complex problem.

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