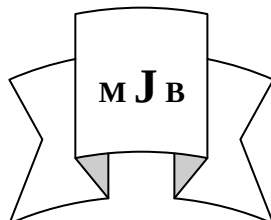


Primary Repair of Bilateral Complete Cleft Lip Nasal Deformity: Iraqi Experience

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Abstract

Background: Simultaneous surgical correction of bilateral cleft lip nasal deformity is becoming more common. This is a major change from the conventional strategy of secondary nasal correction. Many studies had concluded that primary nasal repair will not affect the nasal cartilages growth; it usually reorients the deformed nasal cartilages into a near normal position, and will allow a better growth pattern.

Aim: This study was conducted to document the pattern of primary nasal repair in bilateral complete cleft lip deformity and to evaluate the medium term outcome.

Method: A total of 13 babies with bilateral complete nasolabial clefts underwent simultaneous nasal correction with their lip closure. Mean age was 4 months. The study was performed between March 2006 and April 2009. Alar cartilage manipulation using combined Mulliken - Cutting retrograde nasal approach was performed for all cases.

Results: The average follow up periods were 3 years (ranging from 6 months – 6 years). The results were evaluated by comparing 3 nasal anthropometric measurements with those of normal, age-matched children pre and postoperatively at 3 months and then yearly till 3 years. The selected nasal anthropometric measurements were: nasal tip projection, columellar length, and interalar distance. Nasal tip projection and columellar length were normal or near normal in 5 babies but slightly shorter than in control group in 8 babies. The interalar distance was near normal in 9 babies but moderately wider than in control group in 4 babies. In one case, partial prolabial flap necrosis occurred and was revised successfully 6 months later. In another 2 cases, a hypertrophic scar formed on the upper lip which subsided after 6 months of scar management. Over all nasal tip shapes were improved in all cases with acceptable nostrils asymmetry.

Conclusions: In cases where presurgical molding is not available, a combined Mulliken-Cutting approach is advisable for obtaining a reasonable primary nasal repair in bilateral complete cleft lip deformity. It is not advisable to create a philtral dimple with a deep dermal suture at the prolabial flap as it may compromise the blood supply. Alar dome suspension stitches might be useful for further improvement of alar dome projection. A long follow-up is needed to observe nasal growth over time and detail final outcomes.

Key Words: bilateral cleft lip, bilateral cleft lip nose, Cleft lip, nasal deformity.

تقويم الانف الاولى للاطفال المصابين بشق الشفة الثنائي الكامل الولادي: خبره عراقيه

الخلاصه

ان عملية تقويم الانف الاولى للاطفال المصابين بشق الشفة الثنائي الكامل الولادي اصبح من العمليات الاكثر شيوعا عالميا وبهذا يمثل انعطافه كبيره عن الاستراتيجيه التقليديه المتمثله بتقويم الانف ثانويا حيث ان هنالك عدة دراسات توصلت الى ان تقويم الانف اوليا لهكذا اطفال لا يؤثر على نمو غضاريف الانف بل وحتى يساعد في ارجاع الغضاريف المشوهة الى مكانها الطبيعي محسنا بذلك نمط نموها. لقد بينت هذه الدراسه الطريقه المستخدمه في تقويم الانف الاولى لثلاثه عشر طفلا ، معدل اعمارهم اربعة اشهر و أجريت خلال الفترة (اذار ٢٠٠٦ لغايه نيسان ٢٠٠٩)، وقد تم استعمال طريقه (موليكين/ كانتنج) لجميع الحالات وكان معدل فترة متابعه

المرضى ثلاث سنوات وقد قيمت النتائج عن طريق مقارنه ثلاثة قياسات خاصه لمنطقه الانف مع عدد مماثل من الاطفال الغير مصابين من نفس الفئة العمرية وثبتت النتائج في الجدول المبين في الدراسة.

Introduction

Bilateral cleft lip nasal deformity is a pathophysiological deformity of cleft lip that necessarily accompanies it. It has been well described by many authors [1-5], but of all the nasal distortions, the short columella is the most obvious. It is the hallmark of bilateral cleft lip nose [1-5]. The alar domes are pulled apart and flattened. The columellar crura are separated progressively back toward the nasal spine. As a result, the columella disappears into a broad nasal tip [6]. Traditional methods of bilateral cleft lip repair causes the medial crura to be pulled inferoposteriorly and continues to separate over time by muscle tension, result in further shortening the columella[1,3,5,7-10] . For many years, it was believed that primary nasal repair may interfere with the growth of the nasal cartilages and should not be performed until nasal growth is complete. Later, studies have shown that early manipulation and positioning of the alar cartilages does not affect nasal growth and may even assist normal growth[1-3,10-15].The traditional approach for columellar elongation arose from the observation that the columella is short or absent, whereas the prolabial skin is usually excessively wide. This finding led naturally to splitting the prolabium in some way and using it to elongate the short columella as a secondary procedure. This is usually done when patients were 5 to 7 years old. By that time, the typical deformity of the bilateral cleft lip nose had become firmly established with a confluence of tight secondary scars at the lip – columella junction was also a necessary consequence. This skin paradigm, which is represented mainly

by Cronin and Millard forked flap procedures [1, 18, 2, 3, 5, 19], ignores, and makes worse, the deformity of the nasal tip cartilages. Since 1990, a new class of primary nasal repair (nasal cartilage paradigm) has been focused on correction of the alar cartilages as the primary element in the repair [17].McComb (1990) introduced the first primary bilateral cleft nasal repair in which the fundamental principle was bringing the splayed alar domes together into a normal anatomic relationship[6]. He revolutionized bilateral cleft nasal repair by acknowledging that "the columella is in the nose," not in the prolabium as is designed with the traditional banked fork-flap technique. Reviewing his experience with the banked-fork flap technique, he observed that long term growth led to a broad and underprojected tip. He ascribed this to a lack of cartilaginous support within the pseudocolumella and from growth of the medial crura that separated the domes, and he noted that the alar cartilages were splayed out at the tip with adherent fibrofatty tissue between them. He devised a V-shaped nasal tip incision to oppose and suspend the domes after removing the intervening soft tissues and then close the nasal flap in a V to Y fashion to narrow the nasal tip and elongate the columella [1-3, 5, 6, 17, 18]. Addressing this abnormal anatomy at the alar domes has become the bases of most modern cleft nasal repairs. Various approaches to the nasal cartilages have been described. Mulliken (1992) described a semi-open approach through bilateral alar rim incisions to manipulate the splayed alar domes [1, 8, 2, 3]. Trott and Mohan (1993) used a prolabial-columellar flap based on "a traditional

open rhinoplasty" technique to approximate the domes [18, 17, 2]. Cutting (1993) described a retrograde nasal dissection in which he used an open-tip method similar to that of Trott and Mohan but differs in that the prolabial- columellar flap is incised along the membranous septum, elevating the medial crura in the flap and approaching the domes from the septal angle, so is called a "retrograde approach". He relied on presurgical stretching of the columella with nasoalveolar molding appliance. Advantages of this method are the absence of external nasal scars and lip-columellar junction scar [17, 2, 3]. In this study we present our experience in repairing the nasal deformity simultaneously with bilateral complete cleft lip closure where presurgical molding is not available as it is the situation in our country.

Patients and Method

Patients

A total of 13 babies with bilateral complete nasolabial clefts (9 boys and 4 girls) underwent simultaneous nasal correction with their lip closure between March 2006 and April 2009. The mean age was 4 months ranged from 3 to 6 months. Presurgical lip adhesion, naso alveolar molding, or orthopedic appliances were not used.

Method

Under general anesthesia with a noncuffed oral endotracheal tube fixed at the midline, three nasal anthropometric measurements were taken. The selected nasal measurements were: nasal tip projection subnasale-pronasale (SN-PN) was measured from the lip columella junction to the most projecting point on the nasal tip, columellar length subnasale-columella (SN-C) was measured from the lip columella junction to the line connecting the most projecting point

on the nostril rim on either side, and the nasal width represented by the interalar distance alare-alar (AL-AL) was measured between the most lateral points on the alar curvature. Key landmarks are tattooed with gentian violet dye marking the bilateral lip advancement flaps and the prolabial-columellar flap (Cutting approach) with the peak of the Cupid's bow between 2.5 mm on either side of the midline. The prolabial incision is marked extending superiorly straight to the columella and a lateral forked flaps are also marked but will later discarded. 1:200,000 epinephrine solution is infiltrated into the nose, prolabium and lateral labial elements. Utilizing Cutting retrograde nasal approach, a prolabial- columellar flap is elevated by continuing the incision behind the prolabium along the membranous septum up the septal angle, so the medial crura are going up with the flap. Then, we start creating the labial sulcus by approximating the mucosa of the lateral lip elements (the anterior wall of the sulcus) to the turned over prolabial mucosa (the posterior wall of the sulcus) using 4/0 vicryl suture. The orbicularis muscles are opposed by 3/0 vicryl mattress sutures. The nostril bases are brought together by suturing muscle pennants developed under the alar bases with 4/0 PDS suture. After that, we combined a bilateral nostril rim Mulliken incisions with Cuttings retrograde approach to manipulate the dome cartilages using a fine dissecting scissor dissecting in between the domes as well as dissecting the alar domes and their attached lining mucosa from the overlying skin (Figure 1). No attempt is made to remove the fat between the domes as this is where the blood supply comes in to the prolabial flap. The domes with their attached lining mucosa were then sutured together in the midline using a

horizontal mattress 4-0 PDS suture. The prolabial-columellar flap is then advanced anteriorly along the membranous septum and the advancement maintained with repair of the membranous septum with transfixion sutures of 4-0 polydioxanone. Once the alar cartilages are in proper position, redundant skin at the margin of the rim incisions then excised in a crescent shape including the skin of the lateral columella [2]. Internal 4-0 polydioxanone sutures are used to lateralize any vestibular web. The suture is placed through the web inside the nose and brought out

externally at the nasofacial groove. The needle is passed back through the same external suture hole and passed inside the nose to straddle the web. Tying the suture down lateralizes the web and helps to define the nasofacial groove. The three nasal measurements were retaken immediately postoperatively. Antibiotic ointment was applied on the suture line. Infants can breast or bottle feed already in the recovery room. Photographs were taken preoperatively, immediate postoperatively, 6 months, and if possible each year postoperatively.



Figure 1 Combining Mulliken nostril rim incisions to the retrograde (Cutting) nasal approach facilitates easier approximation of the splayed alar dome cartilages.

Results

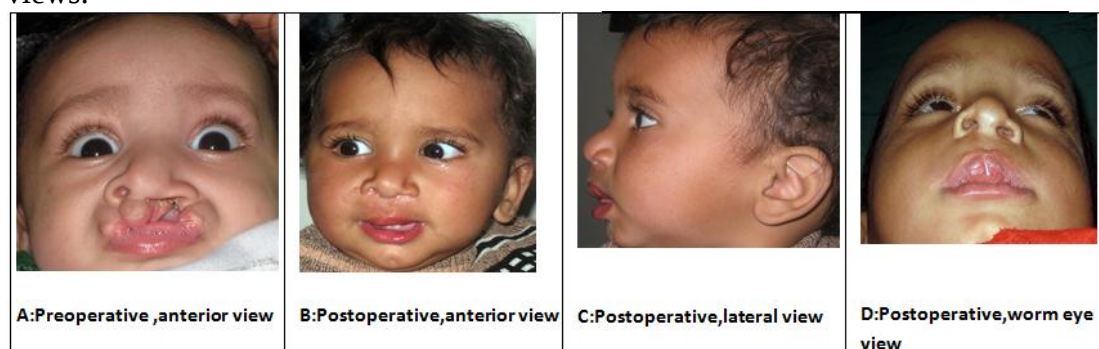
The nasal data are shown in Table 1. Example cases are shown (figure 2 Through 7). The average follow up periods were 3 years (ranging from 6 months – 6 years). The results were evaluated by comparing 3 nasal anthropometric measurements with those of normal, age-matched children at 3 months and 3 years postoperatively. Direct measurements of the nasal parameters by single observer, rather than using photogrammetric measurements, was chosen to assess the results. Thirteen age-matched normal babies from a

local pediatric hospital, served as a control group. Nasal tip projection and columellar length were normal or near normal in 5 babies but slightly shorter than in control group in 8 babies. The interalar distance was near normal in 9 babies but moderately wider than in control group in 4 babies. In one case, partial prolabial flap necrosis occurred and was revised 6 months later. In another 2 cases, a hypertrophic scar formed on the upper lip which subsided after 6 months of scar management. Over all nasal tip shapes seems to be improved in all cases with minor nostrils asymmetry.

Table 1 Three nasal anthropometric measurements for children with and without bilateral cleft lip.

Measurements	Preoperatively(mm)		Post operative	
	Patient 3 months	Normal 3 months.SD	Patient 3yrs	Normal 3yrs.SD
Nasal tip projection(sn-prn)	4.3	9.7 ± 1.3	11	13.7 ± 1.2
Nasal width(al-al)	35.8	27.7 ± 1.2	31	30.4 ± 1.3
Columella length(sn-c)	1.9	5.8 ± 0.6	6	7.4 ± 1.1

sn-prn,subnasale-pronasale;al-al,alare-alare;sn-c,subnasale-columella.

**Figure 2** A and C: Three months old child with bilateral complete cleft lip, you can see the prolabium severely protruded and malrotated and D: Three years postoperative views.**Figure 3** A: Three months old child with bilateral asymmetrical cleft lip with sever nasal deformity especially on left side. B, C, D: Three years postoperative views with acceptable columellar length and tip projection.

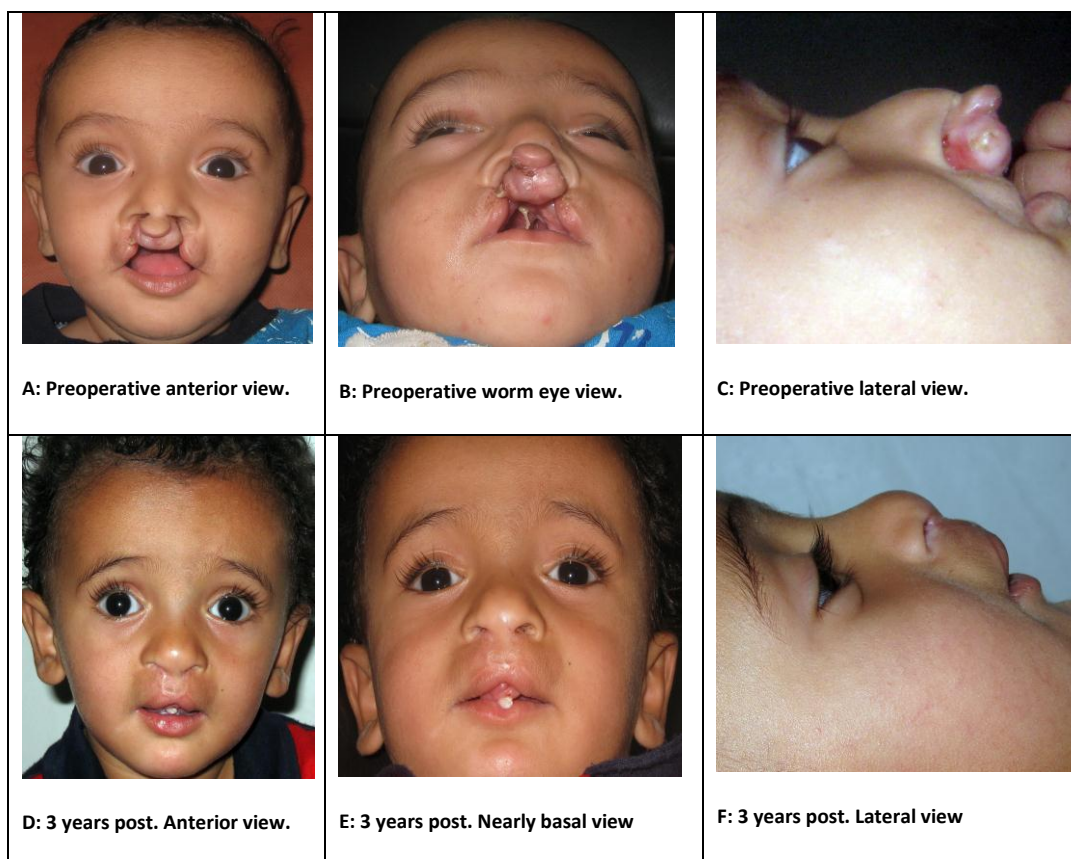


Figure 4 (A, B,C):Three months old child with complete bilateral cleft lip and sever nasal deformity, severely protruded prolabium.(D,E,F) 3 years postoperative results showing reasonable nasal parameters



Figure 5 Three months old child with bilateral complete cleft lip with rotated protruded premaxilla(A).(B) shows 2 months postoperative reasonable result but with hypertrophic philtral scars.(C) shows improvement of the hypertrophic scar with silicon gel treatment,6 years postoperatively.



Figure 6 (A, D,G):Three months old child with complete bilateral cleft lip and sever nasal deformity, severely protruded and malrotated prolabium.(B,E,H) One month postoperative views.(C,F,I) Four years postoperative results showing reasonable nasal parameters.



Figure 7 A: Three months old child with complete bilateral cleft lip with protruded malrotated prolabium, develop necrosis of the prolabial flap within first week following the surgery (B), conservative treatment maintained for 6 months resulting in severe contractures of the lip and nose (C). D, E, F: Revision surgery performed with H, G, I reasonable results after 3 years.

Discussion

Currently, the focus of primary cleft nasal repair is on the correction of the displaced and deformed alar cartilages as the primary element in the repair [19, 6]. Before 2006, we used the Trott open approach. It gave us excellent visualization of the domes, but with poor prolabial blood supply. This was especially dangerous for nonmolded cases with a projecting premaxilla, as it is the situation in our country. This forced us to maintain a wide columella trying to preserve blood supply. The blood supply to the prolabial flap is largely from the external branches of the anterior ethmoid arteries. The terminal vessels pass between the inferior aspects of the medial crura of the alar cartilages into the prolabium. This supply is preserved in the Cutting retrograde method and is divided in the Trott method [19]. In 2007, we started to use the "Cutting retrograde approach" alone for bilateral incomplete cleft lip cases to correct the associated minor nasal deformities where the alar cartilages manipulated from behind. Although Cutting was relying on presurgical molding [19] which is unavailable in our country, but we found it appropriate for incomplete cleft cases that got minor nasal deformity that doesn't required molding(excluded from the study). Milliken's technique provides direct axes through rim incisions to oppose the splayed alar cartilages under vision, enables easier dissection of the interdomal fibro adipose tissues, as well as it allows resection of the redundant skin from the margin of the rim incisions including the skin of the lateral columella, which allow narrowing the tip, narrowing the columellar waist ,and elongating the nostrils[2],but Milliken's technique alone, leaves the footplates of the medial crura in its depressed position

above the projecting premaxilla associated with the diminutive anterior nasal spine. Leaving the footplates in place also prevents adequate approximation of the alar bases. The retrograde method has the advantage that the footplates can be placed on top of the alar base muscle pennants connected in the midline at the site of the absent anterior nasal spine .This allows additional columellar elongation [13,15]. This approximation of the muscle pennants also makes easier, more alar base narrowing than is possible with Milliken's method alone, so we choose to use the combined approach to achieve the benefits of both. By combining both approaches, dissecting and suturing of alar domes becomes much easier than utilizing Cutting approach alone because it allows easier and proper placement of approximating alar dome's sutures, through using horizontal mattress stitches. Although the blood supply to the prolabial flap was found to be good using the combined technique, but we believe it is important not to defat the tip as it may endanger the blood supply. We got one child with partial necrosis of the prolabium; it mostly explained by extensive nasal tip dissection and complete resection of the interdomal fibro adipose tissues, compromising philtral blood supply. A deep dermal philtral stitch that tried to create a philtral dimple, added to the problem, might reduce the blood supply more, resulting in this complication. In most of our series, the nasal tip projection was lower than the normal values which may be explained by the fact that we only performed opposition of alar domes without suspension to the upper lateral cartilages due to the technical difficulty I found with inserting suspension stitches. Columellar length was slightly shorter than the normal values in babies with

complete clefts but improved maximally in incomplete cleft babies. Short columellar length could be addressed later by excising a larger cutaneous crescent from the superomedial nostril rim (soft triangle). It is known that Nasal tip protrusion and columellar length develop slowly, attaining a mean of two – thirds of adult size by 5 years of age[2]so we expect these parameters to be improved with time. the interalar distance was found to be improved dramatically except in 4 babies were in spite of suturing the alar base muscle pennants together in the midline, was pushed away from each other by the protruding and malrotating premaxilla. This condition can be corrected secondarily by removing a wedge of nostril floor in the original scar line without the production of new scars at the lip-columella junction.

Conclusion

In cases where presurgical molding is unavailable, a combined Mulliken-Cutting method is advisable for obtaining a reasonable primary nasal repair in bilateral complete cleft lip deformity. It is not advisable to create a philtral dimple with a deep dermal suture at the prolabial flap as it may compromise the blood supply. Alar dome suspension stitches might be useful for further improvement of alar dome projection. Longer follow-up is needed to observe nasal growth over time and detail final outcomes.

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