

Unilateral Cleft Lip Repair: Experience with Millard Technique and Introduction to the Concept of Junctional Zones Repair

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ABSTRACT

The unilateral cleft lip is a complex deformity. Surgical correction has evolved from straight line repair through triangular and quadrilateral repairs to the rotation advancement technique of Millard. However, modifications to Millard technique continued and new techniques as orthotopic positioning of skin flap and subunit approximation technique adopted for repair of unilateral cleft lip achieving good results when done by their own. The aim of this paper is to present our experience with unilateral cleft lip repair for eighty four patients. We used Millard technique and its modification for 50 patients. We introduce the concept of junctional zones in unilateral cleft lip repair using different ideas from a variety of previously described techniques; this concept was used for unilateral cleft lip repair in 34 patients. Depending on anatomical and histological observations, the cutaneous portion of the lip is classified into main zone and flat zone, and the vermilion into dry zone and transitional zone. For the main zone we used the rotation advancement principles for the upper part and Z plasty for the lower part. Straight line closure used for the flat cutaneous zone and dry zone of the vermilion. Laterally based mucosal flap used to augment the deficit transitional zone of vermilion at the medial segment of the cleft lip. Adequate alignment of the Cupid's bow and symmetric philtral appearance were obtainable. This technique is simple to draw, easy to apply and to learn, with more flexibility and accuracy. Lengthening and augmentation of the cleft lip can be achieved using different principles at different anatomical zones.

INTRODUCTION

The unilateral cleft lip is the second most common congenital deformity (after club foot), accounting for about 13% of all congenital anomalies. The overall incidence of cleft lip with or without a cleft palate is approximately 1 in 750,000 live births. Unilateral clefts are nine times as common as bilateral clefts, and occur twice as frequently on the left side than on right [1].

The earliest publications on cleft lip repair were modifications of the straight-line repair as described by Rose and Thompson [2,3]. This method is conceptually the simplest method to understand and

perform. The basic concept of this technique involves the use of angled incisions made at the opposing cleft margins. Tennison, in 1952 [4], started a more sophisticated repair with actual preservation and positioning of the cupid's bow. After becoming frustrated by still having contractures with the previously mentioned techniques, he resorted to a type of Z-plasty using a triangular flap. Le Mesurier [5] and Tennison repairs were the most widely used techniques; however, a new method, that was destined to become even more popular, was on the horizon. The most common procedure to repair a cleft lip is the Millard procedure presented in 1955 which entails lateral flap advancement into the upper portion of the lip, combined with downward rotation of the medial segment. He published this method for the first time in 1957, made another historical presentation in 1958 [6,7]. In 1958, Skoog advocated repairs involving a combined upper and lower lip flap (two triangular flaps from the lateral lip element are inset into the medial lip element to lengthen it) [8]. In 1959, Randall [9] popularized Tennison method, and Wynn and Davies described variations of triangular flaps introduced into the upper lip [10,11]. Trauner and Trauner [12] described procedure that involves a combination of flaps in the upper and lower portions of the lip from lateral lip to fill a medial deficit.

Since its introduction by Millard, the rotation-advancement flap lip repair has undergone a great number of modifications and refinements, including its author and others (Pool [13], Lindsay [14], Mohler [15], Lewis [16] and LaRossa [17]).

In 1993, Nakajima et al., raised a triangular flap at the alar base on the cleft side and advanced it to the bottom of the columella achieving a straight suture line [18]. Fisher reported his anatomical subunit approximation technique for unilateral

cleft lip repair [19]. Koh and Hong [20] described orthotopic positioning of C flap for repair of unilateral complete cleft lip repair.

Emsen [21] described two small perpendicular back-cuts along the mid portion of the rotation incision of the philtral column into which he advances two small triangles from the lateral advancement flap.

Cleft lip nasal deformity becomes a distinct challenge due to various reasons: (1) the clinical presentation varies widely, requiring a host of surgical techniques. (2) The deformity may be quite asymmetric, making correction difficult. (3) Patients with a cleft lip might have undergone several previous operations leading to significant scarring. (4) The timing of rhinoplasty whether staged or synchronous with a cleft lip repair is still a subject for debate. (5) As this anomaly affects the paediatric population, the effect of and on patients' facial growth needs to be considered before nose correction. The complexity of the problem is reflected by the fact that there are possibly as many methods to correct these deformities as there are surgeons performing operations [22-30]. The aim in cleft lip repair resides in the precise restoration of the anatomic landmarks and functional units in the upper lip. Surgical procedures should be planned to maximize the preservation of appearance and function and to minimize any distortion during growth. The ideal operation for the repair of a unilateral cleft lip would result in a symmetrical upper lip with the philtral column length on either side equal. The scar should mirror to the opposite side and should not transgress the philtral column. There should also be no peaking at the Cupid's bow at the cleft side or notching of the vermilion. The Cupid's bow should be of adequate proportions [31].

The aim of this work is to simplify the repair of unilateral cleft lip through introducing the concept of junctional zones which incorporate rotation advancement principles, Z plasty and triangular flap technique at different anatomical zones of the lip.

PATIENTS

Surgery was performed on 84 patients with variable degrees of unilateral cleft lip; (Millard's technique for 50 patients and the concept of junctional zones for 34 patients). Out of these cases; 58 are males and 26 are females, 50 patients presented with left-sided cleft and the remaining clefts were on the right side. Out of the overall cases, 13

patients presented with minor cleft (microform cleft), 41 cases with incomplete cleft, and the remaining cases were complete cleft lip. Apart from nine patients operated during the adulthood period, (due to their late presentation as negligence by families), the average age of the patients on admission ranged from 3.5 to 11 months. All patients underwent preoperative assessment including history (from parents), physical examination, laboratory investigations and tests for assessment of general health and associated co-morbidities. Preoperative photographs were helpful in addressing the areas for concern to the patient, postoperative photographs was also taken, mimic the preoperative photos.

Surgical principles and technique:

Anatomic consideration: Nicolau [32] indicated that there were deep and superficial parts in the orbicularis oris muscle; the former was subdivided into the marginal and peripheral portions, and the latter was also subdivided into the lower nasolabial and the upper nasal bundles. According to his description, the lower nasolabial bundle was derived from the depressor anguli oris muscle, inserts into the skin, forming the philtral ridge, with short fibers ending in the ipsilateral ridge and long fibers crossing the midline to insert into the contralateral one. The upper nasal bundle had the common insertions of the zygomaticus major and minor, the levator labii superioris, the levator labii superioris alaeque nasi, and the transversus nasi. The deep peripheral portion and the superficial part have the attachment from extrinsic fascial muscles, as Nicolau described.

Park and Ha, [33] stated that the orbicularis oris muscle has two parts, a deep and superficial parts, corresponding to the double function of the upper lip. While the deep part, extending from one modiolus to the other, seals the mouth as a constrictor, the superficial part, mingled with the extrinsic fascial muscles, opens the mouth as a retractor.

The skin prominence just above cutaneous-vermilion border was called the (mucocutaneous ridge) by Marcks and colleagues [34]. This landmark was termed the (white roll) by Gillies [35] and the (white skin roll) by Millard [36]. The vermilion-cutaneous junction was a more complicated anatomic region than was previously surmised. This junction is not so much a ridge as an escarpment, or cliff, as noted by Latham and Deaton [37]. The prominence of the escarpment extends inferiorly as the procumbent vermilion-mucosa of the lip. The white roll appeared to be related to the anatomic configuration of the underlying muscle. The

anterior projection of pars marginalis (marginal fibers of deep intrinsic band of orbicularis oris muscle) accounts for the white roll. The white roll approached 1.0mm in width, and its subepithelial zone contained dense collagen bundles, Mulliken et al. [38]. Noordhoff [39] subsequently designated the vermilion-mucosal junction as the (red line). Yet, little is known of the anatomic abnormalities of the cutaneous-vermilion-mucosal region along the medial and the lateral margins of a cleft lip. This incomplete anatomic knowledge surely affects our attempts to construct the normal upper labial architecture in a cleft infant. Noordhoff's (red line) was easily identified as an abrupt transition between the keratinized squamous epithelium of the vermilion and the nonkeratinized squamous epithelium of the oral mucosa. There is a vertical deficiency of vermilion and mucosa as well, at the proposed crest of Cupid's bow in the medial segment of the unilateral cleft lip in both complete and incomplete anomalies. The (red line) disappeared at the superior border of the cleft on both medial and lateral sides. The tissue reduction paralleled the severity of the cleft. Noordhoff [39] recommended that, whenever possible, a lateral vermilion flap be used to augment the medial vermilion.

Surgical principles:

- The skin incision is basically similar to Millard's rotation advancement method but the back cut of the rotation incision, if necessary, is not parallel to the philtral ridge but in the philtral groove with a more acute angle.
- Skin incisions should never extend medially beyond midline.
- A lateral incision along the alar base is never used, it is unnecessary and leave unsightly scar.
- Incision above the cutaneous roll is through skin and subcutaneous tissue and not through muscle.
- Dissection frees the muscle from the overlying skin and vermilion and from the underlying mucosa. On the lateral lip element, dissection between skin and muscle is more extensive, extending laterally as far as the alar base to relieve the orbicularis muscle bulge. The abnormal attachment of the superficial orbicularis oris muscle is freed for its upturned insertion in the region of the alar base and piriform aperture. On the medial side the dissection is limited to the philtral ridge. Dissection deep to the muscle and in extraperiosteal plane frees the alar base from the underlying maxilla. On both medial and lateral sides, the deep and superficial portions of the muscle are identified and separated. The deep

portion is simply interrupted as a free end at the cleft sides. The deep portion of the orbicularis oris muscle is sutured end to end to the corresponding portion of the medial side, the superficial orbicularis oris muscle is repaired end to side so the lateral muscle is placed below the medial muscle, which contributes to the formation of the philtral ridge (Park and Ha, 1993) [33].

- The vestibular web formed by the caudal margin of the lower lateral cartilage, lateral crus, the accessory cartilages and investing perichondrium, is released from its postero-lateral attachment to the piriform rim. When this release from the piriform rim is sufficient, the alar base can now be advanced antero-medially without accentuating the buckling of the alar rim and of the lateral alar flare.
- Alar transfixion sutures are placed to obliterate any dead space created by the release of the vestibular web from the piriform rim and to maintain anteromedial advancement of the lateral crus. The columellar base and cleft side alar base are approximated with an "alar cinch stitch". Careful placement of this suture will allow the alar base and columellar base to be positioned in the appropriate horizontal plane.

Technique:

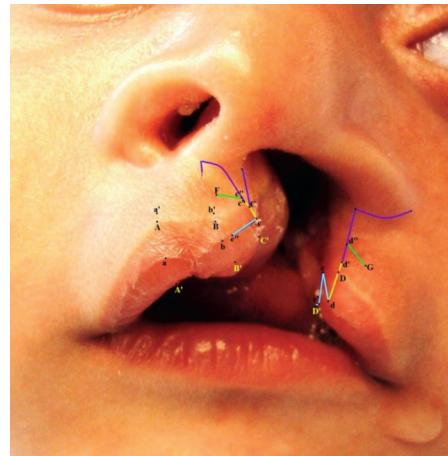
We introduce the concept of junctional zones to simplify the repair of unilateral cleft lip using combination of different ideas from a variety of previously described techniques.

The lip is classified into cutaneous portion and vermilion. The cutaneous portion is subdivided into main zone and flat zone by lines 1, 2 and 3. The vermilion subdivided into dry zone and transitional zone by lines 4 and 5. (Fig. 1a,b,c.). Line 1 represents the lip-columellar junction of the philtrum and alar lip junction of the cleft side. Line 2 lies between the flat and main cutaneous portions of the upper lip. Line 3 is the vermilion-cutaneous junction "white roll". Line 4 is a vermilion ridge between dry zone and transitional zone of the vermilion and line 5 is the red line i.e. the line between the vermilion and oral mucosa.

The rotation advancement principles are used for the upper part of the main zone and Z plasty used for the lower part of the main zone. Straight line closure used for the flat cutaneous zone and dry vermilion. For the transitional vermilion, the laterally based mucosal flap had been used (Fig. 1d).

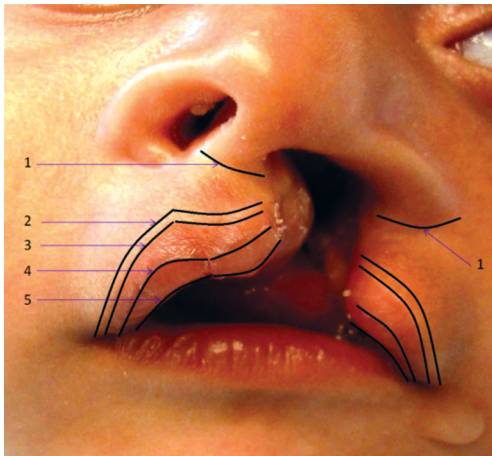


Fig. (1A): Left complete cleft lip.



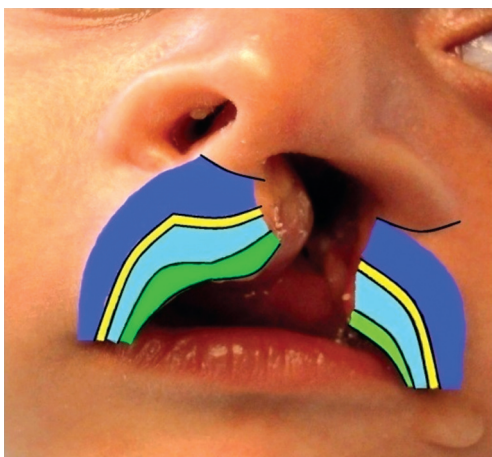
ABC,D = Cupid's bow.
 abc,d = Vermilion ridge (tubercle).
 A'B'C',D' = Vermilion-mucosal junction.
 a'b'c',d' = Upper limit of flat zone.
 c'C = Within flat zone of upper lip on non-cleft side.
 Cc = Within flat zone of dry vermilion on non-cleft side.
 d'D = Within flat zone of upper lip on cleft side.
 Dd = Within flat zone of dry vermilion on cleft side.
 Fc'' = The limb of Z on non-cleft side.
 d''G = The limb of Z on cleft side.
 dee' = The triangular mucosal flap on the cleft side.
 ce'' = The back cut on the vermilion tubercle on non-cleft side.
 Lines c'Cc and d'Dd should be closed straight.

Fig. (1D): Marking of the technique of junctional zones.



Line 1 = Lip-columellar and lip-alar junction.
 Line 2 = Junction between main zone and flat zone.
 Line 3 = Vermilion-cutaneous junction (white line).
 Line 4 = Junction between dry and transitional zones of the vermilion.
 Line 5 = Vermilion-mucosal junction (red line).

Fig. (1B): Junctional lines of upper lip.



| | |
|--------------------------|-------------------------------------|
| ■ = Main cutaneous zone. | ■ = Dry zone of the vermilion. |
| ■ = Flat cutaneous zone. | ■ = Transitional zone of vermilion. |

Fig. (1C): Junctional zones of upper lip.

Line (Fc'') should be parallel to line (AB) and not crossing the philtral dimple. Line (Fc'') will be equal and parallel to line (d''G). The flat zone will be closed as a straight line, i.e. points (c'C) will meet points (d'D). For straight line repair of dry vermilion, line (Cc) and line (Dd) will be equal and perpendicular to white roll. Both lines extended only to the vermilion-mucosal junction.

For augmentation of deficit vermilion of the medial side of the cleft, laterally based mucosal flap used from the transitional mucosa of the lateral side of the cleft. This flap must be designed and harvested from the transitional mucosa, not from dry vermilion or oral mucosa. The incision on the medial side of the cleft must be within the vermilion ridge, i.e. junction between the dry and transitional zone, starting from point (c) and does not extend to the midline.

The rotation advancement at the lip-columellar junction, will lead to adequate rotation of the medial element of the cleft and, Z plasty above the flat zone will counteract the straight line scar contracture and will increase the length of philtral ridge. Straight line closure of the flat cutaneous zone and dry vermilion zone will mimic the normal configuration of this region of the lip, which is related to the attachment of pars marginalis of orbicularis oris muscle. The lateral mucosal flap will augment the central deficiency of the transitional part of vermilion.

Case presentation:

Cases I and II, represent microform cleft lip. Millard repair was used for the case I, and the concept of junctional zones was applied for case II.

Cases III to VIII, represent unilateral incomplete cleft lip. Millard technique was used for repair of cases; III to VI, while cases; VII and VIII, were repaired using the concept of junctional zones.

Cases IX to XIII, represent unilateral complete cleft lip. Millard technique was utilized for repair of cases; IX, X and XI, whilst the concept of junction zones was utilized for repair of cases; XII and XIII.

Case XIV; right incomplete cleft lip in adult girl repaired with Millard technique.

Case XV; right complete cleft lip in adult girl repaired using the concept of junctional zones.

CASE I



Fig. (2): Left microform cleft lip, repaired with Millard technique, with satisfactory result.

CASE II

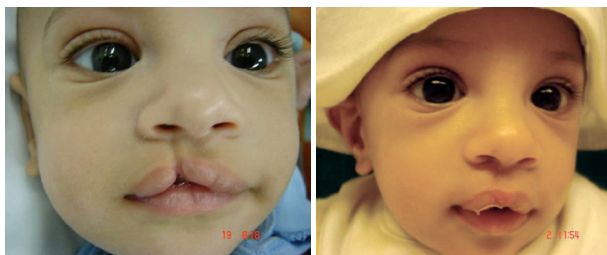


Fig. (3): Right microform cleft lip, the concept of junctional zones was used for repair with highly satisfactory result.

CASE III

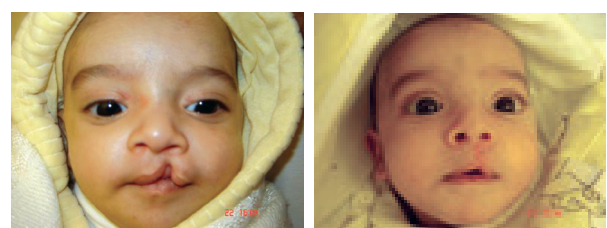


Fig. (4): Left incomplete cleft lip, repaired with Millard technique.

CASE IV



Fig. (5): Left incomplete cleft lip, repaired with Millard technique.

CASE V



Fig. (6): Left incomplete cleft lip, repaired with Millard technique.

CASE VI



Fig. (7): Right incomplete cleft lip, repaired with Millard technique.

CASE VII



Fig. (8): Left incomplete cleft lip, repaired with the concept of junctional zones technique.

CASE VIII



Fig. (9): Right incomplete cleft lip, repaired with the concept of junctional zones technique.

CASE IX



Fig. (10): Right complete cleft lip, repaired with Millard technique.

CASE X



Fig. (11): Left complete cleft lip, repaired with Millard technique.

CASE XI



Fig. (12): Right complete cleft lip, repaired with Millard technique.

CASE XII

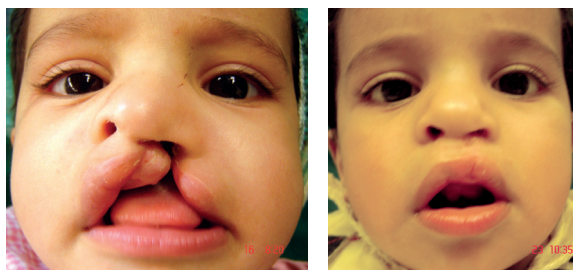


Fig. (13): Left complete cleft lip, repaired with the concept of junctional zones technique.

CASE XIII



Fig. (14): Right complete cleft lip, repaired with the concept of junctional zones technique.

CASE XIV



Fig. (15): Right incomplete cleft lip in adult girl, repaired with Millard technique.

CASE XV



Fig. (16): Right complete cleft lip in adult girl, repaired with the concept of junctional zones technique.

RESULTS

Eighty four cases of unilateral cleft lip, (13 patients presented with microform cleft, 41 cases with incomplete cleft, and the remaining cases were complete cleft lip), were repaired using; Millard technique for 50 cases and the concept of junctional zones for 34 cases. All patients have been followed for 6 to 18 months, with satisfactory results.

Cases treated with Millard technique, and its modifications, verified adequate lip repair with nearly equal philtral pillars, yet few cases presented with vermilion notching that require refinement later on. Some cases with wide clefts and severe nasal deformity on presentation, showed residual mild to moderate nasal deformity after primary repair that will need secondary rhinoplasty later on. Hypertrophic scars that developed in a few cases were managed conservatively.

All patients repaired following the concept of junctional zones, showed highly satisfactory results; vermilion notching was minimal, philtral pillar on the cleft side was adequately created, whistling deformity was not reported in our series, no visible scars could be delineated around the alar rim and the tubercle was created nicely. Yet, this technique couldn't eliminate the hypertrophic scars, where some patients presented with unsightly scar. In addition, this technique, i.e. the concept of junctional zones, was easy to draw, respecting the anatomical subunits of the lip, making the back-

bone for further techniques refinement on horizon. In our series, the results were comparable with results reported in cleft centers.

DISCUSSION

The Euro-cleft survey showed a wide diversity in models of care, national policies and clinical practices in Europe [40]. Of the 201 centers that registered with the network, the survey showed 194 different protocols being followed for only unilateral clefts. Although there is no indication in the literature that all or none of these protocols produces satisfactory outcomes, the results of the six center Euro cleft study [41] suggest that consistency of protocol in multidisciplinary setting leads to the best outcomes.

There are many techniques to repair the unilateral cleft lip deformity. Despite the numerous eponymous techniques, all are derived from three basic "methods" for unilateral cleft lip repair: The straight-line technique, the triangular flap technique, and the rotation-advancement technique. Each has its advantages and limitations, therefore no individual technique has gained universal acceptance. A surgeon's decision to use a certain repair is most often dependent on his or her training and exposure to the various techniques available [42]. Various techniques of lip repair have been described, each of which position the cutaneous scar uniquely. Primary unilateral cleft lip repair focuses on repositioning the orbicularis oris, preserving the Cupid's bow, achieving adequate lip height, obtaining nasal symmetry and projection [43].

Regardless of technique, an understanding of certain principles is necessary and should guide the surgeon through the correction of the cleft lip deformity [44], including; 1) Establish a symmetric, balanced Cupid's bow. 2) Construct a full median tubercle and adequate dry vermilion height. 3) Construct a philtral column with the same shape and height as the philtral column on the non-cleft lip side. 4) Construct a normal unscar-red columella and establish a symmetric columellar-labial junction. 5) Reorient and repair the orbicularis oris muscular sling. 6) Create an adequate labial sulcus. 7) Correct the cleft nasal alar deformity. 8) Atraumatic, nonlinear skin closure.

Rose and Thompson [2,3] developed repairs in which curvilinear incisions along the cleft margins are used to gain vertical lip length, allowing a degree of lengthening that occurs as the medial lip is rotated down and the incisions straighten out. There is potential for scar contracture and the

sacrifice of excess normal tissue along the cleft margins in order to achieve straight-line closure as well as blunting of the shape of the Cupid's bow [45].

Triangular flap techniques involve one or more back-cuts placed along the medial lip cleft-side philtral ridge and one or more lateral lip-element triangular advancement flaps to fill in the resultant defect(s) as the medial lip element is rotated down. Millard's initial technique [6,7] proved revolutionary in unilateral cleft lip repair. Millard's innovation lay in designing incisions that allowed for rotation but also minimized disruption of aesthetic subunits. The fact that 46% of North American surgeons report using the Millard rotation/advancement technique without modifications for unilateral lip closure and another 38% performed rotation / advancement techniques with various modifications is a testament to the success of this technique in camouflaging incisions [46].

The main disadvantage of Millard repair however is that one can easily get a vertical scar contracture with vermilion notching of the lip or lowering of the alar base. Horizontal scar contracture provokes a tendency towards a small nostril. Excessive narrowing of the nostril is never far from reality and the surgeon should simply aim for a slightly larger nostril on the cleft side.

Mohler [15] noted that the marking of the medial lip segment of the Millard rotation-advancement procedure for unilateral cleft lip repair has been altered in the uppermost portion by utilizing tissue from the columellar base. That is why Mohler extended the rotation incision up into the base of the columella before executing a back-cut in order to achieve added rotation. Borrowing this additional tissue from the base of the columella, the resulting scar can be positioned to simulate the "mirror image" of the philtral column on the non cleft side. The initial concern was that the surgery might create a dimpling scar at the base of the columella or even cause paucity of tissue that may reveal an obvious deformity. In reality, this area appears to be a rather silent donor site.

Fisher [19] applied the principle of anatomic subunits to cleft lip repair, the "ideal line of repair" should be one that ascends the lip from the cleft-side peak of Cupid's bow to the base of the nose along a line exactly mirroring the non-cleft-side philtral column and that then continues superolaterally bordering the lip-columellar crease to the point of closure in the nostril sill. He extended the medial lip element cleft-side philtral column inci-

sion away from the cleft margin in Rose-Thompson fashion first. It then curves superolaterally towards the cleft margin around the base of the columella. These maneuvers help preserve natural subunit boundaries allowing for rotation and medial lip lengthening at the expense of narrowing the philtrum to a degree. He too often adds a small inferior triangle just above the cutaneous roll for additional rotation and feels that this accentuates the pout of the lip. While this technique is included in the category of rotation/advancement repairs, it is clearly a hybrid of multiple principles, including triangle-flap techniques and use of geometric and curvilinear incisions to approach a vertically oriented closure.

Koh and Hong [20] described orthotopic positioning of C flap to fill the resultant upper lip deficit. Emsen [21] described two small perpendicular back-cuts along the mid-portion of the rotation incision of the philtral column into which he advances two small triangles from the lateral lip advancement flap. As two triangles are used, these triangles can be relatively small; however, the cost of multiple triangles is a reconstructed philtral column that is broken up in a zigzag fashion.

Correction of the nasal cleft deformity is necessary during the primary surgery. The key to correction of the cleft nasal deformity is dissecting free and translocating the alar cartilage with its attached vestibular lining into a normal position, thereby establishing the normal vault and shape of the cartilage [47-49]. Noordhoff [39] realized that it was impossible to maintain the parallel relationship of the muco-vermilion junction, or red line, and the white roll if the vermilion was repaired using a straight-line or Z-plasty technique; therefore, he began using a lateral triangular vermilion flap which is transposed into the muco-vermilion junction at the medial segment of the cleft. Although this technique partially recreates normal lip anatomy, the vermilion on the medial side of the cleft is often narrow and the muco-vermilion line does not always parallel white roll [50]. Other modifications have been introduced but are often complicated by using abnormal tissue from the cleft or requiring too much operative time [50,51]. Powar et al. [52] present a modified technique for vermilion reconstruction, based on Noordhoff's lateral vermilion flap, which is simple and produces consistent results with a natural appearing Cupid's bow.

A comparative study of outcomes of incision for primary repair of unilateral complete cleft lip in 796 patients were carried out by Reddy et al., [42] using Millard [35] rotation advancement tech-

nique and Pheifer [53] wavy line incision. They found that there were no significant differences in outcome between the two techniques when assessing white roll match, scar appearance or form of Cupid's bow, nostril deformity, alar dome, and alar base.

We agree with Park and Ha, [33] that the single most important procedure in cleft lip repair is the precise repair of the dynamic structure in the upper lip, i.e. the orbicularis oris muscle. The two different functional portions i.e. the superficial and deep parts should be repaired separately to allow each to fulfill its unique function. Additionally, the skin incision would be better designed on the bases of the natural landmarks rather than mathematically using calipers.

We agree with Powar et al. [52] and Fisher [19] that lateral mucosal flap from lateral cleft side is essential to augment deficient vermilion on medial cleft side. We simplified the design of the lateral mucosal flap which must be harvested from the transitional zone of the vermilion on the lateral cleft side and inset in between the dry and transitional mucosa on the medial cleft side.

We disagree with Fisher [19] to extend the incision in the upper part of the lip to the nasal sill, we prefer to extend the incision through the lip columellar line following the rotation advancement principles. We prefer to use small Z plasty above the flat zone of the lip instead of the triangular flap of Fisher, which is complicated and variable in design.

We agree with Reddy et al. [42] that no single technique of cleft lip repair is a panacea for all cases. Individual clefts need to be managed with philosophy incorporating ideas from several methods that can be adapted in flexible manner by the surgeon to fit a particular need.

We introduced the concept of junctional zones repair of unilateral cleft lip. We used the rotation advancement principle and Z plasty for the main cutaneous zone of the lip and straight line repair for the flat cutaneous and dry vermilion zones. We used lateral mucosal flap from the transitional zone of the vermilion on the lateral side of the cleft to augment vermilion deficit on the medial side of the cleft. This technique is simple and reliable because it is based on previously described repairs and principles. Skin incisions done on the basis of natural landmarks of the lip and different principles used for lengthening and augmenting the cleft lip at different anatomical zones.

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