8. The Anatomic Subunit Repair

Gaurav S Deshpande, MDS

HISTORY

- First published by Dr. David M Fisher (Hospital for Sick Children, Toronto) in the year 2005. It was an experience of 144 consecutive cases done over a period of 5 years.
- This technique is inspired from the anatomic subunit concept for nasal reconstruction that was published by Burget and Menick in 1985.
- Also, the concept that was introduced by Noordhoff of placing a small cutaneous triangle above the cutaneous roll was incorporated.
- Description is the author's way of performing this technique, so minor differences may exist as compared to the original technique described by Dr David Fisher

INDICATIONS

- All cases of unilateral cleft lip.

ADVANTAGES

- The scar hides in the natural subunit giving a more aesthetic result.
- The cutaneous triangle breaks the straight line scar, thus preventing the "peaking" of cutaneous roll.
- The cutaneous triangle provides small amount of tension above the cutaneous roll that accentuates the pout of the lip.
- Very arithmetic, so the final result can be anticipated before the start of surgery.

DISADVANTAGES

- May be a bit difficult to understand, especially for beginners.
- Could lead to short lip, if the discrepancy is high.
- May not be able to get complete primary nasal correction.

TECHNIQUE

- After appropriate anesthesia, with the endotracheal tube in place and secured in the midline or after adequate local anesthesia (for adult incomplete cleft lips in developing world), the patient is placed in supine position with neck extended with a small shoulder roll. The operating table is then tilted into a slight reverse Trendelenburg's position.
- Pre-operative photographs are obtained in suitable views.
- Operative markings can then be started using a marking pen (preferred) or a small wooden stick and Methylene blue.

OPERATIVE MARKINGS (Figure 1)

- The markings are started on the medial lip. The midline of columella and height of non-cleft side philtrum column are marked. (points 1 and 2 respectively)
- The height of cleft side phitral column (point 3) is marked on the lip-columellar crease and this point is marked by transferring the distance between point 1 and 2.
- The upper lip midline is marked (point 4), followed by the height of Cupid's bow on the non-cleft side (point 5).

Key Tip: Point 5 is marked a little medial to the exact height of Cupid's bow. This maneuver is important as the curved part of the Cupid's bow is acquired from the lateral lip. On careful observation, this natural curve on the lateral lip is present in almost all cases

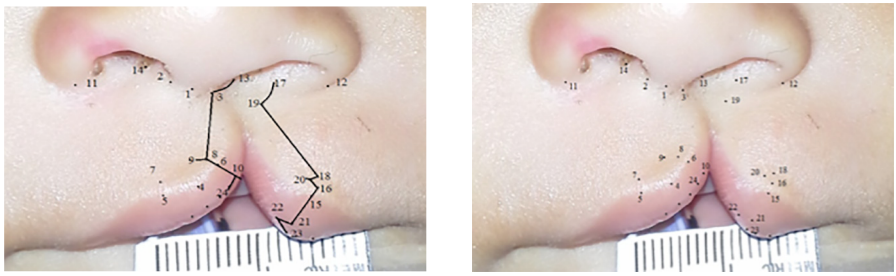


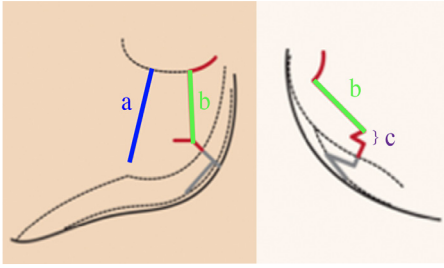
Figure 8-1. Unilateral cleft lip with markings for anatomic subunit repair. Photo and graphic by G Deshpande.

- Now the distance between points 4 and 5 is transferred to get the height of Cupid's bow on the cleft side (point 6).
- At the height of Cupid's bow on both cleft and non-cleft side, two more points (7 and 8) are marked just above the cutaneous roll. These points are marked along the lines perpendicular to the vermillion-cutaneous junction. This helps in accurate apposition of the cutaneous roll.
- The opening cut to accommodate the triangle from the lateral lip is made above the cutaneous roll and is initiated at point 8. This cut equals the length of the two sides of the triangle and is perpendicular to philtral column (3-8).
- This cut should end in a point (9), which should never cross the midline of the philtrum.
- The junction between the vermillion (dry) and mucosa (wet), also referred as "red line" is marked as a dotted line. This is very important anatomic landmark and has to be approximated accurately.
- Key Tip: It is commonly observed that residents and young surgeons use the term "dry and wet vermillion". It should be noted that these are misnomers and the fact is that vermillion is always dry and the wet portion of the lip is the labial mucosa.
- The point on the red line is marked in such a way that point 8,6 and this point (10) makes a straight line that is perpendicular to free margin of the lip.
- The markings on the non-cleft side may vary according to the case. In case of minor cleft, where the discrepancy between the non-cleft and cleft side height is not more than 1 mm, the cutaneous triangle can be completely avoided and the necessary height will be acquired by the Rose- Thompson effect.
- The subalare points are marked on both the cleft and non-cleft side 11 and 12.
- Point 13 is the height of lip at the proposed site of closure of the nostril sill.
- This should be symmetrical with similar point 14 from the normal side.
- These points are marked arbitrarily, and can be manipulated depending on the case. If the tissue on the lateral lip is deficient, then the point 13 can be moved laterally to prevent constriction of

the naris. On the contrary, if there is ample tissue, then this point should be placed medially at the base of the columella.

- Now, measurements are taken to figure out the discrepancy in the lip height. This is done from points 2-7, which is referred as total lip height and 3-8, referred as greater lip height.
- Now 1 mm is subtracted from the difference that is observed between the two lip heights, as there will be a 1 mm gain from the Rose- Thompson effect.
- This will give us the lesser lip height, which represents the base of the cutaneous triangle.
- A simple formula to know the size of the cutaneous triangle is,

Lesser lip height= (total lip height)- (greater lip height) - 1 mm
= base of the cutaneous triangle.



Calculating the base width of the inferior triangle (c). The total height (a) and greater height (b) are measured. Approximately 1 mm of lengthening occurs by a Rose-Thompson type effect, thereby reducing the required size of the inferior triangle. (a – b – 1mm = c).

Figure 8-2. Calculating the base widht of the inferior triangle. Adapted from Fisher, DM. Unilateral cleft lip repair: an anatomical subunit approximation technique. Plast Reconstr Surg. 2005 Jul;116(1):61-71.

- Once the size of the triangle is computed, lateral lip markings are started.
- The most important point that needs to be marked on the lateral lip is the Noordhoff's point. As described by Noordhoff, this is an anatomic point and should be marked at the point where the cutaneous roll starts to fade and good quality of vermillion exists.
- A gentle curvature is also noted at this point which as described earlier needs to be preserved, as it forms the gentle curve of the Cupid's bow.
- Marking this point too medial may result in a "whistle" deformity and marking it too lateral may cause a hypoplastic lip.
- This point 15 is appropriately marked at the vermillion- cutaneous

junction and other point 16 is marked above the cutaneous roll.

- The point of proposed nostril sill 17 is then placed as medially and superiorly as the points 14 from the point 11. This point 17 will eventually join point 13 and will result in symmetric nostril circumference.
- The distance between points 16 and 17 will determine the position of the triangle.
- Using calipers, two points 18 and 19 are placed between 16 and 17, such that 18 to 19 equals the distance between points 3 and 8 and lines 3-13 is equal to 17-19.
- Point 20 is placed such that it will complete an isosceles triangle with points 16 and 18.
- If the distance between these points is too short, which is observed in short lateral lips, then point 18 is placed lateral to the sagittal plane passing through the point 16 and the segment 18-20 can be coincident with the line passing through 18-19.
- If the lip is too long then the triangle is made facing inferiorly to negate any gains from the Rose- Thompson effect. Also, it may be necessary to excise a wedge of triangular tissue at the sill to accommodate the excess length.
- If the lip is normal, then the triangle is placed in line with 16-19 to make use of the Rose-Thompson effect.

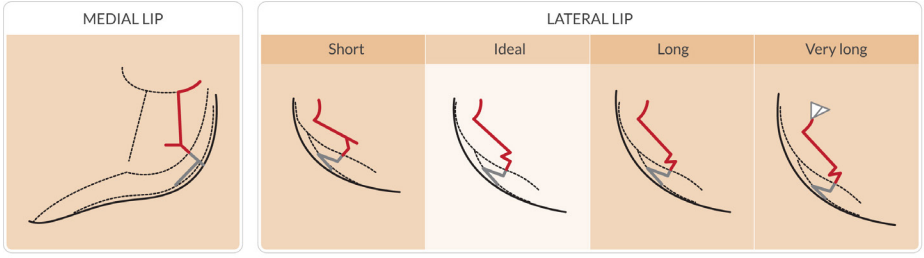


Figure 8-3. The placement of cutaneous triangle according to the availability of tissue on the lateral lip. Adapted from Fisher, DM. Unilateral cleft lip repair: an anatomical subunit approximation technique. Plast Reconstr Surg. 2005 Jul;116(1):61-71.

Key Tip: Care must always be exercised to place the cutaneous triangle above the cutaneous roll and never in the roll. If the triangle is placed in the roll, a thick cutaneous roll may result.

SURGICAL PROCEDURE

- After the markings are accomplished, key points are tattooed using a 27G needle and methylene blue. The advantage of MB is that the marks are temporary and usually disappear by 3rd day.
- Local anesthesia with adrenaline may be infiltrated depending on the surgeon's preference. Some surgeons avoid using LA as it distorts the landmarks.
- The patient's eyes are covered with sterile tapes and patients scrubbed and draped keeping in mind the universal laws of antisepsis.
- If LA has been infiltrated, surgery usually commences after 10 mins for the action of adrenaline to take effect.
- The incision is always started from the non-cleft side. The authors prefers either a beaver blade or no.11 where sharp and defined cuts are needed, and no. 15 blade for other incisions.
- The incision is made as mentioned in the fig ( ). The opening incision above the cutaneous roll is made in the skin and subcutaneous tissues and not in the muscle. The marginal cleft tissue is discarded.
- Scissors are used to free the skin from the muscle. This dissection should be very limited, not more than 5mm and in no instance should cross the midline. This may distort the philtrum.
- The abnormal insertion of orbicularis is freed at the base of the columella. Then the lip and columellar base are positioned to predict the final position and to verify the downward rotation of the cleft side peak of the Cupid's bow.
- In case of complete clefts, the nasal floor is reconstructed using septal flap. This is achieved by continuing the incision into the nose along the caudal aspect of the septum and the vomerine groove.
- The flap is carefully reflected and the septum can be repositioned, if grossly deviated.
- The dissection then continues to the lateral lip. Incision is placed using knife and dissection continued with scissors. Cleft marginal tissue is discarded.
- The mucosa is freed from the muscle only on the cleft side. This dissection is proportional to the severity of the cleft.
- The skin is more extensively freed from the muscle to relieve the orbicularis muscle bulge.

- Orbicularis is then freed from its abnormal insertion in the base of the ala.
- The vestibular web, formed by the caudal margin of the lower lateral
- cartilage's lateral crus, the accessory cartilages, and investing perichondrium, is released from its posterolateral attachment to the piriform rim.
- In case of complete clefts, the nasal floor is reconstructed using the turbinate flap and lateral flap.
- Closure starts from the most inaccessible area to the most accessible area. So the nasal floor is closed first. The authors prefer either vicryl® 5-0 or monocyrl® 5-0.
- Then the buccal vestibular incision is closed using Vicryl® or chromic gut 5-0 or 6-0.
- The muscle layer is closed using 5-0 PDS® or Monocryl® 5-0. No attempt is made to place mattress sutures. Since the philtrum is a dynamic structure, creating a philtrum by mattress sutures serves no purpose and is only time consuming.
- For closure of skin, use of 7-0 prolene® is ideal, which are removed after 5-7 days. But, in resource poor countries, resorbable sutures can be used with acceptable results. The authors prefer 6-0 plain gut in these settings.

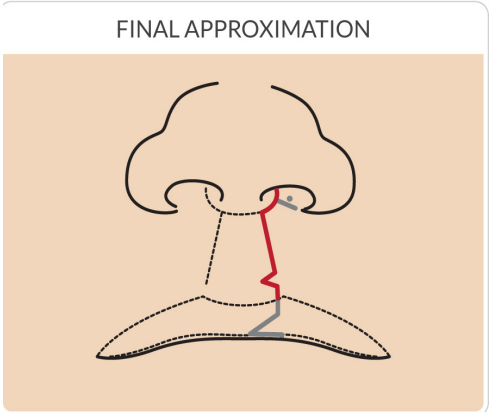


Figure 8-4. Final approximation with resultant scar. Adapted from Fisher, DM. Unilateral cleft lip repair: an anatomical subunit approximation technique. Plast Reconstr Surg. 2005 Jul;116(1):61-71.

KEY READING

1. Fisher DM. Unilateral cleft lip repair: an anatomical subunit approximation technique". Plast Reconstr Surg. 2005 Jul;116(1):61-7.
2. Noordhoff, M. S. The Surgical Technique for the Unilateral Cleft Lip-Nasal Deformity. Taipei: Noordhoff Craniofacial Foundation, 1997.
3. Burget, G. C., and Menick, F. J. The subunit principle in nasal reconstruction. Plast. Reconstr. Surg. 76: 239, 1985.
4. Thomson, H. G. Unilateral cleft lip repair. Oper. Tech. Plast. Reconstr. Surg. 2: 175, 1995.
5. Tennison, C. W. The repair of the unilateral cleft lip by the stencil method. Plast. Reconstr. Surg. 9: 115, 1952.
6. Randal, P. A triangular flap operation for the primary repair of unilateral clefts of the lip. Plast. Reconstr. Surg. 23: 331, 1959.
7. Rose, W. On Harelip and Cleft Palate. London: HK Lewis, 1891.
8. Thompson, J. E. An artistic and mathematically accurate method of repairing the defect in cases of harelip. Surg. Gynaecol. Obstet. 14: 498, 1912.