Cleft lip: our experience in repair

Received: 26 October 2007 / Accepted: 5 January 2010
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Abstract The ideally repaired cleft lip should provide a symmetrical cupid's bow, philtrum and a minimal scar. The lip length, pout and symmetry of the alar base should be maintained to achieve the best result.

The most popular method for cleft lip repair is rotation advancement technique introduced by Millard which improves the relationship of alar base of cleft side, produces harmonious symmetry of the nostril, the surgical scar is masked in the philtral crest and nostril floor. In addition, it uses and preserves the lip anatomy, returns lip tissue into its normal position, minimizes amount of tissue discard and reconstructs orbicularis oris muscle.

Methodology We have assessed the incidence of cleft lip deformities, discussed the feasibility of repair by Millard, its modifications and evaluated the results of cleft lip repairs at our center. The study included 158 patients of cleft lip and palate, of which 60 cleft lip patients underwent surgical repair.

Result The outcome of our surgical result was good and suggested quantitative changes with progressive diminution of asymmetry of the cleft and non cleft sides.

Keywords Cleft lip · Millard technique

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Introduction

Management of cleft lip remains an enigma and a challenge. Spatial relationship and function of the muscular elements, particularly those that cause this deformity, has to be understood for a functional correction of the cleft lip.

Congenital labial clefts result from the absence of fusion or incomplete fusion of the maxillary and the medial nasal process. In a complete nasomaxillary cleft, the muscles of the nasal floor and upper lip (transverse nasal muscle, levator labii superioris aequi nasii, levator labii superioris, depressor septi and both horizontal and oblique heads of orbicularis oris) cannot bridge the gap of the cleft, nor can they unite with their muscular counterparts on the non cleft side and remain lateral to the defect [1]. Schendel [2] has well described the anatomy and orientation of the muscles involved in cases of cleft lips. The process of causation of cleft lip is well established and needs no discussion.

Surgery of the cleft lip should reconstruct both form and function of the entire face so that a balanced growth of the facial skeleton can take place. The ideally repaired cleft lip should provide a

symmetrical cupid's bow, philtrum with a minimal scar.

The most popular method for unilateral cleft repair is rotation advancement technique introduced by Millard (1958) [3], which requires rotation of the non cleft side flap. Reconstructive goals of Millard repair include lengthening of the skin of the lip reconstructing orbicularis oris muscle and reconstructing the full height of the labial sulcus. Additionally, simultaneous reconstruction of the nasal deformity should be considered in the form of columellar lengthening and repositioning of the misplaced alar cartilage. The basic principle of the definitive Millard cleft lip repair is to return the normal displaced tissue into its normal position and to minimize discarding of normal tissue [3].

Many surgeons have attempted to regulate the discrepancy between the peaks of cupid's bow by minimising scarring and modifying this technique to improve the symmetry of the philtral columns [4].

Purpose

- To assess the incidence of cleft lip deformities in various age groups in a particular regional population.

- To discuss the feasibility of repair by Millard and its modifications.
- To assess the results of cleft lip repairs in terms of lip length, cupid's bow, pout, scar, ala, nasal floor, columella, septum and distance between nasal floor-columella and the distance between floor-commissure.
- The difficulties faced during the procedure and the guidelines to overcome it.

Materials and methods

This study comprised 158 patients of cleft lip and palate (96 male and 62 female patients) with mean age of 9 years. The patients were selected randomly without bias. 60 patients with cleft lip deformity, either bilateral or unilateral, were operated for surgical repair of cleft lip by modified Millard's rotation advancement technique.

Surgical technique

Skin markings were made after identification of the deepest point of cupid's bow (point 1) and the highest point of the bow (point 2 and 3) equidistant from point

1 on the non cleft side. The point at the commissure of the mouth was marked as points 4 and 5 on either side. Point 6 was established on the cleft side of upper lip so that the distance between points 4–2 and points 5–6 was the same (Fig. 1).

Incision line on the non cleft side, dropped down perpendicularly from point 3 on to the lip and then extended from point 3 along the white roll upto the cleft. On the cleft side, point 6 had to eventually join point 3. The incision started from point 6 along the white roll upto the cleft and then curved along the alar base upto the mid point of alar base or sometimes a little more extended in cases of complete clefts.

A local anaesthetic (2% lignocaine with adrenaline 1:100,000) was injected after the dye markings were made to avoid error by tissue distortion. After making the incision and through dissection, orbicularis oris and transverse part of nasalis muscles were located, reoriented and reconstructed using vicryl 3-0. Skin was closed with 4-0 prolene. Intra-oral mucosal incisions were then closed using 4-0 black silk. Simultaneous correction of nasal deformity was carried out to achieve symmetry of the nostrils.

In bilateral clefts, (Fig. 2) the incision was made from the point of lip at the vermilion border corresponding to highest point of Cupid's bow. The incision then started from back of the same point extending up along the white roll upto the cleft. Similarly the incision was made on the other side. This back cut was used to increase the columellar length. In the central part, the incision was made from the highest part of Cupid's bow perpendicularly into the lip and then extended upto the cleft. In cases of bilateral clefts, orbicularis muscle was passed through the tunnel created in the central fragment and sutured to the other side of the muscle to achieve fullness in the central part of the lip.

In cases where there was chances of breakdown of suture line due to tension on the lip after muscle closure, instead of using a logon bow/steristrips/elastocrape, we placed a stay suture across the suture line as a horizontal mattress as a modification of the technique.

Results

This study was undertaken to study the incidence of cleft lip deformities in various age groups in a particular regional population, to discuss the feasibility of repair by Millard and its modifications, to

assess the results of cleft lip repairs in terms of lip length, cupid's bow, scar, ala, nasal floor, columella, septum and distance between nasal floor-columella and the distance between floor-commissure, to describe some of the difficulties that have been experienced and to lay down guidelines to overcome difficulties met.

Among these patients, 18 had unilateral incomplete cleft lip, 27 had complete unilateral cleft lip, 2 had bilateral incomplete while bilateral complete cleft lip was found in 2 patients (Table 1). Cleft lip was usually associated with cleft alveolus and cleft palate. Isolated cleft alveolus was found in only 1 patient, isolated cleft palate in 6 patients whereas combination of cleft lip and alveolus was found in 42 patients, cleft lip alveolus and palate was found in 22 patients unilaterally and 35 patients bilaterally (Table 2). 33 patients had unilateral incomplete cleft lip with alveolus and only 1 had complete cleft lip, alveolus cleft whereas incomplete bilateral cleft lip with alveolus was observed in 8 patients (Table 3).

Only 60 patients with cleft lip deformity were treated for repair of cleft lip using the modified Millard method. Assessment of results was based on lip and nose correction. In the lip - the length, scar, vermilion, cupid's bow, pout and symmetry were examined, in the nose - lip, ala floor, columella, septum and any curvature of cartilage was noticed. Many factors which affected the final result included the size of the original defect, bony support and position, growth potential and operating surgeon.

Vermilion line correction was achieved in all the patients with adequate columellar lengthening. 10% of patients required a secondary rhinoplasty for correction of ala of nose and nasal septum. Results (Figs. 3, 4, 5 and 6) suggested quantitative changes with progressive diminution of asymmetry of the cleft and non cleft sides. The outcome of the surgical repair was good when examined at 1 week in 58 patients, but 2 patients had pus discharge from the surgical wound which healed later with wound dressing.

Discussion

The continued attempt to improve results with surgical repair of cleft lips is clearly evident by the frequency with which new methods and modifications of the older techniques are being formulated. Wijayaweera [5] focused the importance

of identification and reconstruction of the extrinsic and intrinsic bundle of orbicularis oris muscle separately to enable them accomplish their distinctive functions. The intrinsic bundle has the constrictor action responsible for the sphincteric action of the mouth whereas extrinsic bundle is the retractor associated with facial expression.

In 1958, Millard [3] described his method of rotation advancement of a triangular flap taken high up with unequal Z plasty flaps. Bruce [6] compared Le Mesurier and Millard technique and assessed cleft lip repair outcomes. Wang (1960) [7] modified and published his results using a modified Hagedorn procedure with transposition of quadrilateral flap to the medial side of the cleft. The advantage of a quadrilateral flap, however, is that the major and the minor distances being vertical and horizontal, can be easily measured in both the flaps which is not the case with the triangular flap techniques. It should be noted that tissue loss is greater with the quadrilateral flap method.

In the natural course of evolution in this field, an alternative to the classical repair has been sought which incorporates a Z plasty by Tennison [8] (1952) and later Randalls' (1959) [9] modification (advancement of the triangular flap to the lower third of the non-cleft side of the lip) of Tennison's repair; although this method has the advantages of a triangular flap viz, (a) addition to the length of the medial lip element (b) building a good floor of the nostril (c) preservation of the Cupid's bow (d) addition of tissue to the lower third of the lip where it is needed the most; but only a partial correction of nasal deformity is achieved furthermore, the vermilion contour is deficient in the mid line and there is a tendency to get an increase in lip height on the repaired side. Steffenson (1953) described his experience with quadrilateral flaps, but Millard's cut as you go technique enables the alar flare to be fully corrected. Trauner [6] (1957) used Z plasties at the top and bottom of cleft. Skoog (1958) incorporated a Z plasty resembling Tennison's but the scar in Skoog's repair did not correspond to the philtral column and his design lacked simplicity. Wang's approach however, combines the better qualities of LeMesurier and Tennison methods but has deficiencies of quadrilateral design. Bilwatsch [10] analysed 3D data to show that complete nasal symmetry is difficult to achieve with Tennison-Randall's lip repair without

revisional surgery. Successful results have been reported with simultaneous prolabium lengthening by Turkish tulip method in bilateral cleft lip repair [11].

Francesconi [12] used reversed Goldstein technique to correct a hypoplastic cupid's bow following bilateral cleft lip repair. Savaci [13] suggested that simultaneous correction of cleft lip and palate as one stage procedure offers several important advantages, such as less psychological trauma, low cost, and an improvement in speech results due to less scarred palatal fields and low rates of palatal fistula. Literature [14,15] also shows successful results with synchronous repair of bilateral cleft lip and nasal deformity. Powar [16] developed a modification of Noordhoff's lateral vermilion flap to preserve the parallel relationship of the

Table 1 Types of isolated cleft lip

N=49	U/L Incomplete	U/L Complete	B/L Incomplete	B/L Complete
Total	18	27	2	2
%	36%	55%	4%	4%

Table 2 Types of Cleft

N=158	Isolated cleft lip	Isolated cleft alveolus	Isolated cleft palate	Cleft lip + alveolus	Cleft lip + alveolus + palate		Cleft alveolus + palate	Cleft lip + soft palate
					U/L	B/L		
Total	49	1	6	42	22	35	1	2
%	31%	0.6%	3.7%	26.5%	14%	22%	0.6%	1.2%

Table 3 Types of Cleft Lip + Alveolus

N=42	U/L Incomplete	U/L Complete	B/L Incomplete	B/L Complete
Total	33	1	8	0
%	78.5%	2.3%	19%	0

Fig. 1 Incision line in unilateral cleft lip cases

Fig. 2 Incision line in bilateral cleft lip cases

muco-vermilion line and white roll improves results in unilateral cleft lip patients.

These modifications conclude that not all clefts are the same. Rotational advancement technique is not the ultimate solution for every cleft case, but can be applied effectively to all cleft deformities with specific adaptations for the correction of wide clefts.

In cases where there was chances of breakdown of suture line due to tension on the lip after muscle closure, instead of using a logon bow, steristrips or elastocrape, we placed a stay suture across the suture line as a horizontal mattress. The modification was used to overcome the difficulty earlier met in our previous cases.

Conclusion

Millard's rotation advancement technique of lip repair is an excellent procedure for cleft repair. Some modifications have been suggested based on our results. To achieve a good lip pout in bilateral cases, tunneling of orbicularis oris muscle into the central lip fragment is a modification made in our cases. Also, an additional stay suture was placed to hold the sutured line in cases of tension on lip. Both of these modifications in the technique were helpful in achieving a good lip repair.

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Fig. 3 Preoperative unilateral cleft lip

Fig. 4 Postoperative cleft lip

Fig. 5 Preoperative bilateral cleft lip

Fig. 6 Postoperative lip

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Source of Support: Nil, **Conflict of interest:** None declared.