

Bilateral Cleft Lip Repair – Advantages of Pfeifer’s Technique

Abstract

Context: Primary repair of bilateral cleft lip depends on the sound knowledge of anatomy, identification of landmarks, clinical variation of presentation, surgical expertise of the operator, etc., Herewith, we present the results of 129 cases performed during our study. **Aim:** To evaluate the advantages of Pfeifer’s technique in bilateral cleft lip repair. **Design:** This was a retrospective analysis of the results of repair. **Patients and Methods:** The study was carried out on 129 patients using Pfeifer’s technique. Pfeifer described a technique which involves changing the lip skin incision to a wavy line, thus making it less conspicuous, using the concept of “morphological order.” The basis of this technique is, a skin incision between two points can be lengthened if both points are joined in a curved or wavelike manner rather than in a straight line. **Results:** Lip parameters improved by 70% as viewed in frontal profile in terms of white roll match, vermilion match, and Cupid’s bow. Nasal parameters improved by 80% as viewed in basal view in terms of alar symmetry, nasal dome and alar base. **Conclusions:** We found four advantages by strict adherence to the steps in the technique as given in the available literature. This technique is easy to learn and teach with satisfactory results.

Keywords: Bilateral cleft lip, cleft lip, Pfeifer’s technique, wave-line incision

Introduction

Clefts are one of the most commonly repaired congenital malformations with an incidence of 1/1000 live births. The incidence of bilateral clefts is <15% of all deformities and constitutes 1:5000/6500 live births. The etiology of clefts appears to be multifactorial, with a strong hereditary component. Recent research has focused on the role of cellular messengers during the gestational fusion of facial structures leading to the cleft formation. However, application of these findings to alter facial growth and development is not yet a clinical reality, and surgical repair remains the treatment of choice.^[1]

Cleft lip repair is usually done with either Tennison or Millard method. Pfeifer’s method is less commonly known and practiced.^[2] The study aimed to evaluate the outcome of Pfeifer’s wavy-line incision technique in bilateral cleft lip repair. The objectives of the study were (1) to assess the lip parameters such as continuity of white roll match, vermilion match, and symmetry of Cupid’s bow of the lip postoperatively and (2) to assess the nasal

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

parameters such as nostril symmetry, alar dome, and alar base postoperatively.

Patients and Methods

A total of 129 patients having bilateral cleft lips were included in the study. The study included the case records from December 2002 to June 2018. Consent from the patients (parents, if the age of the patient is <12 years) and ethical committee approval were taken before the study. Bilateral cleft lips with/without cleft palate were included in the study. Those who were not fit for general anesthesia and those who did not give consent were excluded from the study. Preoperative evaluation of all the patients was performed in a regular manner. All the procedures were performed under general anesthesia, except in adults where lip repair was done under local anesthesia.

The lip repair technique used for all these cases is Pfeifer’s wave-line incision method. This technique involves modifying the lip skin incision to a wavy line using the concept of “morphological order,” i.e., a skin incision between the two points will be lengthened if both points are joined in a wave- or curve-like manner.^[3] The incisions on both sides of the cleft are made of equal

How to cite this article: Reddy YS, Kumar RV, Kumar DS, Rajasekhar G, Babu VR, Reddy KS, et al. Bilateral cleft lip repair – advantages of pfeifer’s technique. *Contemp Clin Dent* 2018;9:530-4.

**Yaratha
Sivanagendra
Reddy, Rayadurgam
Venkata Kishore
Kumar¹,
Devireddy Sathya
Kumar¹,
Gali Rajasekhar¹,
Vaka Ramesh
Babu¹,
Kanubaddy Sridhar
Reddy¹,
Kuruganti Prasanna
Purna²**

*Department of Oral
Maxillofacial Surgery, Anil
Neerukonda Institute of Dental
Sciences, Visakhapatnam,
¹Department of Oral
Maxillofacial Surgery, Narayana
Dental College, ²Department
of Pulmonology, Narayana
Medical College, Nellore,
Andhra Pradesh, India*

Address for correspondence:
*Dr. Rayadurgam Venkata
Kishore Kumar,
Department of Oral
Maxillofacial Surgery, Narayana
Dental College, Chinthareddy
Palem, Nellore - 524 002,
Andhra Pradesh, India.
E-mail: dr_rvkk@yahoo.co.in*

Access this article online

Website:
www.contempclindent.org

DOI: 10.4103/ccd.ccd_729_18

Quick Response Code:



lengths by incorporating a series of waves leading to a final incision line on lateral segments as well as on the prolabium. This incision frees the excess mucosa over the shortened columella [Figure 1].

The method of repair for bilateral cleft lip is as follows. The patient was prepared in the standardized approach. The positioning of the marking points was planned. The width of the philtrum was designed according to the availability of prolabial tissue. Then, using marking points as a guide, wave line was sketched on the prolabium and skin and mucosa of the lateral lip stumps to acquire symmetry of both the sides. The wave lines should have the maximum distance to each other at the level of the nostrils. This will ensure a cranial elongation of the philtrum and the columella during the skin closure. Planning and marking are followed by administration of local anaesthesia containing 1:80000 adrenaline. After 10-15 minutes incisions are placed with number 11 blade along the planned markings. The incisions are extended just below the nasal entrance in incomplete clefts and extended medially up to vomeromaxillary suture and laterally up to inferior nasal concha in complete clefts on both sides.

This is followed by the preparation of the lateral segments and prolabium. Excess vermilion was removed from the lateral segments and discarded. Orbicularis oris muscle was freed from false insertions along the pyriform rim and separated from the skin above and mucosa below. From the base of the ala, blunt dissection was done toward the alar dome to free the nasal mucosa from the lower lateral cartilage. The procedure was repeated on the other side, so that the nose could be reshaped to make it bilaterally symmetrical on both sides. Then, the prolabium was incised as planned and lifted up with skin hook; blunt dissection was done in the base of the columella on both sides to separate fibers between the two medial crura and between the medial crura and nasal mucosa, so that elongation of the columella occurs freely when it is pulled up. Minor corrections should be done as required and closure will be done by bringing the orbicularis oris muscles below the philtrum and suturing in the midline starting from vermilion to just below the columella with 4-0 Vicryl suture. The prolabium was replaced over the repaired muscular bed and sutured with 5-0/6-0 Ethilon or any nonabsorbable material. Mucosa was sutured on the inner

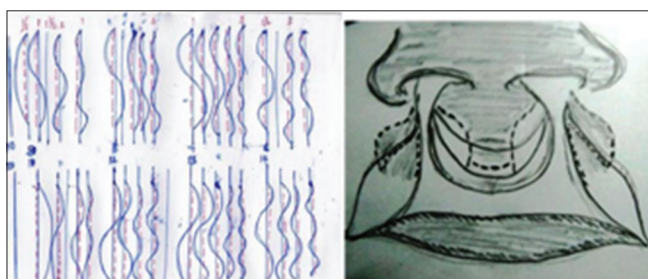


Figure 1: Pfeifer's method of wave-line incision for bilateral lip

surface of the philtrum. Small 5–7 mm length cut pieces of nasogastric tube (Nos. 14 or 17) are placed inside the nostril and secured with two or three silk sutures. Regular postoperative care is followed.

For evaluation of the surgical results, the assessment was done on the photographs. Two different photographic views were used for the analysis: a frontal view and basal view. The frontal view was taken to assess the white roll match, vermilion match, and Cupid's bow. The basal view was taken to assess the nostril parameters such as symmetry, alar dome, and alar base. In this study, all six parameters were compared both pre- and postoperatively and evaluated on a three-point scale – poor, average, and good. For lip, the parameters considered poor before surgery, good when discrepancy between the two sides is <2 mm (aligned), and average if the discrepancy is >2 mm (malaligned). For nasal parameters, as there is no normal side for comparison, assessment was done arbitrarily, i.e., equal nostrils is considered as good and unequal nostrils is considered as average or less than average. In bilateral repairs, the lip parameters will improve slightly, but nasal parameters will be improved more because the nose is not affected much [Figures 2 and 3].^[3]

Results

Of 129 cases in the study, 92 (71.3%) cases were complete clefts and 37 (28.6%) were incomplete clefts. Age of the patients ranged from a minimum of 6 months to a maximum of 50 years. Majority of them were children and were below 10 years of age (72.8%). Males were more affected (98 cases; 75.9%) than females (31 cases; 24%).

Analysis of the results revealed that almost 70% of the patients showed significant improvement in lip and nose parameters [Table 1], which is due to the young age at the time of primary surgery in which the skin of prolabium is highly elastic and vulnerable under functional stress especially when cleft width is less than 10 mm wide leading to good results which follows the concept of “form follows function”. About 20-30% of cases showed average results, because of the following reasons a) higher age at the time



Figure 2: Bilateral cleft lip – before and after

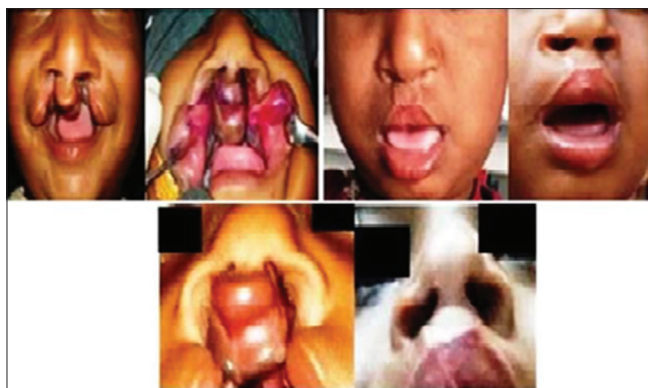


Figure 3: Bilateral cleft lip – before and after

Table 1: Results of bilateral lip repair

Parameter	Total cases	Preoperative	Postoperative	
			Poor	Average (%) Good (%)
White roll match	129		31 (24.1)	98 (75.9)
Vermilion match	129		37 (27.7)	92 (71.3)
Cupid's bow	129		23 (12.5)	106 (87.5)
Nostril symmetry	129		16 (12.5)	113 (87.5)
Alar dome	129		18 (13.9)	111 (86.1)
Alar base	129		18 (13.9)	111 (86.1)

surgery which reduces the elasticity of prolabial tissues to expand under functional stress b) cleft width less than 10 mm.

Discussion

Among the different types of cleft deformities, bilateral cleft lip repair presents the greatest challenge to the cleft surgeon. Its incidence is <10% of all deformities of cleft lip or palate or both. Although the surgical principles are same for unilateral as well as bilateral cases due to nonavailability of landmarks, the bilateral variety is difficult to treat and presents with its own unique set of technical problems. The nasolabial deformity is largely caused by secondary hypoplasia, rather than primary mesenchymal deficiency. The nasolabial muscle rings are disrupted, and their abnormal insertions result in unrestrained lateral displacement of the lateral nasolabial elements. The isolated prolabium, which is deprived of muscle and normal vermilion, protrudes anteriorly and is rotated upward. Its dimensions are reduced by secondary hypoplasia. The prolabial skin is retracted and displaced, secondary to the absence of normal muscle function. The most important feature of the bilateral cleft is the short columella that is produced by an unopposed muscular pull on elements of the lateral cleft in the early stages of fetal development.

Treatment protocols for repair of a bilateral cleft lip are varied with poor long-term outcomes. One-stage versus

two-stage repair, lip adhesion, and presurgical orthopedics, i.e., NAM, have been described with varied results. Currently, the trend toward a more detailed reconstruction of the nasolabial muscles together with simultaneous correction of the deformed nose is the preferred method. An understanding of the true nature of the nose improves the clinical and esthetic outcome.^[4]

Cleft lip repair has evolved largely in the past three decades to modern form. Millard's rotation advancement technique revolutionized the cleft lip repair. Throughout literature, numerous methods of repairing a cleft lip are available (more than 36 methods), since one method cannot reach the ideal result in repairing clefts, which are widely variant in severity and morphology. In general, surgical methods of repairing a cleft lip have been classified into four groups, i.e., straight-line incision group, angular-line incision group, curved-line incision group, and diverse-line incision group.^[5,6] Pfeifer described a wave-line repair that allowed downward rotation as the curves were approximated into the straight line and the natural elasticity of the skin allows for the stretching the incision in the direction of a shallow curved margin. Corresponding to the skin incision, an additional lengthening of the lip stump is achieved if the falsely inserted muscles are repositioned and sutured. This offers numerous possibilities of variations which allow it to be individually adapted to the form of the cleft lip.^[3]

The skin incision varies depending on the extent of retraction and elasticity of the skin and characteristics of the white roll. The peculiarity of this procedure is the simple identification of the anatomical points without the need for measurements, which would have little meaning in relation to the tissues that are retracted as a result of cleft. The skin on both sides of the cleft appears to be dome like due to lack of proper insertions of the underlying muscles. The skin, however, after surgery becomes distended, becomes thinner, and assumes normal dimensions once the normal muscle activity is regained.^[3]

Using a wave-line incision method, it is easy to reconstruct the deficient vermilion than with a straight-line incisions, so that the results will be improved which was observed in our study in terms of lip and nasal parameters.^[7] This indicates that parameters have almost reached near normal after the surgery, indicating the success of Pfeifer's technique.

The nostril symmetry showed overall good result, especially in children below 6–12 months of age as alar cartilage is highly flexible, vulnerable, and adaptable into new position. The nostril symmetry is further improved by inserting two small 5–8 mm cut pieces of no.14 nasogastric (ryle's) tube, one into each nostril and secured with one or two 3.0 silk sutures with a bolster stitch. This manoeuvre maintains the shape and reduces the hematoma formation.^[8]

Outcome of primary surgery for cleft lip is judged by its effects on the quality of orofacial function and development;

this is dependent on good muscular repair of the perioral and perinasal muscles that is seen to be possible with this method. Nasoalveolar moulding (NAM) reduces the surgical burden by reducing the protrusion of premaxillary segment and prevents collapse of lateral segments. As both hard and soft tissues come close which will aid in ease of surgery with better aesthetic and functional outcome.^[9] NAM was not incorporated as part of our study due to nonaffordability and noncompliance of patients; however, good surgical results were obtained [Figures 2 and 3].

The advantages we observed after strictly following the steps and incision design as described in the available literature are as follows: (1) the positioning of the symmetric marking points, sketching of multiple short waves with maximum distance to each other at the level of the nostrils, was the only way to ensure a cranial elongation of the philtrum and the columella. Usually, typical TIE preparation is done over prolabium for Cupid's bow which leads to loss of tissue, i.e., discarded. With this method, good amount of tissue is available for vertical columellar lengthening and elongation of nose, along with better coverage of protruded premaxilla with decreased incidence of dehiscence or revision procedure which may be required later [Figure 4a]. (2) On the lower edge of the philtrum, an approximately 2 mm border of lip mucosa is preserved and a piece of vermilion border has to be excised on each side over lateral segments, i.e., incision made into the vermilion, so that proper inserting of prolabium occurs which leads to good vermilion, white roll match, and Cupid's bow with good lip esthetics [Figure 4b]. (3) The vermilion at the lower end of the prolabium can be increased by rotation from the lateral segments on to the lower end of prolabium which leads to increased length of prolabium (even in cases of small prolabium), so that good amount of tissue is available for creating a lip pout for the repaired lip [Figure 4c]. (4) As part of the technique, the skin is bluntly mobilized from the alar base up to the nasal dome and loosened from the cartilage frame, in the columella, strands of connective tissue between the crura medialis of both sides have to be dissected to enable the erect nasal dome. A suture placed high up in the nasal dome percutaneously advances the crura medialis. With this maneuver, vertical nose elongation and columellar elongation occurs with decreased columellar-alar distance which ultimately decreases tension over orbicularis oris muscle with decreased chance of dehiscence and decreased chances of scar contracture [Figure 4d].

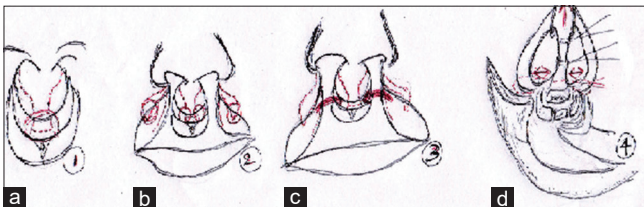


Figure 4: (a) markings over prolabium and Preservation of lip mucosa at lower end of philtrum (b) excision of piece of vermilion on the lateral segments (c) Rotation of vermilion mucosa from lateral segments onto lower end of prolabium (d) Vertical elongation of nose with medial advancement of both medial crura

Pfeifer's incision consists of short-curved waves which are subsequently approximated in a straight line, which helps in expanding the length and width of the tissue. The versatility of the Pfeifer's method is that it is single-stage procedure, applicable to almost all varieties of bilateral clefts including the revision surgeries. Wave-line incision is also used to correct Tessier clefts 0 and soft palatal repair with promising results. These incisions helped in tension-free closure of the cleft tissues, especially in wide clefts.^[10] The technique helps to properly align the orbicularis oris and the white roll which help in achieving adequate lip length, symmetry of the philtrum, and Cupid's bow, with a better scar. The only disadvantage of this technique is temporary postoperative shortening of the lip scar, which spontaneously improves within a few months by the regained function of the muscles of the lip.

Conclusions

The bilateral cleft lip repair is the most challenging one and requires high level of skill, knowledge, and experience. Cleft lip and palate are one of the most common birth defects that need long rehabilitation. Over the years, a number of techniques of cleft lip repair have been proposed and practiced based on designing and cutting of flaps of various dimensions and geometry. Apart from the parameters mentioned for lip, the other parameters such as lip scar, Length-lip balance, and pout and nasal parameters such as dorsum, septum, and position of columella can also be assessed. Although the Pfeifer's technique is not new, the literature available is sparse. The results of the study were clinically satisfactory and statistically significant. Finer details of this technique are possible in future with large series of work in high-volume centers with long-term evaluation.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

- McLeod NM, Urioste ML, Saeed NR. Birth prevalence of cleft lip and palate in Sucre, Bolivia. *Cleft Palate Craniofac J* 2004;41:195-8.
- Zayed EF, Ayad W, Moustafa WA, El Shishtawy AH. Unilateral cleft lip repair: Experience with Millard technique and introduction to the concept of junctional zones repair. *Egypt J Plast Reconstr Surg* 2012;36:109-18.
- Esprashare.org. Closure of Cleft Lips with Wave Line Incisions According to Pfeifer. Available from: <http://www.esprashare.org>.
- Penfold C, Dominguez-Gonzalez S. Bilateral cleft lip and nose repair. *Br J Oral Maxillofac Surg* 2011;49:165-71.
- Henkel KO, Dieckmann A, Dieckmann O, Lenz JH, Gundlach KK. Veloplasty using the wave-line technique versus classic intravelar veloplasty. *Cleft Palate Craniofac J* 2004;41:1-4.

6. Demke JC, Tatum SA. Analysis and evolution of rotation principles in unilateral cleft lip repair. *J Plast Reconstr Aesthet Surg* 2011;64:313-8.
7. Chait L, Kadwa A, Potgieter A, Christofides E. The ultimate straight line repair for unilateral cleft lips. *J Plast Reconstr Aesthet Surg* 2009;62:50-5.
8. Niimi T, Natsume N, Tsukawaki T, Furukawa H, Masuda H, Kobayashi M, *et al.* Treatment of the nostrils in patients with cleft lip by a nostril retainer. *Br J Oral Maxillofac Surg* 2000;38:224-6.
9. Grayson BH, Shetye PR. Presurgical nasoalveolar moulding treatment in cleft lip and palate patients. *Indian J Plast Surg* 2009;42 Suppl: S56-61.
10. Pandey R, Gupta R, Bhagat N, Verma A. Surgical repair of a median cleft of the upper lip via a pfeifer incision: A case report. *J Dent (Tehran)* 2016;13:139-42.