

## Research Article

# Retrospective subjective evaluation of aesthetic outcome in secondary cleft lip deformities operated with Abbe's flap

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**Received:** 2 November 2014

**Accepted:** 3 December 2014

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## ABSTRACT

**Background:** The Abbe's flap is most commonly used to repair the full thickness defects of the lip that do not involve the commissure. The Abbe flap was first introduced to correct the secondary deformity of bilateral cleft lip. By this pedicled flap, we are able to equalize the disparity which existed between the tight upper lip and excessive lower lip. Aims to study retrospective subjective evaluation of aesthetic outcome in secondary cleft lip deformities operated with Abbe's flap.

**Methods:** 29 patients operated during the period of January 2007 - December 2011 for correction of secondary cleft lip and nasal deformity with Abbe's flap with or without rhinoplasty were included in our retrospective study. The secondary corrective surgeries were performed by a single surgeon. The photographs of the patients were retrospectively assessed by two plastic surgeons and one oral and maxillofacial surgeon, other than the one who performed the surgery. 29 patients operated during the period of January 2007 - December 2011 for correction of secondary cleft lip and nasal deformity with Abbe's flap with or without rhinoplasty were included in our retrospective study. The secondary corrective surgeries were performed by a single surgeon. The photographs of the patients were retrospectively assessed by two plastic surgeons and one oral and maxillofacial surgeon, other than the one who performed the surgery.

**Results:** Out of 29 patients with secondary cleft deformities 12 were male and 17 were female. Average follow up period was 3 years. Multiple variables of the nose and the lips were used to assess the aesthetic outcome of Abbe's flap.

**Conclusion:** As per the subjective retrospective analysis of our study we have come to the conclusion that Abbe's flap is a work horse for correction of shortage of tissue for the secondary cleft lip deformities. Uniform satisfactory outcome was obtained with a more natural contour and more satisfactory proportion of both lips.

**Keywords:** Cleft lip, Abbe's flap, Rhinoplasty, Secondary cleft lip

## INTRODUCTION

The distribution of cleft lip and palate in literature is - cleft lip and palate at 46%, followed by isolated cleft palate at 33%, then isolated cleft lip at 21%. The majority of bilateral cleft lips (86%) and unilateral cleft lips (68%) are associated with cleft palate. Males are predominant in

cleft lip and palate population, whereas females have more of isolated cleft palates.<sup>1</sup>

The primary cleft lip surgery has undergone vast improvement in technique, but revision of residual lip deformity continues to be a major challenge. The marked horizontal tightness of the cleft upper lip attributes to deficient tissue and intense scarring. The situation is

perpetually aggravated by repeated surgery leading to excessive tissue wastage. The tight upper lip is more common in bilateral than unilateral cleft lip and palate. Most of these patients have associated protruding and excess lower lip.

Robbert Abbe, initially described his “lip switch” flap in 1898 for the secondary correction of a cleft lip deformity.<sup>3</sup> By this pedicled flap Abbe was able to equalize the disparity which existed between the tight upper lip and excessive lower lip.<sup>2</sup>

The Abbe’s flap is a reliable axial flap composed of skin, muscle, vermilion and mucosa. The Abbe’s flap’s advantage is the similarity of the tissue structure and appearance between the upper and lower lips. It is useful to reconstruct the philtral subunit, and to reverse the discrepancy between the upper and lower lip.

In this case series, three non-allied surgeons other than the operating surgeon were assigned to evaluate the aesthetic outcome of the Abbe’s flap in secondary cleft lip deformity correction. Many patients with primary and secondary cleft deformities were reviewed. Of these, patients with secondary cleft lip deformities requiring Abbe’s flap have been included in our study. The standard views, frontal view, Worm’s eye view and lateral profile photographs of all the patients were used and different variables of the lip and nose are seen and scored.

Aim of the study was to:

- Retrospective subjective evaluation of aesthetic outcome in secondary cleft lip deformities operated with Abbe’s flap with or without rhinoplasty.
- To assess the photographs of the patients taken in preoperative and post-operative periods of follow up.
- To subjectively assess the photographs with application of objectivity to the following variables like - Cupid’s bow, philtral column, soft tissue augmentation and vertical length of the upper lip, scar line, horizontal length of lower lip and labiomental fold and also alar flare, columella, tip and dorsum of the nose.
- Evaluation to be done by three independent surgeons other than the operating surgeons and the scores by the evaluators to be tabulated and analysed.

**METHODS**

29 patients operated from the period of May 2007 - April 2012 for correction of secondary cleft lip and nasal deformity with Abbe’s flap with or without rhinoplasty were included in our retrospective study. The secondary corrective surgeries were performed at a centre in Chennai. The primary cleft lip repairs for these patients

were performed at some other centres. Average follow up period was 4 years (2-6 years).

**Inclusion criteria**

- Patients with unilateral and bilateral cleft lip with secondary deformities who required correction using Abbe’s flap only.
- Patients with unilateral and bilateral cleft lip with secondary deformities who required correction using Abbe’s flap and closed or open rhinoplasty.
- Such operated patients who could be followed up for more than 2 years.

**Exclusion criteria**

- Operated patients with follow-up period of less than 2 years.
- Secondary deformities due to malignancy, trauma, infection and bites, in which Abbe’s flap was used.

Preoperative and postoperative photographs of 12 male and 17 female patients were included in our study. All photos, both preoperative and postoperative were taken by using the same digital camera. The distance, illumination and exposure were standardised. The photographs of the patients were retrospectively assessed by two plastic surgeons with an experience of more than 10 years in craniofacial and cleft surgery and one oral and maxillofacial surgeon with an experience of 5 years, other than the ones who performed the surgery.

Frontal view, lateral view and worm’s eye view photograph were taken after division of the flap, and during discharge and at follow ups during patient’s revisit. Evaluation was done for various variables and graded objectively by a scoring system as 3 - Good, 2 - Reasonable improvement, 1 - No improvement (Example Table 1 & 2).

**Table 1: Evaluation of variable - Tip of the nose.**

Variable	3- Good	2- Reasonable improvement	1- No improvement
<b>Nose</b>			
Tip			
Columella			
Dorsum			
Alar flare			
<b>Upper lip</b>			
Philtral column			
Cupid’s bow			
Vertical length			
Soft tissue augmentation			
<b>Lower lip</b>			
Scar line			
Labio mental fold			
Horizontal length			

**Table 2: Tip of the nose.**

Scores	1 <sup>st</sup> evaluator		2 <sup>nd</sup> evaluator		3 <sup>rd</sup> evaluator	
	(No. of patients)	Percentage	(No. of patients)	Percentage	(No. of patients)	Percentage
1	4	13.8	6	20.7	2	06.9
2	2	06.9	0	0	3	10.3
3	23	79.3	23	79.3	24	82.2
<b>Total</b>	29	100	29	100	29	100

**Scores:**

1. No improvement
2. Reasonable improvement
3. Good

- Tip 1 - 1<sup>st</sup> evaluator
- Tip 2 - 2<sup>nd</sup> evaluator
- Tip 3 - 3<sup>rd</sup> evaluator

The example Table 2 explains that, of the 29 patients (100%), 4 patients (13.8%) were given a score of 1, two patients (6.9%) were given a score of 2 and 23 patients (79.3%) were given a score of 3 by the 1<sup>st</sup> evaluator, which concludes that 79.3% of patients had good outcome as per 1<sup>st</sup> evaluator. Similarly consistent good outcome results were given by 2<sup>nd</sup> evaluator (79.3%) and 3<sup>rd</sup> evaluator (82.8%). The mean acceptances by three evaluators were calculated for the variable tip of the nose which comes to 80.4%. Similarly each and every variable was scored objectively and analysed by software and results tabulated.

**Operative technique**

Informed consent is obtained from both parents and the patient after explaining about a two staged procedure, necessity to have the two lips temporarily joined and the vertical scar in the lower lip. In case of combining the procedure with rhinoplasty, requirement of the costochondral and the conchal cartilage graft will also be explained.

The procedures are performed under general anaesthesia, with orotracheal intubation. After marking, epinephrine solution is injected to the nose but not to the lips to prevent the lip swelling and distortion. Now the upper lip, the prolabium and the lip scar are outlined for the excision. The mucosa of maxilla and prolabium is preserved for the deepening procedure for the patients with shallow buccal sulcus and the same time, any fistula if present in the primary palate is repaired. The lateral lip segments are mobilized by incisions onto the nostril floor and by freeing the mucosa and muscle from the premaxilla and pyriform margin allowing medial advancement of the lateral lip segments without tension.

This procedure would reduce the nostrils and nasal width and lengthen the upper lip. On the other hand, shortening of a long lip is achieved by direct excision at the alar base.

In a few patients as desired, open or closed tip rhinoplasty is performed. If the lower alar cartilages are only required to be repositioned then the alar margin incision is used and the cartilages are repositioned, in this closed tip rhinoplasty. When the columella and the dorsum of the nose requires both skeletal and the cartilage work then the open tip rhinoplasty is used. Patient is explained about the requirement of the costochondral graft. The columella is raised from its base through lateral incisions behind the columella and extending upward inside the nostrils or by using connecting reverse U-incision on the alar skin surface. Subcutaneous dissection of the nasal skin envelop is performed on the tip and alar subunits, excess subcutaneous fatty tissue are trimmed off. Adequate haemostasis is achieved. Conchal cartilage grafts are used for approximating and supporting the medical crus of the lower lateral cartilage, sustaining the columellar elongation and the nasal tip definition. The nasal skin is redraped and the lateral lip segments are fixed to the columellar base, alar cinch sutures are sometimes used to maintain the reduction of the nostrils and alar width.

Design of the flap in all patients begins with determination of the lower lip midline. From the midline the width, length, and shape of the Abbe flap as per the conventional method (no modifications of the Abbe's flap were done) are outlined, simulating the philtrum for the upperlip. The size of the Abbe's flap is 13-14 mm in length and 8-9 mm in width on the cutaneous portion, tapering inferiorly slightly. The end of the Abbe flap is cut in a W-shape to match the excised defect at the columellar base. Multiple darts are made for accurate donor site closure and approximation of the skin, white skin roll, and the red line at the junction of the dry vermilion and the wet mucosa.

Bilateral incisions are made on the lower lip skin, vermilion and across the red line on both sides. Harvesting of the Abbe flap is performed using no. 11 blade to penetrate and cut full thickness lip, leaving a cuff

of pedicle tissue on one side. The pedicle contains appropriate amount of mucosa and muscle on the posterior superior aspect of the lower lip with inferior labial branch of facial artery. The flap is easily rotated upwards without distortion of the tissue surrounding the pedicle and the vascular supply is not jeopardized upon transfer. The unused rhomboid shape tip of the flap is trimmed. The donor site of the Abbe flap is carefully closed. The Abbe flap is then inserted and sutured to the defect in layers. The Abbe flap is divided after 10 to 14 days under local anaesthesia.

The patient and the parents are explained about the post-operative management, during which the patient has to take care of the operated site by keeping the hygiene both intraoral and extra orally.

Airway obstruction sometimes can occur if Abbe flap is combined with rhinoplasty. This complication can occur in the first 2-3 days when the edema occurs and the patient breathes through the mouth. Therefore in such cases the oropharyngeal airway tube is placed on the side of the flap.

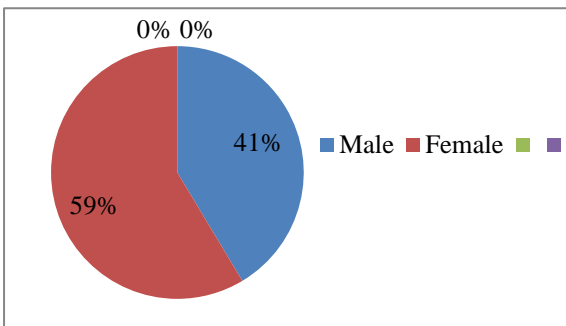
**Statistical evaluation**

- The results were analyzed using SPSS 16 and EPIinfo software.
- The descriptive evaluation was done for all variables.
- Inferential evaluation was done using Cronbach's Alpha method which is based on the average inter-item correlation and intra-item ANOVA method.

**RESULTS**

**Sex distribution**

Out of 29 patients with secondary cleft deformities, 41.4% (12) were male and 58.6% (17) were female (Figure 1).



**Figure 1: Showing distribution of sex.**

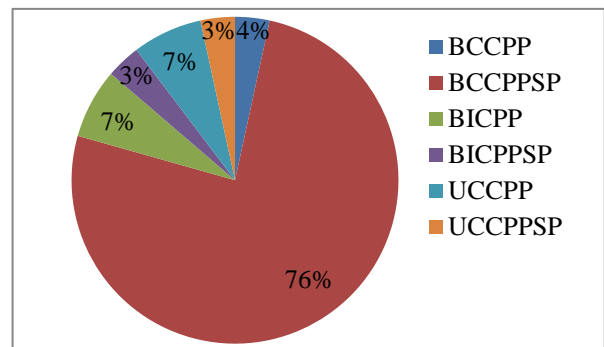
**Age distribution**

Age ranged from 8 to 40 years with mean of 21.62 years.

**Distribution of diagnosis**

- Bilateral complete cleft of primary palate (BCCPP) - 3.4
- Bilateral complete cleft of primary palate + secondary palate (BCCPPSP) - 75.9
- Bilateral incomplete cleft of primary palate (BICPP) - 6.9
- Bilateral incomplete cleft of primary palate + secondary palate (BICPPSP) - 3.4
- Unilateral complete cleft of primary palate (UCCPP) - 6.9
- Unilateral complete cleft of primary palate + secondary palate (UCCPPSP) - 3.4

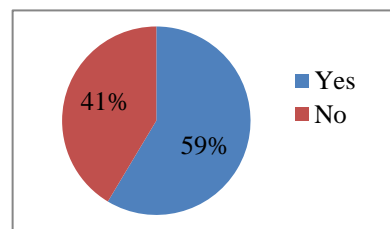
Figure 2: 75.9% (22) of the patients had bilateral complete cleft of primary palate and secondary palate, followed by bilateral incomplete cleft of primary palate 6.9% and unilateral complete cleft of primary palate with 6.9% (2). Bilateral complete cleft of primary palate 3.4%, bilateral incomplete cleft of primary palate and secondary palate and unilateral complete cleft of primary palate and secondary palate had 3.4% (1).



**Figure 2: Showing distribution of diagnosis in percentage.**

**Abbe's flap with rhinoplasty**

Figure 3: Of the 29 patients 58.6% (17) had rhinoplasty along with the Abbe's flap.



**Figure 3: Showing percentage of cases with and without rhinoplasty.**

**Evaluation of variables**

Significant consistent agreement for inter-item analysis among the evaluators for the variables tip of the nose and columella, dorsum of the nose, alar flare, philtral column, Cupid’s bow were achieved, with closer agreement for the variable scar line.

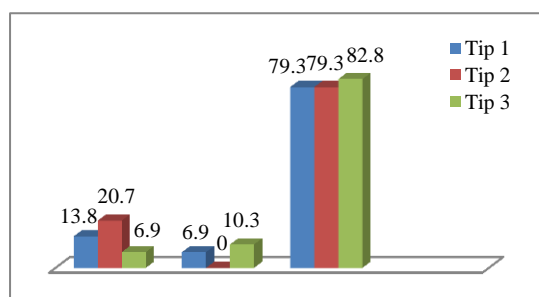
**Tip of the nose**

Table 3 & Figure 4: For the variable tip of the nose the three evaluators had a mean acceptance of 80.4%\* as good outcome and 13.8%\* with no improvement.

**Table 3: Evaluation of variable - Tip of the nose.**

Scores	1 <sup>st</sup> evaluator		2 <sup>nd</sup> evaluator		3 <sup>rd</sup> evaluator	
	(No. of patients)	Percentage	(No. of patients)	Percentage	(No. of patients)	Percentage
1	4	13.8	6	20.7	2	06.9
2	2	06.9	0	0	3	10.3
3	23	79.3	23	79.3	24	85.8
<b>Total</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>

Cronbach’s alpha - 0.941 (significant)



**Figure 4: Representing evaluation of variable tip.**

**Columella**

Table 4 & Figure 5: Columella variant had 77.03%\* good result and 12.60%\* had no improvement.

**Dorsum of the nose**

Table 5 & Figure 6: Dorsum of the nose had 83.93%\* of good outcome and 8%\* of patients had reasonable improvement.

**Table 4: Evaluation of variable Columella.**

Scores	1 <sup>st</sup> evaluator		2 <sup>nd</sup> evaluator		3 <sup>rd</sup> evaluator	
	(No. of patients)	Percentage	(No. of patients)	Percentage	(No. of patients)	Percentage
1	5	17.2	5	17.2	1	03.4
2	3	10.3	0	0	6	20.7
3	21	72.4	24	82.8	22	75.9
<b>Total</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>

Cronbach’s alpha - 0.845 (significant)

**Table 5: Evaluation of the variable - Dorsum of the nose.**

Scores	1 <sup>st</sup> evaluator		2 <sup>nd</sup> evaluator		3 <sup>rd</sup> evaluator	
	(No. of patients)	Percentage	(No. of patients)	Percentage	(No. of patients)	Percentage
1	2	06.9	4	13.8	1	03.4
2	1	03.4	1	03.4	5	17.2
3	26	89.7	24	82.8	23	79.3
<b>Total</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>

Cronbach’s alpha - 0.795 (significant)

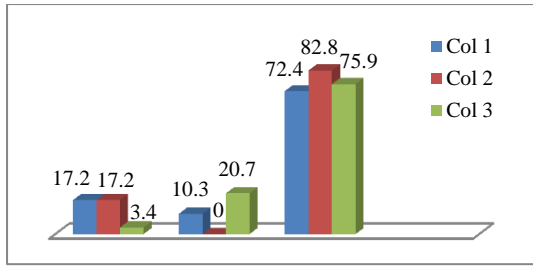


Figure 5: Representing evaluation of variable columella.

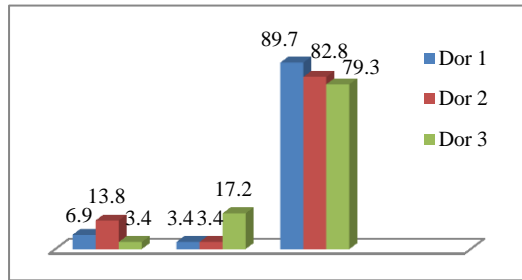


Figure 6: Representing evaluation of variable dorsum of nose.

*Alar flare*

Table 6 & Figure 7: The variable alar flare had good outcome in 75.9%\*, with reasonable improvement in 13.77%\*.

*Philtral column*

Table 7 & Figure 8: In philtral column 83.90%\* had good outcome and only 4.56%\* had no improvement.

*Cupid's bow*

Table 8 & Figure 9: The variant Cupid's bow had 62%\* good outcome and reasonable improvement was seen in 35.63%\*.

*Vertical length of upper lip*

Table 9 & Figure 10: The variables vertical length and soft tissue augmentation of the upper lip had 95.4%\* and 94.3%\* good outcome respectively.

Table 6: Evaluation of the variable - Alar flare.

Scores	1 <sup>st</sup> evaluator		2 <sup>nd</sup> evaluator		3 <sup>rd</sup> evaluator	
	(No. of patients)	Percentage	(No. of patients)	Percentage	(No. of patients)	Percentage
1	4	13.8	4	13.8	1	03.4
2	3	10.3	3	10.3	6	20.7
3	22	75.9	22	75.9	22	75.9
<b>Total</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>

Cronbach's alpha - 0.796 (significant)

Table 7: Evaluation of the variable - Philtral column.

Scores	1 <sup>st</sup> evaluator		2 <sup>nd</sup> evaluator		3 <sup>rd</sup> evaluator	
	(No. of patients)	Percentage	(No. of patients)	Percentage	(No. of patients)	Percentage
1	1	03.4	0	0	3	10.3
2	3	10.3	2	06.9	5	17.2
3	25	86.2	27	93.1	21	72.4
<b>Total</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>

Cronbach's alpha - 0.798 (significant)

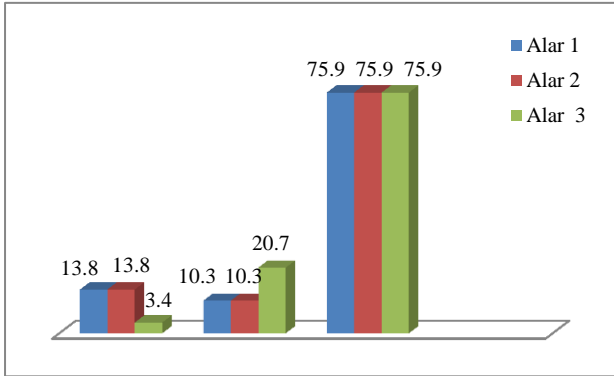
Table 8: Evaluation of the variable - Cupid's bow.

Scores	1 <sup>st</sup> evaluator		2 <sup>nd</sup> evaluator		3 <sup>rd</sup> evaluator	
	(No. of patients)	Percentage	(No. of patients)	Percentage	(No. of patients)	Percentage
1	1	03.4	0	0	3	10.3
2	3	10.3	2	06.9	5	17.2
3	25	86.2	27	93.1	21	72.4
<b>Total</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>	<b>29</b>	<b>100</b>

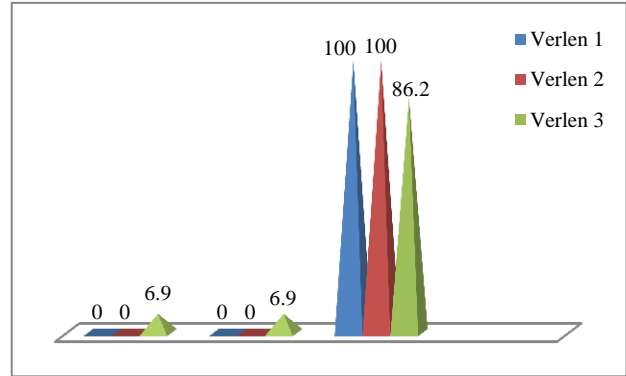
Cronbach's alpha - 0.686 (significant)

**Table 9: Evaluation of variable - Vertical length of upper lip.**

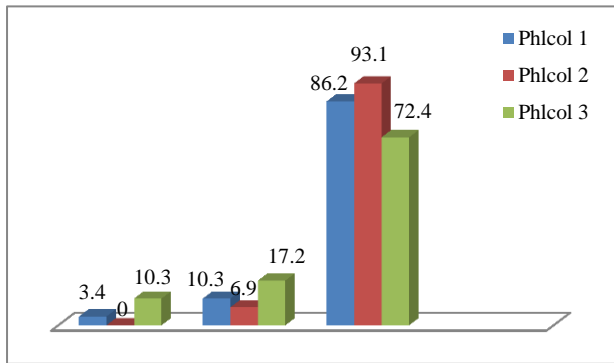
Scores	1 <sup>st</sup> evaluator (No. of patients)	Percentage	2 <sup>nd</sup> evaluator (No. of patients)	Percentage	3 <sup>rd</sup> evaluator (No. of patients)	Percentage
1	0	0	0	0	2	06.9
2	0	0	0	0	2	06.9
3	29	100	29	100	25	86.2
<b>Total</b>	29	100	29	100	29	100



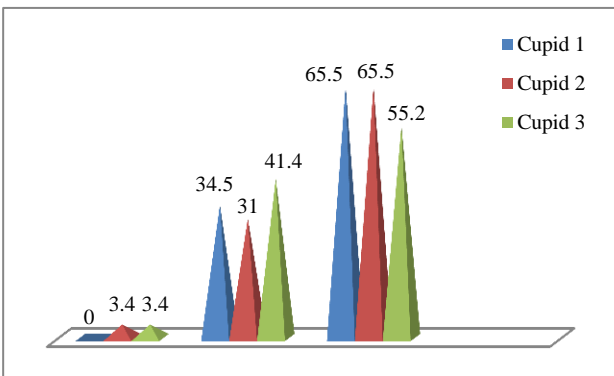
**Figure 7: Representing evaluation of variable alar flare.**



**Figure 10: Representing evaluation of variable vertical length of upper lip.**



**Figure 8: Representing evaluation of variable philtral column.**



**Figure 9: Representing evaluation of variable Cupid's bow.**

*Soft tissue augmentation*

Table 10 & Figure 11.

*Scar line in lower lip*

Table 11 & Figure 12: Scar line was inconspicuous in 88.53%\* of the patients.

*Labiomental fold*

Table 12 & Figure 13.

*Horizontal length of lower lip*

Table 13 & Figure 14: Labiomental fold and horizontal length of the lower lip was maintained in 98.86%\* of the patients (\* = all % values are in mean).

Out of the multiple variables of the nose and the lips soft tissue augmentation, vertical length of the upper lip, horizontal length of the lower lip had good outcome with a mean more than 90% and however, philtral column had 83% and cupid's bow had 62% good outcome.

In review of literature, only a few articles have mentioned collectively good outcome of Abbe's flap,<sup>3,11</sup> none of them have specifically assessed the variables of nose or lips as done in our study.

**Table 10: Evaluation of variable - Soft tissue augmentation.**

Scores	1 <sup>st</sup> evaluator (No. of patients)	Percentage	2 <sup>nd</sup> evaluator (No. of patients)	Percentage	3 <sup>rd</sup> evaluator (No. of patients)	Percentage
1	0	0	0	0	0	0
2	1	03.4	1	03.4	3	10.3
3	28	96.6	28	96.6	26	89.7
<b>Total</b>	29	100	29	100	29	100

Cronbach's alpha - 0.877 (significant)

**Table 11: Evaluation of the variable - Scar line in lower lip.**

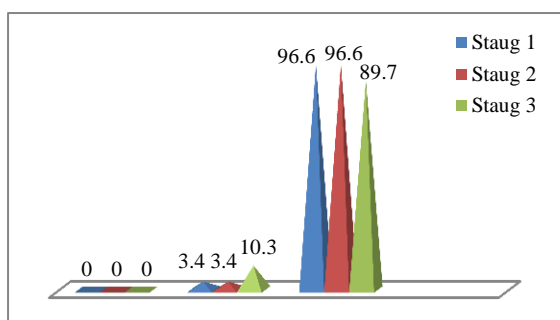
Scores	1 <sup>st</sup> evaluator (No. of patients)	Percentage	2 <sup>nd</sup> evaluator (No. of patients)	Percentage	3 <sup>rd</sup> evaluator (No. of patients)	Percentage
1	0	0	0	0	0	0
2	2	06.9	3	10.3	5	17.2
3	27	93.1	26	89.7	24	82.8
<b>Total</b>	29	100	29	100	29	100

**Table 12: Evaluation of the variable - Labiamental fold.**

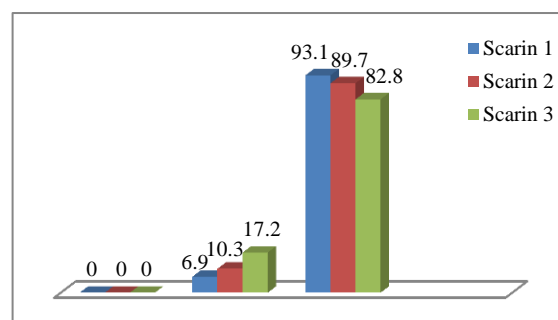
Scores	1 <sup>st</sup> evaluator (No. of patients)	Percentage	2 <sup>nd</sup> evaluator (No. of patients)	Percentage	3 <sup>rd</sup> evaluator (No. of patients)	Percentage
1	0	0	0	0	0	0
2	0	0	0	0	1	03.4
3	29	100	29	100	28	96.6
<b>Total</b>	29	100	29	100	29	100

**Table 13: Evaluation of variable - Horizontal length of lower lip.**

Scores	1 <sup>st</sup> evaluator (No. of patients)	Percentage	2 <sup>nd</sup> evaluator (No. of patients)	Percentage	3 <sup>rd</sup> evaluator (No. of patients)	Percentage
1	0	0	0	0	0	0
2	0	0	0	0	1	03.4
3	29	100	29	100	28	96.6
<b>Total</b>	29	100	29	100	29	100



**Figure 11: Representing evaluation of variable soft tissue augmentation.**



**Figure 12: Representing evaluation of variable scar line in lower lip.**



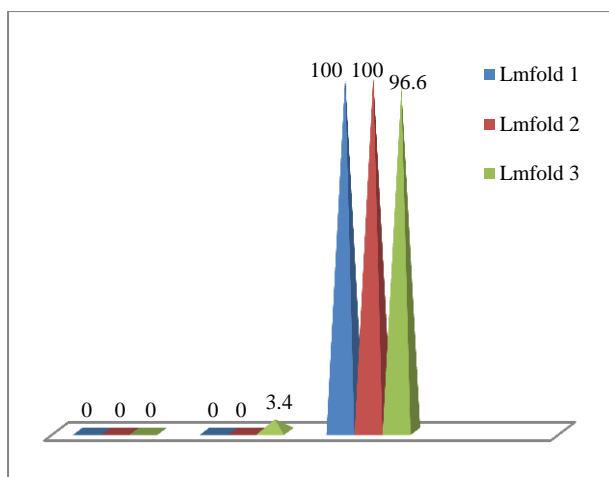


Figure 13: Representing evaluation of variable labiomental fold.

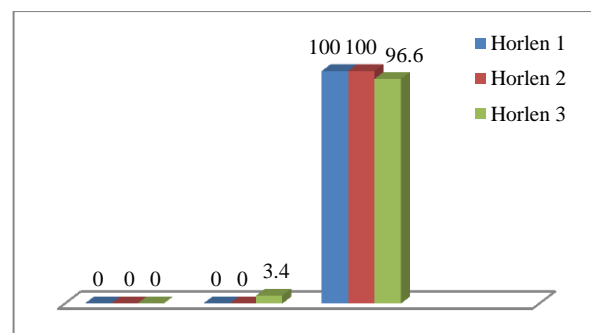


Figure 14: Representing evaluation of variable horizontal length of lower lip.

**Cronbach’s alpha**

This method is a model of internal consistency, based on the average inter-item correlation (Table 14).

Table 14: Cronbach’s alpha.

Cronbach’s alpha (three analyzers)	Tip	Col	Dor	Alar	Ph-Col	Cupid	STAUG	SCARLN
Value	0.936	0.850	0.780	0.806	0.695	0.675	0.816	0.462

For the variables vertical length of the upper lip, labiomental fold, and the horizontal length of the lower lip, the first evaluator and the second evaluator were consistent with each other’s observations and which gave zero variant for these three variables.

Hence, these items were deleted from the scale. This indicates that satisfactory results were obtained as per the three evaluators when inter-item analysis by Cronbach’s alpha method was used.

**ANOVA method**

As it is a subjective analysis done by more than two evaluators, the study demands intra-item (intra-evaluator) analysis. This was analyzed using ANOVA method.

*Tip of the nose*

Table 15: There is no significant difference between the evaluators and also within the evaluators among the observations (F = 2.498, P value = 0.091).

*Columella*

Table 16: There is no significant difference between the evaluators and also within the evaluators among the observations (F = 1.279, P value = 0.286).

Table 15: Tip of the nose.

	Sum of squares	Df	Mean square	F	Sig
<b>Between people</b>	38.000	28	1.357		
<b>Within people between items</b>	0.437	2	0.218		
Residual	4.897	56	0.087	2.498	0.091
Total	5.333	58	0.092		
<b>Total</b>	43.333	86	0.504		

Grand mean = 2.67 (People = evaluator)

Table 16: Columella.

	Sum of squares	Df	Mean square	F	Sig
<b>Between people</b>	31.954	28	1.141		
<b>Within people between items</b>	0437	2	0.218		
Residual	9.563	56	0.171	1.279	0.286
Total	10.000	58	0.172		
<b>Total</b>	41.924	86	0.488		

Grand mean = 2.67 (People = evaluator)

*Dorsum of the nose*

Table 17: There is no significant difference between the evaluators and also within the evaluators among the observations (F = 0.853, P value = 0.432).

**Table 17: Dorsum of the nose.**

	Sum of squares	Df	Mean square	F	Sig
<b>Between people</b>	20.598	28	0.736	0.853	0.432
<b>Within people between items</b>	0.276	2	0.138		
Residual	9.057	56	0.162		
Total	9.333	58	0.161		
<b>Total</b>	29.931	86	0.348		

Grand mean = 2.76 (People = evaluator)

*Alar flare*

Table 18: There is no significant difference between the evaluators and also within the evaluators among the observations (F = 0.554, P value = 0.578).

**Table 18: Alar flare.**

	Sum of squares	Df	Mean square	F	Sig
<b>Between people</b>	26.989	28	0.964	0.554	0.578
<b>Within people between items</b>	0.207	2	0.103		
Residual	10.460	56	0.187		
Total	10.667	58	0.184		
<b>Total</b>	37.655	86	0.438		

Grand mean = 2.66 (People = evaluator)

*Philtral column*

Table 19: There is no significant difference between the evaluators and also within the evaluators among the observations (F = 5.143, P value = 0.009). That is there is no consistency among the evaluators for this variable.

**Table 19: Philtral column.**

	Sum of squares	Df	Mean square	F	Sig
<b>Between people</b>	12.943	28	0.462	5.143	0.009
<b>Within people between items</b>	1.448	2	0.724		
Residual	7.885	56	0.141		
Total	9.333	58	0.161		
<b>Total</b>	22.276	86	0.259		

Grand mean = 2.79 (People = evaluator)

*Cupid's bow*

Table 20: There is no significant difference between the evaluators and also within the evaluators among the observations (F = 0.863, P value = 0.428).

**Table 20: Cupid's bow.**

	Sum of squares	Df	Mean square	F	Sig
<b>Between people</b>	14.920	28	0.533	0.863	0.428
<b>Within people between items</b>	0.299	2	0.149		
Residual	9.701	56	0.173		
Total	10.000	58	0.172		
<b>Total</b>	24.920	86	0.290		

Grand mean = 2.60 (People = evaluator)

*Soft tissue augmentation of the upper lip*

Table 21: There is no significant difference between the evaluators and also within the evaluators among the observations (F = 2.074, P value = 0.135).

**Table 21: Soft tissue augmentation of the upper lip.**

	Sum of squares	Df	Mean square	F	Sig
<b>Between people</b>	3.379	28	0.121	2.074	0.135
<b>Within people between items</b>	00.092	2	0.046		
Residual	1.241	56	0.022		
Total	1.333	58	0.023		
<b>Total</b>	4.713	86	0.055		

Grand mean = 2.94 (People = evaluator)

*Scar line in the lower lip*

Table 22: There is no significant difference between the evaluators and also within the evaluators among the observations (F = 1.000, P value = (0.374).

**Table 22: Scar line in the lower lip.**

	Sum of squares	Df	Mean square	F	Sig
<b>Between people</b>	4.184	28	0.149	1.000	0.374
<b>Within people between items</b>	0.161	2	0.080		
Residual	4.506	56	0.080		
Total	4.667	58	0.080		
<b>Total</b>	8.851	86	0.103		

Grand mean = 2.89 (People = evaluator)

### *Vertical length of upper lip, labiomental fold and horizontal length of lower lip*

As consistent scores were given by the 1<sup>st</sup> and 2<sup>nd</sup> evaluators for the following variables, hence zero variant was given statistically by the software and is deleted from the scale.

No significant differences between the evaluators and also within the evaluators, among the observations were noted in most of the variables. However, significant difference was seen in only one of the variable that is philtral column. Since it is a subjective analysis of the photographs this difference can be ignored.

## **DISCUSSION**

The Abbe flap was first introduced to correct the secondary deformity of bilateral cleft lip and palate. This lip switch flap is helpful for restoration of the upper lip defect or the deformity.<sup>2,3,4</sup>

The logical approach is to use the redundancy of the lower lip to correct the deficiency of the upper lip. Severe disproportionate dimensions between the widths of the upper and the lower lips is an indication for the use of an Abbe flap.<sup>5</sup> This flap is especially useful for patients with an extremely tight upper lip following the treatment of bilateral clefts.<sup>6</sup> A cross-lip vermilion orbicularis oris muscle flap has been used for tubercle reconstruction by Hovey,<sup>5</sup> though we did not have an occasion to use this.

Traditionally marked tissue deficiency of the cleft upper lip has been secondarily corrected by technique such as the Abbe flap. It consists of mucosa, muscle and skin based on a pedicle containing the inferior labial vessels.<sup>7,8</sup>

In our study, the surgeon used the standard conventional technique and obtained the sufficient length of the lower lip which was used not only for the correction of the vermilion but also for the correction of the other deformities of the upper lip.

In our study, 29 patients with secondary cleft deformities with 41.4% (12) were male and 58.6% (17) were female patients. The age ranged from 8 to 40 years with mean of 21.62 years. The average follow up period in this group was 4.5 years (2-7 years).

In distribution of diagnosis, 75.9% (22) of the patients had Bilateral complete cleft of primary palate and secondary palate, followed by Bilateral incomplete cleft of primary palate and Unilateral complete cleft of primary palate each with 6.9% (2). Bilateral complete cleft of primary palate, bilateral incomplete cleft of primary palate and secondary palate and unilateral complete cleft of primary palate and secondary palate each had 3.4% (1). Of the 29 patients 58.6% (17) had rhinoplasty along with the Abbe's flap.

Lun Jou. Lo et al., in his study, results showed that the Abbe flap could be safely and effectively performed simultaneous with reconstructive rhinoplasty without added surgical morbidity or airway obstruction.<sup>4</sup> In our study two patients with combined Abbe flap and rhinoplasty had airway obstruction for which oropharyngeal airway was placed on the side of the flap and patients were retrieved. The outcome of Abbe's flap in patients with and without rhinoplasty had similar good to reasonable improvement.

Symmetry and satisfactory results were usually achieved using one stage procedure for the bilateral cleft lip nasal deformity.<sup>4</sup> Similar results were obtained in our study during the subjective evaluation of the variables Tip of the nose, dorsum of the nose and philtral column had over 80.4%, 83.93% and 83.90% had good outcome. Columella and alar flare had good aesthetic outcome in 77.03% and 75.9% respectively. Cupid's bow had good to reasonable outcome in most of the patients and vertical length and soft tissue augmentation of the upper lip nearing 95.4% and 94.3% good result. Scar line in the lower lip was inconspicuous in over 88.53%. The horizontal length of the lower lip was maintained in 98.86% of the patients.

The transferred Abbe flap stretches and becomes wider; the width of the flap was designed as 8-9 mm and the length of 13-14 mm in the study conducted by the Lun Jou. Lo et al., and they obtained the satisfactory aesthetic results using the routine design of the Abbe flap.<sup>4</sup> Similar dimensions were used by the surgeon in our study and obtained the satisfactory results.

Significant inter-item consistent agreement among the evaluators for all the variables were achieved with closer agreement for the variable scar line. As it is a subjective analysis done by more than two evaluators the study demanded intra-item analysis. No significant difference was noted between the evaluators, and consistent agreement was noted among all three evaluators for all variables except philtral column where slight difference was noted statistically. However, since it is a subjective analysis this difference can be ignored.

When the orbicularis oris continuity is maintained after the secondary correction with the Abbe flap, good muscle function is achieved which will be noted over a period of time. Miller et al. showed that for an Abbe flap, the source of reinnervation of the flap after transposition is the adjacent orbicularis oris muscle. By histochemical and electromyographic method, muscle neutrotization has also been documented in the laboratory.<sup>9</sup> No functional deficit were noticed in any of our patients. Hence, only aesthetic parameters were assessed in our study. Probably electromyography, biopsy of the transferred muscle and function analysis can be carried out in a large series.

The array of secondary deformities possible in patients with cleft and palate is formidable. When deciding on

which deformities to treat operatively, one must determine their impact on the patient. Consequently, it is important to know when “enough is enough”. As Marsh stated, the surgeon is at times more critical of the result than the patient is and not every cleft lip nasal deformity needs to be revised.<sup>10</sup>

Erol et al., in his study reported that insertion of the Abbe flap resulted in the release of the tight upper lip and a new, inconspicuous scar. Adequate tissue was transferred to the upper lip, which improved the bulk of the lip and the vermilion tubercle. The retrusion of the mid face and the projection of the upper lip were also improved, and the upper and lower lips became better balanced.<sup>11</sup> In our study similar results were obtained which showed improved bulk of the lip and the vermilion with the lower lip.

However this flap for the horizontal upper vermilion tightness in secondary cleft deformity is an effective use of the “Robin Hood principle” of taking what is excess to improve what is missing. This procedure does not violate the principle of units, and the results shown in our study represent definitive aesthetic and functional improvement. More over recovery of the orbicularis oris muscle sphincter function, which is said to occur after a lip switch flap is often meagre at best.<sup>12</sup>

## CONCLUSION

Abbe’s flap was first introduced to correct the secondary deformities of the bilateral cleft lip. This lip switch flap is helpful for the correction of the upper lip deformities like tight upper lip, short lip, shallow buccal mucosal sulcus, lack of philtral and Cupid’s bow definition, unsightly scars and central vermilion insufficiency. The results of various studies also showed that the Abbe flap could be safely and effectively performed simultaneous with rhinoplasty without added surgical morbidity or airway obstruction.

As per the subjective retrospective analysis of our study we have come to the conclusion that Abbe’s flap is a work horse for correction of shortage of tissue for the secondary cleft lip deformities. Uniform satisfactory outcome was obtained with a more natural contour of both lips and more satisfactory proportion.

This study involving large number of patients can further be extended for the objective and functional analysis of the orbicularis oris with the help of electromyography and histochemistry.

## ACKNOWLEDGEMENTS

We would like to thank Dr. Aravind BA, assistant professor, department of community medicine, MSRMC, Bangalore, for statistical analysis.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the institutional ethics committee*

## REFERENCES

1. Richard AH, Court C, Barry G. Cleft lip and palate., In: Richard AH, Court C, Barry G, eds. Grabb and Smith’s Plastic Surgery Text Book. 6th ed. Wolters Kulwer, Lippincott Williams And Wilkins; 2006: 201-225.
2. Abbe R. A new plastic operation for the relief of deformity due to double harelip. *Plast Reconstr Surg.* 1968;42:481.
3. Richard B. Stark. Robert Abbe and his contributions to plastic surgery. *Plast Reconstr Surg* (1946). 1953 Jul;12(1):41-58.
4. Lun-Jou Lo, Alex A. Kane, Yu-Ray Chen. Simultaneous reconstruction of the secondary bilateral cleft lip and nasal deformity: Abbe flap revisited. *Plast Reconstr Surg.* 2003 Oct;122(5):1219-27.
5. Hovey LM. Secondary unilateral cleft lip repair: Combining rotation: advancement principles with a cross lip muscle-vermilion flap. *Ann Plast Surg.* 1979;3:241.
6. Jackson IT, Fasching McCarthy JG. Abbe flap. In: Jackson IT, Fasching McCarthy JG, eds. *Plastic Surgery.* 4th ed. Philadelphia PA: Saunders; 1990: 2771-2802.
7. Millard Jr. Lip switch Abbe flap for philtrum. In: Strauch B, Vasconez LO, Hall-Findlay EJ, eds. *Grabb’s Encyclopedia of Flap.* 1st ed. Philadelphia: Lippincott-Raven; 1998: 547-548.
8. Jackson IT. Lower lip sandwich abbe skin flap to upperlip. Strauch B, Vasconez LO, Hall-Findlay EJ, eds. *Grabb’a Encyclopedia of Flap.* 1st ed. Philadelphia: Lippincott-Raven; 1998: 549-552.
9. Miller TA, Korn HN, Wheeler ES. Can one muscle reinnervate another? A preliminary study of muscular neurtization in the rabbit. *Plast Reconstr Surg.* 1978;61:50.
10. Marsh JL. When is enough? Secondary surgery for cleft lip and palate patients. *Clin Plast Surg.* 1990;17:37-47.
11. Erol Onur O, Pence M, Agaoglu G. The Abbe island flap for the reconstruction of the severe secondary cleft lip deformities. *J Craniofac Surg.* 2007 Jul;18(4):766-72.
12. Beyoung Yun Park, Tai Suk Roh. Rectangular flap for horizontal upper vermilion tightness in secondary cleft lip deformity. *Plast Reconstr Surg.* 1999 Dec;104(7):1976-81.

DOI: 10.5455/2320-6012.ijrms20150115

**Cite this article as:** Kumar KM, Murthy J, Narayan N. Retrospective subjective evaluation of aesthetic outcome in secondary cleft lip deformities operated with Abbe’s flap. *Int J Res Med Sci* 2015;3:83-94.