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Primary Rhinoplasty In Unilateral Cleft Lip Nose Repair

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Abstract

Background: Primary nasal surgery techniques include open or closed rhinoplasty In most studies the results have been based on qualitative analysis, Qualitative analysis will vary according to the perception of the observer. However, this has to be taken seriously because ultimately the results have to satisfy everyone and not only the surgeons. Few authors are in favour of closed rhinoplasty and most others are of the opinion that open rhinoplasty gives superior results**. Methods**, This is prospective clinical trial for comparison of two different techniques of primary rhinoplasty in unilateral cleft lip with nasal deformity presented to pediatric surgery clinic at Cairo university specialized pediatric hospital CUSPH at period from October 2017 to June 2019.**Results** , primary rhinoplasty was done at the time of lip repair in 30 patients. Their ages ranged from 3-18 months.. (16,7%) of those patients were of simple cleft lip type. (70%) of them were of complete cleft lip type and (13,3%) were of complete cleft lip palate type. (46,7%) of them suffer from a wide cleft, while (53,3%) had narrow defect. The technique used in (67%) of the patients was closed rhinoplasty while in (33%) open rhinoplasty was used. The follow up period ranged from 3-6 months with a mean value of 4 months. Complications observed were; early: infection in 2 cases, dehiscence in 1 case (due to infection), post-operative edema in 18 cases, Late: hypetrophic scar in 5 cases notching in 2 cases one of them in the white roll and the other on vermillion border . **Conclusion**: closed rhinoplastry is the best technique for primary rhinoplasty during unilateral cleft lip repair with nasal deformity.

Key words primary,cheilorhinoplasty,closed,open,techniques

INTRODUCTION

Early cleft surgeons faced the dilemma on whether to repair the cleft lip nose primarily. Surgeons who shed away from primary correction feared that they would cause harm to the growth of the nose and the maxilla. **Huffman et al., Byrd et al.,** believed that primary nasal repair is durable and decreases the extent of secondary surgery in adolescents..However, since the nineties of the last century, there has been a reappraisal to the concept of primary rhinoplasty in unilateral cleft lip management. Senior cleft surgeons, as **McCombie ,Millard, and slayer** provided encouraging results after reviewing the long-term results of primary repair. They proved that there was no interruption of growth by early surgery and reported stable results up to 18 years after surgery..Generally, cleft lip repair with primary rhinoplasty is performed at age 3 months. The patient's overall health status, including the presence of other congenital anomalies, may dictate that repair of the cleft be delayed.

AIM OF WORK

The aim of this work is to compare the use of closed and open techniques of primary rhinoplasty during unilateral cleft lip with nose deformity repair in order to compare the benefits between the two techniques include:

- The value of technique to provide better contour, symmetry, projection of nasal tip,alar base displacement and columellar deviation.
- Cosmotic result

This is prospective randomized controlled clinical trial for comparison between closed and open primary rhinoplasty in unilateral cleft lip with nasal deformity presenting to pediatric surgery clinic at Cairo university specialized pediatric hospital CUSPH at period from October 2017 to June 2019.
We selected cases according to following criteria:

Inclusion criteria:

- Unilateral cleft lip with nasal deformity with or without protruded premaxilla.
- Age from 3 monthes to 18 monthes.
- Both sexes

Exclusion criteria

- Bilateral cleft lip
- Infant or child previously operated for cleft lip repair

We made our study on 30 cases and we divided them into two groups according to the technique used for nasal deformity repair .

GroupA:20 cases underwent closed rhinoplasty

GroupB:10 cases underwent open rhinoplasty

We selected them randomly as we give GroupA (odd number) and GroupB (even number) and all of them undergo unilateral cleft lip repair with original millard rotational advancement technique for lip repair.
All 30 patients underwent cleft lip repair using millard rotational advancement technique as follow:

Preoperative design

We designed a preoperative marking used a brilliant blue dye for marking within a white line. The landmarks for the preoperative design are shown in Fig. 1.

Start by identifying and marking the low point of Cupid's bow,peak of Cupid's bow lateral non cleft side, peak of Cupid's bow medial non cleft side,alar base noncleft side,columellar base noncleft side x.back cutpoint noncleft side,oral commissure noncleft side,oral commissure cleft side,light scroll cleft side,medial tip of advancement flap cleft side,midpoint of alar base cleft side,lateral alar base cleft side,lateral alar base extent of incision.

After the markings and tattooing are completed, 0.25% Marcaine with 1:200,000 epinephrine is infiltrated. At this dilution the maximal dose of Marcaine is 1ml/kg. Typically, the entire amount is injected and the lip often blanches white in appearance secondary to vasoconstriction. Fig:2
Incisions are then made with a 15-blade scalpel along the medial skin markings first as in fig 3. The lateral incision is then performed creating three triangular flaps 2 cutaneous and 1 in the dry vermilion as in fig 4 An incision is made in the labial sulcus several millimeters above the attached gingiva. Rarely, in very wide clefts, a 3-4 mm “releasing back cut” is made at ninety degrees to the distal aspect of the gingivobuccal incision. This allows for easier advancement of the lateral cleft element and helps establish an adequate gingivobuccal sulcus.
As illustrated in fig 4.Medial flap(a)rotate downward to achieve necessary lengthening,lateral flap(b)advance into the defect produced by downward displacement of medial flap,small (c)flap can be used to restore nostril sill or lengthen the columella.

Muscle incisions and movement

A 15 scapel is used to incise the junction of muscle , and subcutaneous tissue and submucosa . The goal is to isolate the orbicularis muscle layer. Fig 5,6
Primary closed rhinoplasty in 20 cases

The ala is approached from both the medial and the lateral aspects using a pair of curved Kilner Scissors Figure 7. The scissors are introduced medially through the incision at the base of the columella and laterally through the perialar incision. Dissection is carried out in the plane between the dorsal skin and the lower and the upper lateral cartilages on the cleft side, so that these cartilages are completely devoid of any skin attachments from the alar rim up to the nasal tip. We do not attempt to separate the lower lateral cartilage from the vestibular lining as the cartilage is firmly adherent to the lining.

10 cases underwent open rhinoplasty

Transcolumellar skin incision was made, Bilateral marginal incisions or infracartilaginous incisions were made just below the lower part of lower lateral cartilage, and the two incisions were joined ,Columellar skin is dissected upward along the rim incision to expose the medial crura of the alar domes (fig 8). Care is taken to free the fibrofatty tissue between the domes of the alar cartilage and to leave attached to the overlying skin. The nasal skin is dissected widely over the nasal skeleton to allow redraping over the reconstituted nasal tip. The colemellar skin retracted with the skin hook, This maneuver tends to symmetrically align the alar cartilages. Four to five 5/0 Vicryl(ethicon) sutures are used to suture the medical crura of the alar domes. The cranial edges of the lateral crura are sutured with nasal septal cartilage, securing the upward rotation of the lateral crura on the affected side.
Three -Layer Closure:

Mucosa
Vecryl 5-0 interrupted sutures was used to close the mucosa.

Muscle
5-0 Vicryl interrupted full thickness sutures are used to close the muscle .

“hemi” alar cinch suture is placed. This rotates and pulls the lower ala toward the skin overlying the medial footplate region as in fig 9

S*kin*

Suturing begins at Cupid's peak. The medial and lateral lip skin is precisely aligned at the white roll. The tattoos of Cupid's peak on the lateral and medial element should be approximated. 6-0 Vicryl is used.
There should be no gap in the skin after these sutures are placed
The nasal floor closure is done with 5-0 vicryl Post-operative care: fig 10

Both nostrils were packed (and lip wound was covered) with steristrips (impregnated with antibiotic ointment) and adhesive strips were applied to decrease tension on the lip wound. The adhesive strips and nasal packs were left in place for 2 days. The wound was cleaned with normal saline, and antibiotic ointment was reapplied 3 times daily. sutures was removed after 5-7 days.

The parents were informed that, beginning about 3 weeks after surgery, the scar wound begin to contract and they were taught how to perform gentle massag(with and without some kind of anti-scar preparations) until wound was soft and without evidence of contraction.fig11
Follow up was from 3monthes to 6 monthes

We assessed the results of our techniques early intraoperative by measuring nostril diameter, nostril –tip distance by measuring the distance between alar facial groove to nasal tip,distance between alar facial groove to columella ,naso labial angle which is the angle between columella and tangential line of philtrum using ruler and manqiluh ,non cleft philtral column,philtral peak using squint parjal ,cleft philtral colum fig 12,philtral peak on cleft side and compared with non cleft side .fig13

We made close observation and regular follow up of patients every 2 weeks in first 3 monthes , and we learnt the parents to photo their children nose from front to expose columella and nasal tip and symmetry and submental view to expose nasal opening and from both sides and send us these photos to compare preoperative nasal deformities with postoperative results and to assess early and late postoperative complication.

Fig1: preoperative marking

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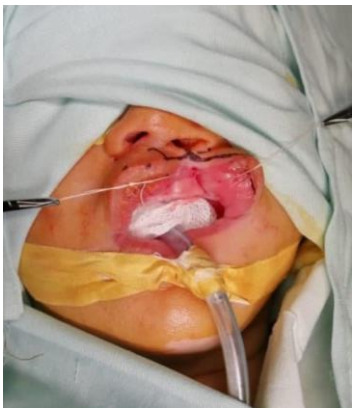

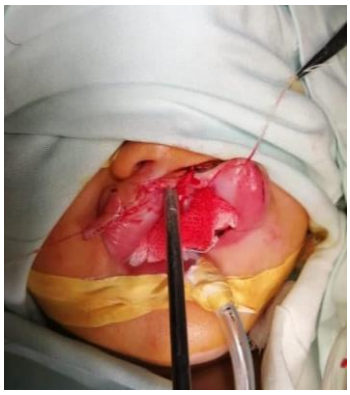

Fig2: preoperative epinephrine injection

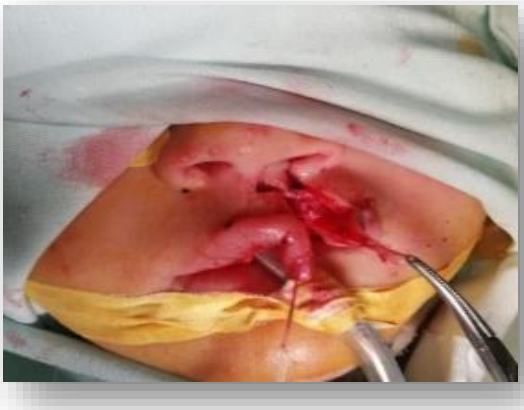

Fig 3: full layer incision along lip marking

Fig 4: rotational and advancement flaps
Rotatinal (a&c)flaps and (b)advancement flap

Fig5: orbicularis muscle isolation

Fig 6: septal and alar dissection using curved scissors

Fig 7: columellar incision to expose septal cartilage and access mucosa of nostril

Fig 8: complete dissection of nasal septum

Fig 9: sutures given at bilateral lateral crural cartilage and septum.

Fig 10: muscle and mucosa closure

Fig 11: alar cinch suture

Fig 12: skin closure

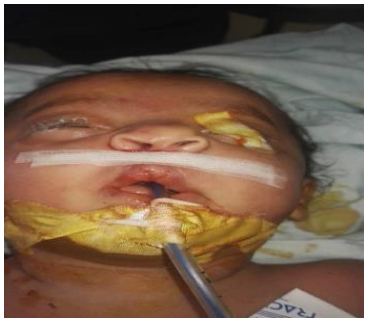

Fig 13: covering wound with steristrip

Results

The age of the patients ranges from 3 months to 18 months, 10 patients fall in the age group from 3 to 6 months, 11 fall in the age group from 6 to 12 months and 9 fall in the age group from 12 to 18 months, the mean age was 9 months.According to cleft type 5 of the patients out of 30 were of simple cleft lip type (SCL). 21 were of complete cleft lip type (CCL) and 4 were of complete cleft lip and palate type (CCLP).We divided our patients according to preoperative measures of deformed nose comparable with normal side according to :nostril width,nostril tip distance,nasolabial angle,columellar nostril distance ,non cleft philtral column peak into mild, moderate and severe nasal deformity.In our study we compare the use of closed and open techniques of primary rhinoplasty during unilateral cleft lip with nose deformity repair regarding to the value of technique to provide better contour, symmetry, projection of nasal tip,alar base displacement and columellar deviation.The defect size of 16 patients out of the 30 that shared in the study considered to have a narrow defect the remaining 14 patients were with wide defects.table1

Table1: Analysis of patients according to defect size

Defect size			**Closed**	**Open**	**Total**
Narrow		N	14	2	16
		%	70.0%	20.0%	53.3%
Wide		N	6	8	14
		%	30.0%	80.0%	46.7%
Total		N	20	10	30
		%	100.0%	100.0%	100.0%
Chi-square	**X^2**	1.086			
	P-value	0.297			

The time of the operation ranged from 45 minutes to 1.5 hours with a mean at 1hours. Closed rhinoplasty showed shorter time ranged from 45 minutes to 1 hour,open rhinoplasty take longer duration ranged from 1 hour to 1.5 hours. The time of the operation showed improvement with improvement of the experience with the technique, with the first cases taking longer time than the last ones. Also, it's noted that the wider the defect and the greater the deformity, the longer the time of the operation. table2

Table 2: analysis of patients according to time of operative

Time of surgery	Closed	Open
Range	45 – 60min	55 – 90min
Mean ± SD	46.50min ± 4.01	68.50min ± 11.06
T. test	14.281	
P. value	0.001*	

In the context of early postoperative complication 2 persons out of 30 developed suture breakdown one of them managed conservatively as the breakdown was partial, the other one complicated by wound dehiscence that needed further operative intervention in the form of redo surgery after 6 months.table3 and table 4

Table3: Analysis of patients according to infection and suture breakdown

Infection and suture breakdown			Closed	Open	Total
Yes		N	1	1	2
		%	5.0%	10.0%	6.7%
No		N	19	9	28
		%	95.0%	90.0%	93.3%
Total		N	20	10	30
		%	100.0%	100.0%	100.0%
Chi-square	X^2	0.268			
	P-value	0.605			

Table 4: analysis of patients according to wound dehiscence

Wound dehiscence			Closed	Open	Total
Yes		N	0	1	1
		%	.0%	10.0%	3.3%
No		N	20	9	29
		%	100.0%	90.0%	96.7%
Total		N	20	10	30
		%	100.0%	100.0%	100.0%
Chi-square	X^2	2.069			
			P-value	0.150	

18 cases out of 30 showed post-operative edema that resolved with medical treatment in the form of steroids 8 cases of them were open rhinoplasty. Table 5

Table 5: analysis according to postoperative edema

Edema			Closed	Open	Total
Yes		N	10	8	18
		%	50.0%	80.0%	60.0%
No		N	10	2	12
		%	50.0%	20.0%	40.0%
Total		N	20	10	30
		%	100.0%	100.0%	100.0%
Chi-square	X^2	2.501			
	P-value	0.114			

As regard to late post-operative complication Also 5 cases showed hypertrophic scar 3 of them that underwent open rhinoplasty that stars to appear one month after the operation which was managed conservatively with anti-scar silicon containing topical preparation. It is noted that those cases who developed structure breakdown developed hypertrophic scar.table6

Table 6: analysis according to hypertrophic scar

Hypertrophy scar			Closed	Open	Total
Yes		N	2	3	5
		%	10.0%	30.0%	16.7%
No		N	18	7	25
		%	90.0%	70.0%	83.3%
Total		N	20	10	30
		%	100.0%	100.0%	100.0%
Chi-square	X^2	1.920			
	P-value	0.166			

2 cases of open rhinoplasty showed notching one of them showed notching of the white roll after contraction of the scar the other showed notching at vermillon.table7

Table7: Analysis of cases according to postoperative lip notching

Lip notching		Closed	Open	Total
Yes	N	0	2	2
	%	0%	20.0%	6.7%
No	N	20	8	28
	%	100.0%	80.0%	93.3%

Total		N	20	10	30
		%	100.0%	100.0%	100.0%
Chi-square	X^2	4.286			
	P-value	0.038*			

According to nasal tip deviation the cases were further subdivided into those with no post-operative tip deviation (26 cases) , mild post-operative (3 cases) 2 of them with closed rhinoplasty and 1 case with open rhinoplasty , moderate post-operative deviation (1 case) belong to closed rhinoplasty and severe post-operative deviation (0 case) .table8

Table 8: Analysis of results according to nasal tip deviation

Nasal tip deviation			**Closed**	**Open**	**Total**
NO		N	17	9	26
		%	85.0%	90.0%	86.7%
Mild		N	2	1	3
		%	10.0%	10.0%	10.0%
Moderate		N	1	0	1
		%	5.0%	.0%	3.3%
Total		N	20	10	30
		%	100.0%	100.0%	100.0%
Chi-square	**X^2**	0.519			
	P-value	0.771			

In relation to columellar deviation the patients are further subdivided into 4 groups of; no columellar deviation (10 cases), mild columellar deviation (18 cases),6 of them were open rhinoplasty moderate columellar deviation (3cases)2 case was open rhinoplasty and severe columellar deviation (0 cases).table9

Table 9: Analysis of results according to columellar deviation

Columellare deviation		**Closed**	**Open**	**Total**
NO	N	8	2	10
	%	40.0%	20.0%	33.3%
Mild	N	12	6	18
	%	60.0%	60.0%	60.0%
Moderate	N	0	2	2
	%	.0%	20.0%	6.7%
Total	N	20	10	30
	%	100.0%	100.0%	100.0%

Chi-square	**X^2**	4.800
	P-value	0.091

Alar base displacement either in depth or in vertical level (in comparison to the other side) are further subdividing the patients into those with no alar base displacement (18 cases), those with mild alar base displacement (7 cases)3 cases were open rhinoplasty , those with moderate alar base displacement (5cases) 3 case was open rhinoplasty and those with severe alar base displacement (0 cases) .table 10

Table 10: analysis of results according to alar base deviation

Alar base displacement		**Closed**	**Open**	**Total**
NO	N	14	4	18
	%	70.0%	40.0%	60.0%
Mild	N	4	3	7
	%	20.0%	30.0%	23.3%
Moderate	N	2	3	5
	%	10.0%	30.0%	16.7%
Total	N	20	10	30
	%	100.0%	100.0%	100.0%
Chi-square	**X^2**	2.886		
	P-value	0.236		

Regarding the overall symmetry of the nose the patients are further subdivided into 4 groups; those which are symmertical (15 cases), those with mild asymmetry (12 cases)7 cases of them were open rhinoplasty, those with moderate asymmetry (3 cases) 1 of them was open rhinoplasty and those with severe asymmetry (0 cases).Table 11

Table 11: analysis of results according to symmetry of nose

Nasal asymmetry		**Closed**	**Open**	**Total**
NO	N	13	2	15
	%	65.0%	20.0%	50.0%
Mild	N	5	7	12
	%	25.0%	70.0%	40.0%
Moderate	N	2	1	3
	%	10.0%	10.0%	10.0%
Total	N	20	10	30
	%	100.0%	100.0%	100.0%
Chi-square	**X^2**	6.075		
	P-value	0.048*		

Follow up periods of the patients ranged from 3 months to 6 months with a mean of 4 months.For assessment of results of this study we used parent satisfaction and judgments on the patient's photographs.

22 couple of parents showed complete satisfaction (88%), while 2 showed partial satisfaction with the results (8%) and 6 couple of parents was un-satisfied 4 of them underwent open rhinoplasty. Table 12

Table 12: analysis of results according to parent satisfaction

Parent satisfaction			**Closed**	**Open**	**Total**
No		N	2	4	6
		%	10.0%	40.0%	20.0%
Partial		N	0	2	2
		%	.0%	20.0%	6.7%
Satisfaction		N	18	4	22
		%	90.0%	40.0%	73.3%
Total		N	20	10	30
		%	100.0%	100.0%	100.0%
Chi-square	**X^2**		9.273		
	P-value		0.010*		

Two cases out of 30 needed further operative interventions in the form of redo surgery for one case which was infected with wound dehiscence and other case with lip notching of the white roll.

Discussion

Fontana and Mutiin 1998, stated that the generally accepted best time for primary rhinoplasty is between 3 and 6 months after birth. In our study we performed primary chelorhinoplasty in age from 3monthes to 18 monthes and we divide patients randomly into two groups according to type of rhinoplasty technique either closed or open."rule of 10's" (age 10 weeks, hemoglobin 10 g, weight 10 lb), as originally proposed by Millard, is a good starting point for deciding when to perform the repair. The precise timing, however, depends on critical analysis for co-morbid medical conditions, syndromes, and feeding issues.

McCarthy JG, Cutting CB, Hogan VM study was to compare the results of two different surgical techniques and as there were almost an equal distribution of age population in both the groups, they made the conclusion taking into account only the surgical techniques and not the age factor.

This study was similar to our study that we compared between open and closed rhinoplasty as surgical technique without interference of age factor in both groups.We agree with **Millard DR, Jr., Latham RA** study in performing lip repair using original millard rotational advancement technique in both groups before performing open or closed rhinoplasty .

We disagree with **Thomas and Mishra** study that stated that closed rhinoplasty technique does not allow the intercrural soft tissue dissection; hence a better projection of the nasal tip is possible in

the open tip rhinoplasty .**Foda HM,Bassyouni K.in 2000** did not reveal any statistically significant difference between two methods of rhinoplasty such as other investigators. However, when we evaluated the difficulty of correction, we saw that closed rhinoplasty is rather mild procedure. The degree of difficulty of open procedure may be useful for future research in this area.

We agree with **McComb** and **Salyer** that reported on their long term experiences using various approaches for mobilizing and reorienting the nasal alar cartilages,They claimed improved symmetry and a decreased rate of secondary nasal revision surgery using a closed approach that did not require direct exposure of the nasal cartilage at the time of repair.

We agree with **singh a et al** in that to obtain a wide view of the nasal cartilage structures and to avoid cutaneous scars, it is possible to use a marginal bilateral incision allowing complete subversion without need for open rhinoplasty .

Some authors reported undesirable features (large nose with a broad and amorphous nasal tip) in early correction of unilateral cleft lip nose. They attributed this to the use of an open surgical technique, and the mobilization and suspension of the alar cartilages; which would cause greater amounts of scar tissue. However, they pointed out the possible role of the unique features of the oriental. nose (nasal bones, nasal septum, alar cartilages, and columella are lower and shorter than in Caucasian nose, the overlying skin is rather thick, and the nasal tip is not well defined in causing those undesirable features. **Tajima S, Maruyama M** have reported that closed primary rhinoplasty is simple technique and sufficient for nasal deformity correction during unilateral lip repair. we made follow up period between 3 to 6 monthes with mean of 4 monthes. According to postoperative results

Early postoperative we compared between measures of (nostril width,columellar nostril distance,nostril tip length,nasolabial angle and philtral peak) between repaired side and normal non cleft side and we divided patients according to :

nasal tip deviation the cases were further subdivided into those with no post-operative tip deviation (26 cases) , mild post-operative (3 cases) 2 of them with closed rhinoplasty and 1 case with open rhinoplasty , moderate post-operative deviation (1 case) belong to closed rhinoplasty and no severe post-operative deviation (0 case) .

In relation to columellar deviation the patients are further subdivided into 4 groups of; no columellar deviation (10 cases), mild columellar deviation (18 cases),6 of them were open rhinoplasty moderate columellar deviation (3cases)2 case was open rhinoplasty and severe columellar deviation (0 cases).

Alar base displacement either in depth or in vertical level (in comparison to the other side) are further subdividing the patients into those with no alar base displacement (18 cases), those with mild alar base displacement (7 cases)3 cases were open rhinoplasty , those with moderate alar base displacement (5cases) 3 case was open rhinoplasty and those with severe alar base displacement (0 cases) . Regarding the overall symmetry of the nose the patients are further subdivided into 4 groups; those which are symmertical (15 cases), those with mild asymmetry (12 cases)7 cases of them were open rhinoplasty, those with moderate asymmetry (3 cases) 1 of them was open rhinoplasty and no cases with severe asymmetry.

Follow up period ranged from 3 to 6 months with mean of 4 months

We made close observation and regular follow up of patients every 2 weeks in first 3 months , and we learnt the parents to photo their children nose from front to expose columella and nasal tip and symmetry and submental view to expose nasal opening and from both sides and send us these photos to compare preoperative nasal deformities with postoperative results and to assess early and late postoperative complication.
early postoperative complications were : infection in 2 cases, dehiscence in 1 case (due to infection), post-operative edema in 18 cases (10cases of closed and 8 cases of open rhinoplasty). Edema treated conservatively with topical steroids and anti edematous medications.

Late complication: 2 cases of open rhinoplasty showed notching one of them showed notching of the white roll after contraction of the scar the other showed notching at vermillon,the case of lip notching at whiteroll was surgically corrected.

Tan KK, Pigott Rw. reported no significant difference between the patients who underwent closed rhinoplasty and those who underwent an open rhinoplasty after operating on 60 patients with unilateral cleft lip nasal deformity comparing the two techniques, they stated " The nasal correction achieved by closed technique is as good as by open technique.

Conclusion

According to these results we found no significant difference between the closed and open rhinoplasty according to symmetry, columella deviation, nasal tip deviation and alar base displacement but the main difference between the two techniques was that open rhinoplasty need columellar incision and more dissection of nasal septal cartilage and take longer operative time than closed rhinoplasty, postoperative patient need more observation in open rhinoplasty for possibility of hypertrophic scar formation.

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