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Evaluation of the Effect of Fat Grafting in the Correction of Secondary Cleft Lip Deformities

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Abstract

Background: The individual with a cleft lip will require several surgical procedures during the patient early life. It is critical to prioritize treatment of secondary abnormalities and therefore reduce the number of necessary interventions.

Objective: Fat grafting represents a minimally invasive technique, and we aimed to evaluate the effect of fat grafting in correcting secondary deformities post cleft lip repair.

Patients and Methods: This prospective clinical trial includes 30 patients with secondary deformities post cleft lip repair. This study was conducted at Kasr El-Ainy, Cairo University Hospitals, Plastic Surgery Department, between October 2019 and May 2021. All patients received a fat injection to the lip and were evaluated using pre and postoperative ultrasonography and photo graphometry (image J), the Vancouver scar scale, and the patient satisfaction questionnaire.

Results: There were statistically significant differences in scar width in bilateral cases (right scar 4.1062 Vs 3.7923) (left scar 3.7985 Vs 3.5146) and lip thickness in both unilateral and bilateral cases using ultrasonography, and statistically significant differences in scar width, vermilion Hight, and nasolabial angle by photograph meter, and statistically significant difference in preoperative and postoperative Vancouver scar scale, with overall very good patient satisfaction.

Conclusions: Fat injection should be considered a therapeutic option in managing secondary lip deformities, particularly the volume deficiency, mild to moderate vermilion notching, and wide depressed scars, as it is a simple procedure with minimal and almost no complications.

Key Words: *Cleft lip – Fat grafting – Photographometer.*

Ethical Committee: The Research Ethics Committee of the Faculty of Medicine, Cairo University, approved the study on October 12th, 2019, with the committee identifier code MD-120-2019.

Disclosure: No conflict of interest.

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Introduction

Cleft lip with or without cleft palate is the most common congenital craniofacial anomaly **[1]**.

Secondary cleft lip abnormalities are a common problem post cleft lip repair Correcting secondary cleft lip and nasal abnormalities effectively begins with a precise diagnosis of the disease and determining the underlying anatomic etiology. Treatment must consider the anatomical relationships between cartilage, soft tissue, muscle, and the underlying skeleton, as well as any insufficiency, distortion, or excess of each **[2]**. Asymmetry of the upper lip's volume or volume insufficiency is a serious symptom following cleft lip repair. Asymmetries like these attract a lot of attention and hence impair the overall success of cleft lip repair **[3]** (Koonce et al., 2018).

Prior to undergoing any surgical procedure to treat a secondary deformity, the nature of this deformity must be diagnosed, studied, and reported. All of the structures involved should be thoroughly assessed. With regards to the entire lip, this includes a thorough examination of the lip scar, orbicularis muscle, vermilion and white roll, Cupid's bow shape and symmetry, and the mucosa, as well as any volume asymmetry. Nasal assessment is a comprehensive process that should take into account the columella and the position of the alar bases, nostril form and size, nasal tip, and nasal lining defects. A fistula, severity of scarring, and anatomic length of the palate must all be carefully assessed. The assessment must be three-dimensional in reference to the underlying skeleton foundation upon which they have formed **[4,5]**.

Despite the growing prevalence of autologous fat grafting in children, Paediatric fat grafting suffers many of the same difficulties as adult fat graft-

ing, the most significant of which being variable resorption rates [6].

In the Paediatric setting, autologous fat grafting has been described to treat a variety of craniofacial, chest, and breast soft tissue defects correlated with congenital abnormalities, such as pectus excavatum, craniosynostosis, Parry–Romberg syndrome, craniofacial microsomia, Poland syndrome, and cleft lip. Additionally, a limited number of papers have identified fat grafting as a beneficial technique for paediatric scar treatment. Additionally, autologous fat grafting has been characterized as a therapy option for rehabilitating function, primarily in young patients with velopharyngeal insufficiency and cleft palate [7].

Structural fat grafting is a simple procedure that has revolutionized the field of plastic surgery, with several applications, including tissue regeneration, scar modulation, and volume restoration [8].

The current study aimed to assess the application of fat grafting to improve contour distortion volume loss, enhance tissue features, and remodel scarring.

Patients and Methods

This study was conducted at Cairo University Hospital (Kasr Al-Aini Hospital and Paediatric Hospital) in the Department of Plastic and Reconstructive Surgery between October 2019 and May 2021.

It was a prospective clinical trial including thirty patients. They were selected from the outpatient clinic during their visits. All were presented with a history of cleft lip repair, and they had secondary lip deformities.

The Research Ethics Committee of the Faculty of Medicine, Cairo University, approved the study on October 12th, 2019, with the committee identifier code MD-120-2019.

The inclusion criteria were patients from 4 to 18 years old with repaired cleft lip, unilateral or bilateral with volume asymmetry, wide depressed, hypertrophic, or pigmented scar, and notched vermilion.

Patients with age less than 4 years or more than 18 years, Patients associated with sever congenital anomalies and those with severe deformities who need secondary surgical correction were all excluded from the study.

Preoperative preparation was started by initial evaluation to determine whether the patients met the study inclusion criteria.

A detailed history was taken from the parents in cases of young children, and the patient mentioned the main deformity brought him to seek advice. Surgical history included the date and center of the cleft operation, any lip revision surgery, history of orthognathic surgery in older patients, any complications related to cleft surgeries, other surgeries, and any hospital or ICU admission. Dental history included the time of any orthodontic interventions. Medical history was performed to determine any associated congenital anomalies or systemic disease and drug intake.

Patients were subjected to clinical examination, including general examination, and for any suspected abnormalities, pediatric consultation was performed. Local lip examination comprised lip length, scar width, philtrum, white role, vermilion mucosa, nostrils, columella, alae of the nose, cupid bow, and continuity of orbicularis oris. In addition, the abdomen and thighs were examined for proper donor site selection for fat harvesting.

Routine investigations were done in the form of full blood picture, coagulation profile, liver function tests, and renal functions. Moreover, since February 2020, all patients were subjected to COVID-19 PCR and chest CT scans for diagnosis.

The participants were informed about the procedure and complications, and Arabic informed consent was obtained.

Operative detail:

Under general anesthesia, the face was prepared and draped with the patient in the supine position, and the donor site for fat harvesting (infraumbilical region in older patients and the thigh in younger patients) was also prepared. Then, according to Klein's formula, the infiltration solution was prepared. According to the patient's weight, 50-150ml of the solution was injected with the infiltrating cannula, then left for 10 minutes.

Liposuction was accomplished using a 2mm Tonnard fat harvesting cannula connected to a Leur lock 20ml syringe. The plunger was pulled back gently to minimize negative pressure to reduce the effect of barotrauma on the tissue. Fat was prepared using the Colman technique; then, it was transferred through a 1.2mm adapter to 1ml fat injection syringes. The syringes were attached on the Luer-lock end to the fat injection cannula.

The fat was injected into the upper lip through a 2mm incision placed 5mm from the oral commissure using a 1.5mm fat injection cannula. The fat was injected into vermilion submuscular, intramuscular, and subcutaneous planes. Overcorrection of about 30% was performed to the side of volume deficiency, prolabium in bilateral clefts, nasal sills, the base of the alae, and underneath the scars, due to the expected resorption of fat. The injected amount of fat never exceeds 30ml.

The commissure openings were closed using a 6/0 vicryl® suture, and then a gentle massage was applied to the lip for proper distribution and equalization of the volume. According to their weights, all patients received a single dose of third-generation cephalosporin intraoperatively.

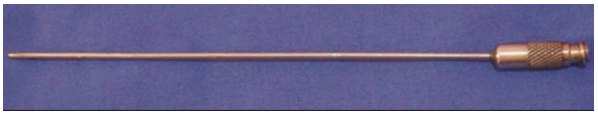

Fig. (1): Infiltration cannula.

Fig. (2): Tonnard fat harvesting cannula.

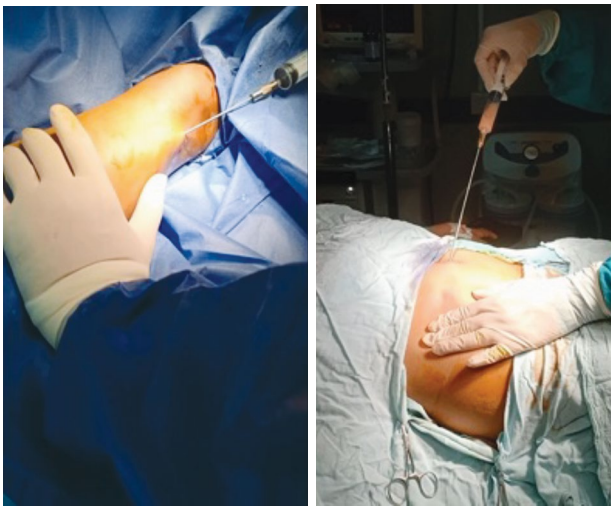

Fig. (3): Harvesting the microfat from the thigh and from abdomen.

Fig. (4): Decanting of the fat.

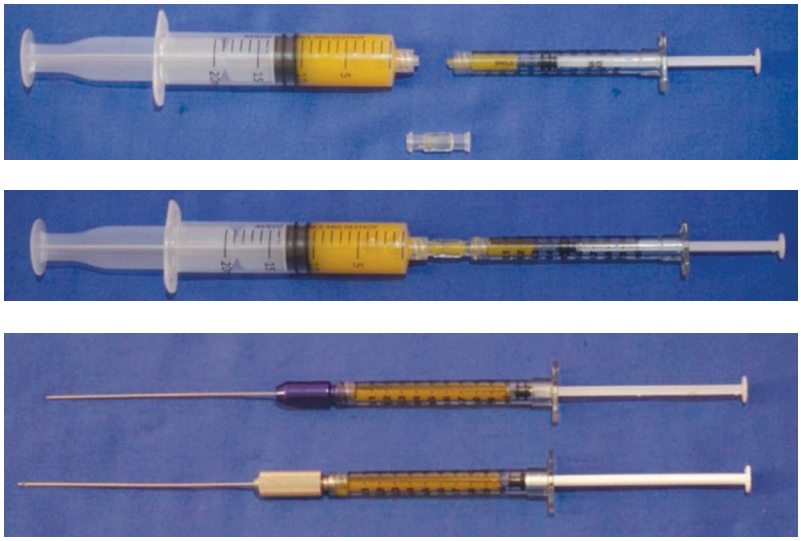

Fig. (5): Transfer of the fat to 1cc syringes and 1.5mm fat injecting cannula.

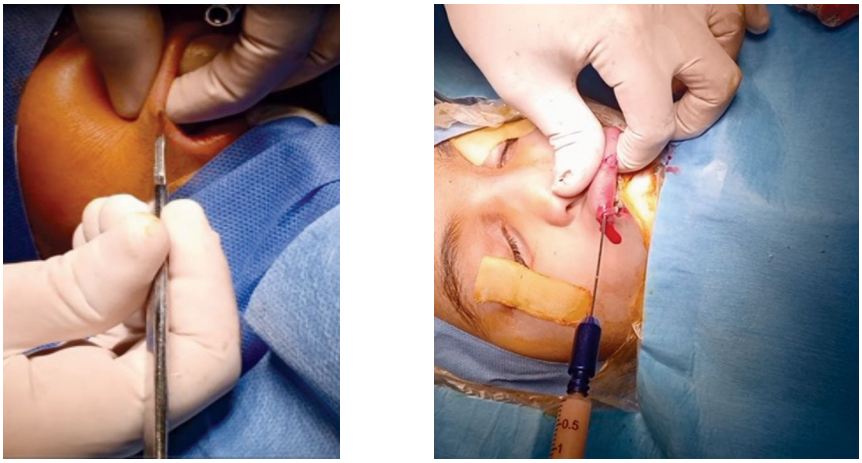

Fig. (6): Showing the site of incision near the commissure and the insertion of injecting cannula.

Post operative all patients have minimal compression bandage was applied to the donor site. All the patients were discharged from the hospital on the same day of the operation after full recovery from anesthesia and initiation of oral feeding. They were instructed to use cold packs over the lip to prevent hematoma.

Post-operative medications was in the form Amoxicillin/clavulanic acid were orally administered according to the patients' weight every 12 hours for 5 days. Oral nonsteroidal anti-inflammatory drugs were administered every 12 hours for three days postoperatively. Topical antibiotic ointment (fucidin® ointment) was applied to the whole lip for softening every 8 hours.

The follow-up visits were done as follow, the first visit was performed one week postoperatively to assess any lip hematoma or infection. The second visit was performed one month postoperatively to assess the patient clinically. The third visit was six months after the surgery to assess the patient clinically with the Vancouver scar scale (VSS); scar dimension and lip thickness were also determined by ultrasound and image J program computer.

All patients were assessed by the following assessments methods over the six months postoperatively.

1- *Scar width and Lip thickness assessment:*

By ultrasound preoperatively and six months postoperatively. Using a medical ultrasound equipment, Logiq P6 PRO1 in B-mode (gray scale) by using superficial linear array transducer (9L) with frequency of 7.5-9 MHz, foot print 44x6mm.

Each participant's upper lip was prepped for transversal scanning by putting a 1cm thick coating of commercial ultrasonic contacting gel over the whole width of the lip. The transducer was then placed with its upper border contacting the columella-philtral junction, which is located between the columella and vermilion borders.

The transducer was then progressively moved from the midline to the left, back to the midline, to the right, and back to the midline again Preoperative upper lip imaging will be acquired, and the scar width at the skin surface and lip thickness on both sides of the scar will be evaluated and standardized by (MA) in duplicate

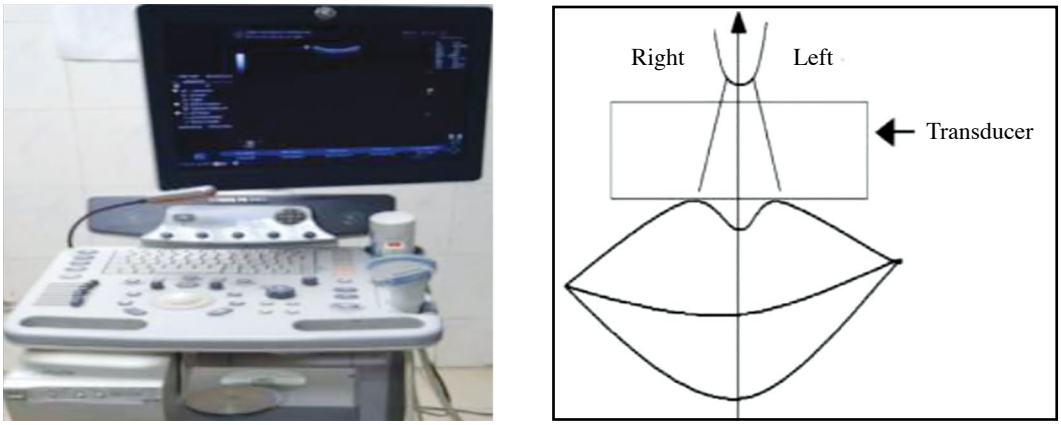

Fig. (7): The ultrasound machine and the direction of the transducer on the lip.

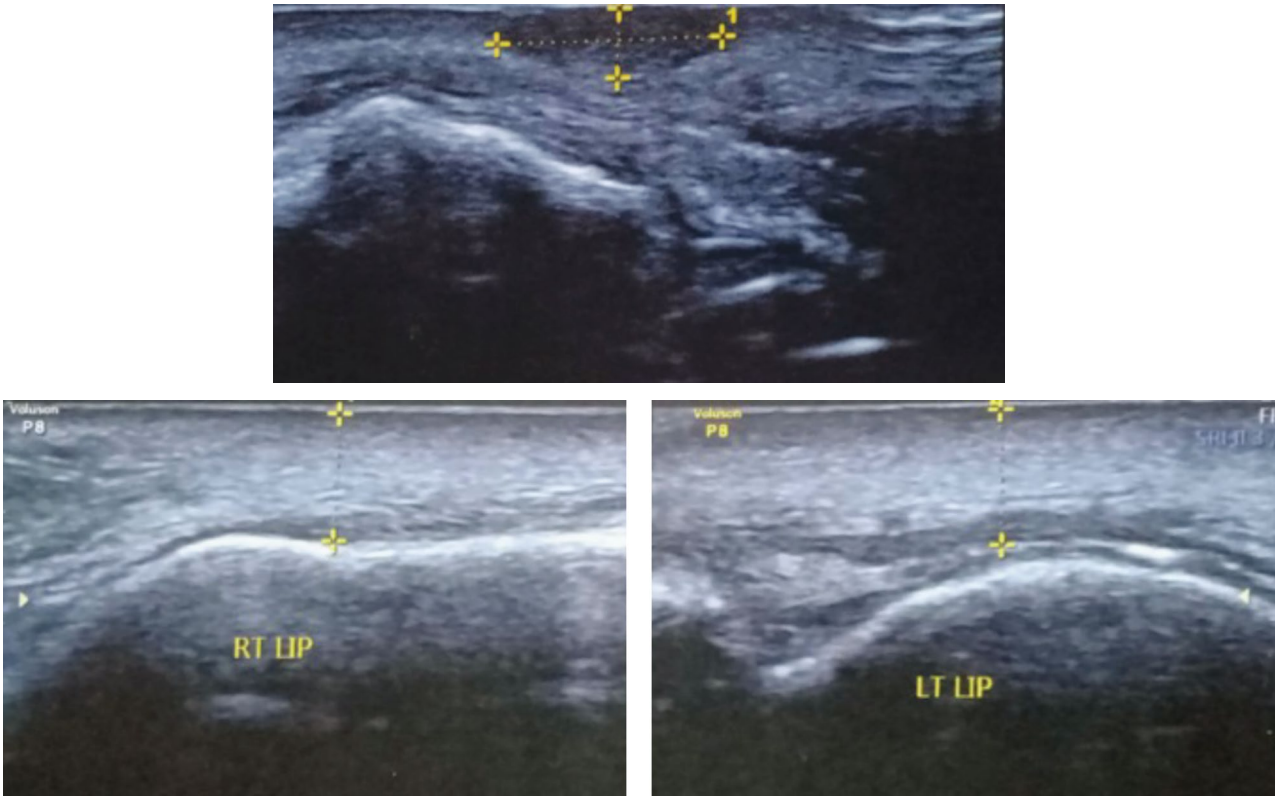

Fig. (8): Ultrasound showing width of the lip scar, lip thickness on both sides of the scar.

2- *Lip projection, vermilion height, and scar width:*

- Vermilion height on a photograph, using Image J program preoperative and six months postoperative.
- Lip projection assessed preoperative and six months postoperative on photograph using Image J program.

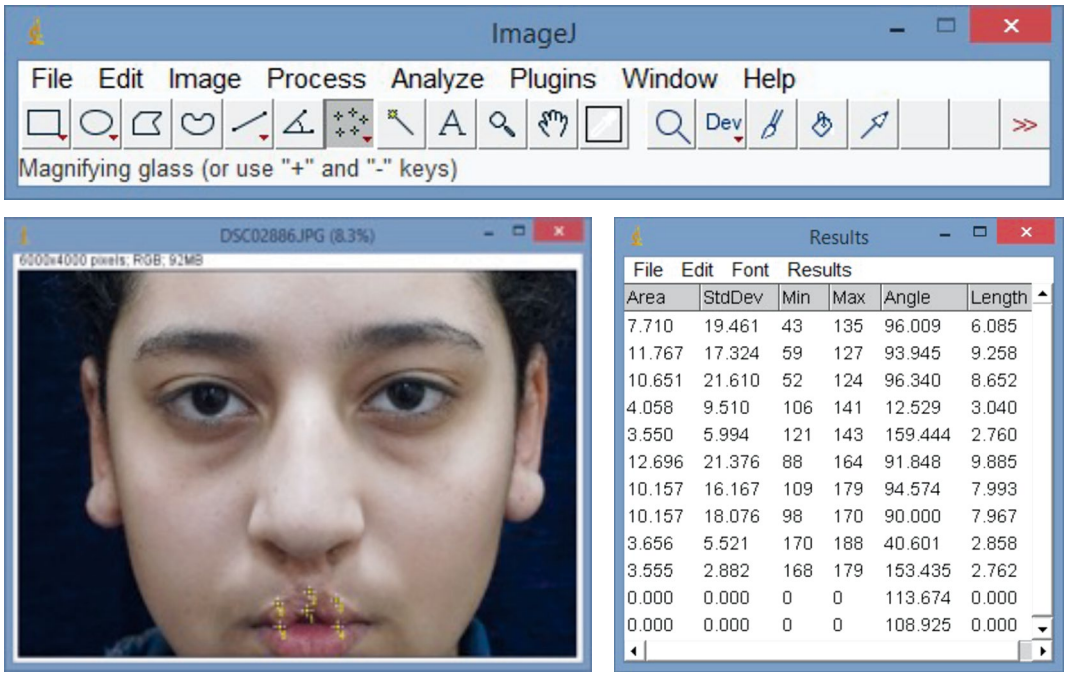

Fig. (9): Showing the points of measurement in the vermilion using image J.

3- *Lip projection, vermilion height, and scar width assessment by the photograph:*

Standard photography was taken, and objective measurements were obtained from the photographs. The digital caliper was used to measure the intercanthal distance, which was calibrated as a control reference.

The patient's frontal and lateral views photograph was taken preoperative and at 6m follow-up to the assess scar width, the thickness of the vermilion, and the nasolabial angle on lateral view using the Image J®1.5i0R program.

The scar width was measured at 1mm above the white role, and the vermilion height was assessed at 3 points. The first point was the site of repair in the vermilion in unilateral cleft and the midline in bilateral cases. The second and third points were 1cm on both sides of the scar, then the preoperative and postoperative thickness were assessed.

4- *Vancouver scar scale (VSS):*

VSS was measured at 1 and 6 months (comprising the following components: Pigmentation, vascularity, pliability, and scar height) by two lecturers who examined the patients in the outpatient clinic of Kasr Alini and Pediatric Hospital. They have blinded to which patients belonged.

5- *Patient satisfaction questionnaire:*

Patient satisfaction was measured using a questionnaire from a study performed for investigating fat grafting to help achieve the best outcome of secondary cleft lip reconstruction **[4]**.

This questionnaire was filled out by adult patients and by parents in pediatrics.

	Scale	Pre-operative	1 month post	6 months post
Vascularity	Normal 0 Pink 1 Purple 2			
Pigmentation	Normal 0 Hypopigmentation 1 Hyperpigmentation 2			
Pliability	Normal 0 Supple 1 Yielding 2 Firm 3 Ropes 4 Contracture 5			
Height	Flat 0 <2 mm 1 2-5mm 2 >5mm 3			

Fig. (10): Vancouver scar scale.

	Question	Very Happy	Happy	Neither happy nor unhappy	Unhappy	Very unhappy
1	How happy were you with your appearance before you received fat injections?					
2	How happy are you with your appearance after you received fat injections					
3	How would you rate your recovery?					
4	How did getting fat injections compare to your other surgeries?					

Fig. (11): Patient satisfaction Questionnaire (Jones et al., 2015).

Results

Thirty patients were allocated to the trial. There were 15 male and nine female patients with no syndromic unilateral or bilateral cleft lip. All patients continued their follow-up.

In unilateral cases, the scar width was assessed by ultrasound preoperatively and six months postoperatively. There was no significant statistical difference in the scar's mean (3.5776 Vs. 3.7294) pre and postoperatively (p=0.676). Table (1).

In bilateral cases, the scars on both sides of repair showed a significant statistical difference in the mean right (4.1062 Vs 3.7923) (p-value 0.038) and mean left (3.7985 Vs 3.5146) (p-value=0.012) scar width by ultrasound pre and postoperatively Table (2).

There were statistically significant differences between pre and postoperative lip thickness on both sides of the repair in unilateral and bilateral cases (p<0.001).

As mentioned before, a photograph meteor program (Image J)® was used to assess pre and postoperative pictures of the patients and compare the scar width on the skin and vermilion height.

In unilateral cases, the mean scar width significantly decreased postoperatively (3.24276 Vs. 2.70776), attributed to the regenerative effect of the high concentration of stem cells in the adipose tissue.

There were statistically significant differences in the mean scar width in bilateral cases on the right (p=0.011) and left sides (p=0.007).

Regarding the vermilion height in photographs of the patients, there were three points of measurement in the unilateral cases: point (A) was the site of the repair, point (B) was one centimeter to the right side of the repair, and point (C) was one centimeter to the left side of the repair.

There was a significant difference in image J's vermilion height in the previously mentioned points pre and postoperatively.

On the other hand, vermilion heights in photographs of the patients with bilateral cleft were measured at three points: Point (A) was the site of repair, or the midline of vermilion, Point (B) was one centimeter to the right side, and Point (C) one centimeter to the left side.

There was a significant difference in image J's vermilion height in the previously mentioned points pre and postoperatively.

The mean nasolabial angle was measured using the Image J program to show pre and postoperative differences in the lip projection in the unilateral (Table 2) and bilateral cases (Table 4).

Subjective scar assessment was performed preoperatively, one month, and three months postoperatively using the Vancouver scar scale, which showed a statistically significant difference between the mean postoperative scales.

Patient satisfaction was measured using a patient satisfaction questionnaire. Out of 30 patients, 16 (53.3%) patients (parents in cases of younger patients) were unhappy with their appearance before they received fat injections, 12 (40.0%) patients were happy, and 2 (6.7%) patients were neither happy nor unhappy.

Table (1): The mean scar width by ultrasound preoperative and postoperative in unilateral cases.

	No	Mean	Std. Deviation	*p*-value
Preoperative scar width by ultrasound	17	3.5776	1.30240	0.676
Postoperative scar width by ultrasound	17	3.7294	1.97152	

Table (2): The mean scar width by ultrasound preoperative and postoperative in bilateral cases.

	No	Mean	Std. Deviation	*p*-value
Right scar:				
Pre-operative right scar width by ultrasound	13	4.1062	1.47930	0.038*
Post-operative right scar width by ultrasound	13	3.7923	1.42872	
Left scar:				
Pre-operative left scar width by ultrasound	13	3.7985	1.09343	0.012*
Post-operative left scar width by ultrasound	13	3.5146	1.05717	

Table (3): Pre and postoperative lip thickness on both sides of the repair in unilateral and bilateral cases.

	No	Mean	Std. Deviation	*p*-value
Scar width:				
Preoperative scar width by j image	17	3.24276	1.807573	0.001*
Postoperative scar width by j image	17	2.70776	1.873272	

Table (4): Pre and postoperative nasolabial angle using image J in unilateral cases.

	No	Mean	Std. Deviation	*p*-value
Unilateral cases:				
Nasolabial angle preoperative	17	97.33406	8.198633	<0.001*
Nasolabial angle postoperative	17	90.27624	9.583544	

Table (5): Pre and postoperative nasolabial angle using image J in bilateral cases.

	Mean	No	Std. Deviation	*p*-value
Bilateral cases:				
Nasolabial angle preoperative	117.70438	13	15.748914	<0.001*
Nasolabial angle postoperative	105.95008	13	13.717671	

Table (6): Shows the parents or the patient's response to the first question in patient satisfaction questionnaire.

	Frequency	Percent
Unhappy	16	53.3
Happy	12	40.0
Neither happy nor unhappy	2	6.7
Total	30	100.0

Table (7): Show the response of the patients to second question of patient questionnaire.

	Frequency	Percent
Very happy	14	46.7
Happy	13	43.3
Neither happy nor unhappy	1	3.3
Unhappy	1	3.3
Very unhappy	1	3.3
Total	30	100.0

Table (8): Show the response of the patients to third question of patient questionnaire.

	Frequency	Percent
Very happy	14	46.7
Happy	13	43.3
Neither happy nor unhappy	3	10.0
Total	30	100.0

Table (9): Show the response of the patients to fourth question of patient questionnaire.

	Frequency	Percent
Very happy	12	40.0
Happy	17	56.7
Neither happy nor unhappy	1	3.3
Total	30	100.0

Case (1):

18 years old female patient presented with post left unilateral cleft lip repair with left side deficient vermilion, volume asymmetry of the lip and wide depressed scar, the age of primary cleft lip repair was 6 months. The patient underwent two revisional surgery one at the age of 1.5 year the other at the age of 3 years. before about on and half year the patient underwent Le Fort I fracture with maxillary advancement, 6 months after that she has rhinoplasty.

Preoperative scar width by ultrasound was 4.4 mm and preoperative lip thickness right to the scar 7.1mm and lip thickness left to the scar was 7.6mm.

Preoperative vermilion height at the repair site by image J was 4.471mm.

8ml of microfat was harvested from his right thigh, 3ml of decanted microfat injected to the vermilion notch, underneath the scar after scar release using fat injecting cannula and lastly fat injected as volume enhancement to the vermilion border and whole lip.

Post-operative scar width by ultrasound was 2.7mm the lip thickness right to the repair sit was 8.7mm and left to the repair was 8.6mm. postoperative vermilion height at repair site was 5.051mm.

Nasolabial angle preoperative was 82.36 degree and post operative was 68.468 degree.

Fig. (12): Preoperative (left column) and postoperative (right column) pictures of a case (1) of left unilateral cleft.

Case (2)

Fig. (13): Preoperative (left column) and postoperative (right column) pictures of a case (2) of left bilateral cleft.

Case (3):

7 years old male patient presented with post right unilateral cleft lip repair with right side vermilion notching and wide depressed scar, the age of primary cleft lip repair was 4 months.

Preoperative scar width by ultrasound was 2.9mm and preoperative lip thickness right to the scar 5.6mm and lip thickness left to the scar was 5.3mm.

Preoperative vermilion height at the repair site by image J was 4.471mm. 8ml of microfat was harvested from his right thigh, 3ml of decanted microfat injected to the vermilion notch, underneath the scar after scar release using fat injecting cannula and lastly fat injected as volume enhancement to the vermilion border and whole lip. Post-operative scar width by ultrasound was 2.8mm the lip thickness right to the repair sit was 8.6mm and left to the repair was 8.5mm.

Postoperative vermilion height at repair site was 5.051mm.

Nasolabial angle preoperative was 96.616 degree and post operative were 92.121 degree.

Fig. (14): Preoperative (left column) and postoperative (right column) pictures of case (3).

Case (4):

17 years old male patient presented with post bilateral cleft lip repair stigmata in the form of deficient vermilion, wide depressed scar, and deficient whole lip volume with recession of premaxilla, the age of primary cleft lip repair was 6 months the patient has one revision surgery.

Preoperative right scar width by ultrasound was 6mm and left scar width was 5mm preoperative lip thickness right to the scar 8.2mm and lip thickness left to the scar was 7.9mm

Preoperative vermilion height at the midline by image J was 4.346mm.

20ml of microfat was harvested from his infraumbilical area, 15ml of decanted microfat injected to the whole vermilion border, underneath the scar after scar release using fat injecting cannula and lastly fat injected as volume enhancement to the whole lip.

Post-operative right scar width by ultrasound was 4.1 and left scar width was 4.2mm the lip thickness right to the repair sit was 10.1mm and left to the repair was 9.3mm.

Postoperative vermilion height at midline was 4.9mm.

Nasolabial angle preoperative was 99.551 degree and post operative was 93.453 degree.

Fig. (15): Preoperative (left column) and postoperative (right column) pictures of case (4).

Case (5):

8 years old female patient presented with post bilateral cleft lip repair deformities in the form of midline vermilion notching and wide depressed scar, the age of primary cleft lip repair was 6 months, the patient underwent two revision lip surgery one at the age of 2 years and the other at the age of 4 years.

Preoperative right scar width by ultrasound was 4.33mm and left scar width was 5.1 mm preoperative, lip thickness right to the scar 8.1mm and lip thickness left to the scar was 7.77mm

Preoperative vermilion height at the midline by image J was 6.604mm.

10ml of microfat was harvested from his infraumbilical area , 8 ml of decanted microfat injected to the whole vermilion border, underneath the scar after scar release using fat injecting cannula and lastly fat injected as volume enhancement to the whole lip.

Post-operative right scar width by ultrasound was 4.1 and left scar width was 5mm the lip thickness right to the repair sit was 10.1mm and left to the repair was 10.3mm.

Postoperative vermilion height at midline was 10.263mm.

Nasolabial angle preoperative was 121.224 degree and post operative was 109.809 degree.

Fig. (16): Preoperative (left column) and postoperative (right column) pictures of case (5).

Discussion

A cleft lip is the most often occurring craniofacial anomaly. Lip and nose repair aim to have a normal appearance with little visible stigmata from the prior cleft lip. All repairs, nevertheless, generate a cutaneous scar, and healing can be unexpected regardless of the incision pattern or repair approach used.

Restoration of the cleft lip entails re-establishing the anatomic continuity of several tissue layers and restoring the area's smooth-flowing contours symmetrically. However, due to the reduced tissue mass, contours are frequently more challenging to control than the underlying structure **[8]**.

Many individuals with a cleft lip are dissatisfied with some part of their repair and wish to enhance their appearance. The upper lip's volume asymmetry or deficit is a common complication following cleft lip surgery. This asymmetry may attract further emphasis to the repair, resulting in decreased patient or caregiver satisfaction **[8]**.

The mean age of the participants (n=30) in the current study was 10.33 years (4-18 years). Out of the 30 patients involved in the study, 17 (56.67%) had lip deformities post unilateral cleft repair and 13 (43.33%) post bilateral cleft repair. About 60% of patients were females, and 40% were males.

This was consistent with research published in 2014 by Knooce et al. The mean age of fat injection was seven years (2–16 years). In addition, the majority (79%) had previously undergone unilateral cleft lip repair, whereas 21% had bilateral cleft lip repair. However, in their analysis, males accounted for a more significant number of individuals (67%) **[8]**.

In contrast, in another study, the mean age at fat injection was 25 years (22–41 years). Of the 65 patients, 52 had a bilateral cleft lip, and 13 had unilateral clefts Click or tap here to enter text **[9].** Another study concluded that ages ranged from 15 to 70 years, with an average age of 21 years. Six patients had a complete unilateral cleft lip, and the rest had a complete cleft lip palate. Fourteen out of 15 patients were female Click or tap here to enter text **[10]**.

The shape, placement, and orientation of a cleft scar, especially if it was of poor quality, permanently identify the patient as having been born with cleft lip malformation. These facial scars were prominent and difficult to conceal. Most individuals with facial scarring were dissatisfied with their appearance and required a slight enhancement **[11]**.

This study showed a significant improvement in scar width measured by ultrasound in bilateral cases and improvement of scar width measured by image J photographometer in both unilateral and bilateral cases. In addition, there was a significant difference between the preoperative and one-month and six-month postoperative scar on the Vancouver scar scale.

According to these findings, it was indicated that autologous fat grafting played a crucial role in facial scar remodeling and had a significant impact on facial scar tissue and scar-related disorders, providing not only aesthetic but also functional effects. Furthermore, regarding the VSS, there was an improvement in both vascularity and pliability of scars with an improvement in scar pigmentation **[12]**.

It was also shown that autologous fat grafting improved scar appearance, skin features, volume, and three-dimensional contour recovery **[13]**.

The current study showed statistically significant differences in lip thickness measured by ultrasound and vermilion heights, notching, and nasolabial angle measured using a photographometer when comparing preoperative and postoperative measurements. All of these lead to aesthetic improvement of the lip contour, fullness, and decrease in the stigmata of the cleft lip after repair with no reported complication, a less invasive procedure, and rapid recovery.

Similarly, it was concluded that augmentation of the upper lip autologous fat tissue was considered a minimally invasive procedure. This approach was affordable and repeatable, making it a generally accessible option. It improved lip volume, resulting in a more physiological form for the upper lip, nasal columella, and nasolabial angle. Autologous adipose tissue augmentation was accomplished on individuals with a complete cleft without complications or harmful effects; the more precisely the stigmatizing malformation removal, the higher the patient's quality of life **[14]**.

The current results were consistent with a study that reported objective enhancements in upper lip projection, vermilion height, and fullness Click or tap here to enter text **[15]**. In addition, they revealed that the elevated upper lip volume was well sustained six months after fat grafting was used to correct an upper lip volume insufficiency in patients with repaired cleft lip. Furthermore, the aesthetic result showed a statistically significant volume increase. Thus, when volume insufficiency existed in patients with healed cleft lips, it was believed that restoration with fat grafting was valuable **[16]**.

It was also concluded that immediate fat grafting was a valuable technique in cleft surgery and improving lip contour, appearance, and scarring **[17]**.

However, another study showed an improvement in lip symmetry on both sides and a significant increase in the thickness of the filling part. In addition, the filling area was soft, the overall appearance of the lip was pleasing, and the lip function was unaffected. On a 1- to 5-point scale, symmetry and attractiveness were enhanced following fat grafting based on the vermilion border, lip symmetry, and nasal profile encompassing the upper lip. In addition, preoperative mean scales were substantially higher than postoperative mean scores **[6]**.

In conclusion, autologous fat grafts for repairing whistling malformation are a safe and effective procedure with low incidence rates. Additionally, this approach is repeatable and can be administered under local anesthetic. However, the resorption rate is unpredictable. Therefore, an overcorrection of about 30% should be performed. If necessary, several autologous fat injections should be conducted at six months. More extensive studies with two-dimensional analysis and 3D-volumetric assessment are necessary and should be performed **[7]**.

In the current study, most patients were satisfied with their appearance after fat injection, with a high satisfaction rate of their recovery and the ease of the procedure compared to other surgeries performed before fat injection.

Similarly, it was demonstrated that patient satisfaction following fat grafting augmentation in cleft lips and nose. All patients expressed satisfaction with the outcome and strategy. The intended effect of the fat lasted an average of seven months (five to nine months) due to fat resorption.

Additionally, autologous fat grafting was examined for treating post-cleft lip volume asymmetry and observed that all patients and caregivers were pleased with the outcomes and would undergo surgery again **[5]**.

Recently, It has been discovered that individuals were much more satisfied with their appearance ($p<0.001$) **[4]**. Furthermore, when questioned about the simplicity of the procedure and the restoration rate, individuals responded positively **[3]**.

The main limitation of this study was the small sample size which might negatively affect its validity. Another limitation was the age group of the participants, particularly the preschool and school-age

groups in which the donor site was scarce, making the fat harvesting challenging.

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