New Cosmetic Modality of Fat Graft as a Treatment for Dark Pigmentation and Skin Rejuvenation of Lower Eyelids

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Abstract

Back ground: Dark pigmentation and skin laxity of lower eyelids attributed to many factors including thin ,translucent skin, prominent vasculatures and excessive melanin deposition which is difficult to treated ;in this study we used nanofat injection in the lower eyelids as a treatment for dark pigmentation and skin rejuvenation, the aspirated fat was mechanically emulsified so fat fragments altered into liquid emulsion, and the color turned from yellow to whitish, then injected intradermally in the lower eyelids, all procedures performed in an outpatient clinic. The objectives is to study the effect Nanofat injection for the treatment of skin rejuvenation and dark pigmentation of the lower eyelids . This prospective study conducted in the period of February 2015 to November 2015 included as an outpatient clinic procedure in Kirkuk province in Iraq. 22 female patients were recruited aged from 20 to 40 years, all were treated with intradermal Nano fat injection in the lower eyelids, and only 4 patients underwent lower eyelid blepharoplasty as they had excess skin in the lower eyelids. All patients had nanofat injection for skin rejuvenation and deep dark pigmentation of the lower eyelids, Assessment of the results by the surgeon were good in 50%, fair 36.4 and poor 13.6; patient satisfaction was taken into consideration and almost more than half of the them expressed satisfaction (good result in 59.1% ,fair result in 31.8%). Only 2 patients (9.1%) had minimal postoperative complications. Nano fat injection may consider an affordable option as an outpatient procedures that can be performed with ease in clinics to relive deep dark pigmentation and skin rejuvenation of the lower eyelids.

Keywords: Nanofat, eyelid

Introduction

Skin laxity with dark pigmentation of the lower eyelids considered as an aesthetic problem which may led to significant cosmetic concern for female patients; but it is not influence the quality of life from the medical point of view (1).

It can affects individuals with a wide range of age, and for both sexes, which worsens with altered in subcutaneous fat distribution and by sagging of skin with age (2). Many causative factors of the dark circles include translucent, thin skin with excessive pigmentation of the lower eyelids skin overlying the orbicularis oculi muscle and shadowing due to laxity of the skin and tear trough deformity, periorbital edema, superficial location of vasculature may also exacerbate the condition (3) .Etiologic factors also include genetic/constitutional, (4) post inflammatory hyperpigmentation ,dermal melanin deposition, allergic contact dermatitis ,secondary to anemia, stress, faulty habits .(5) So this condition may be challenging to treat due to it complex etiopathogenesis, and lacking straightforward and repeatable therapeutic options (6).Many treatment modality had been used like IPL, and Q-switched ruby laser, local creams ,Chemical peels, as well as fillers have all been tried for treatment but none have provided a satisfactory treatment (7).

All mentioned treatment option are not effective for patients with dark pigmentation in lower lid due to thin, translucent skin. In this type of dark pigmentation, injection of autologous fat has been reported as a good method (4) .

Tonnard et al develop new treatment technique called Nanofat in which autologous

fat graft harvested manually by closed syringe lipoaspiration then it's emulsified mechanically until a liquid suspension is obtained and then superficially injected in intradermal plain with fine sharp needles (8). Autologous fat grafting firstly reports in the early twentieth century and used clinically after the introduction of liposuction by Illouz in the 1980s as a lipofilling treatment in which fat injected deep subcutaneously (9) .

In 2001 Zuke et al determined that stem cells could be isolated from human adipose tissue obtained by suction-assisted lipectomy (liposuction) was processed to obtain a fibroblast-like stem cells (10).

The aim of this research is to study the effect Nanofat injection for the treatment of skin rejuvenation and dark pigmentation of the lower eyelids

Material and methods

Patients: In a prospective study, a total number of 22 female patients under the age of 40years(rang from 20 - 40 years) all complaining form dark pigmentation with or without skin laxity involving the lower eyelids in Kirkuk city in north of Iraq ,all patient had been treated by intradermal nanofat injection apart from 4 patients were also treated by lower eyelids blepharoplasty due to moderate to severe skin laxity then injected by nanofat . Those patients were selected, evaluated and operated during the period from February 2015 to November 2015. In all cases the diagnosis confirmed clinically; none of these patients in this study received previous medical or surgical therapy. Their ages were ranging between (20 years to 40 years), as shown in table1:

Aim of study: The objectives is to study the effect Nanofat injection for the treatment of skin rejuvenation and dark pigmentation of the lower eyelids short term follow up.

2:3 Preoperative measure:

Preoperative evaluation in all 22 patients included medical history, a complete physical examination, thorough history and physical examination, and these were including the following:

2:3:1 Clinical data:

Collected information about patient associated illnesses, smoking, drug use and medication history, and family history all this information had a direct effects which leads to increase in perorbital pigmentation , preoperative photograph were taken to all patients in frontal view.

2:3:3 Investigation:

Preoperative preparation included routine blood investigation and blood count (i.e., hematocrit and, platelet count). Prothrombin time and partial thromboplastin time all this measures were done to minimize postoperative problems.

All cases were operated under local anesthesia, in supine or semi sitting position, the involved area (lower abdomen) (Fig.1a), prepared and draped and surgical approaches were include the following:

Liposuction was performed and harvested from the lower abdomen after

infiltration with a modified Klein solution (Fig.1b-c),prepared by 1 liter of physiological solution (RL) + lidocaine 800 mg with adrenaline 1mg (1:1000); This aid in harvesting fat with closed syringe connected to a multi- port 2 mm cannula with side holes of 1 mm in diameter(Fig 1.d).

Then the collected fat (Fig.2:2a), in order to reduce any residual local anesthetic solution and red blood cells lipoaspirated fat was rinsed with sterile saline (Fig.2:2b), then by using Tonnard's technique (8) the lipoaspirate fat is mechanically emulsified this achieved by 30 passes shifting between two 10-cc syringes connected each other by a female-to-female Luer-Lock connector (Fig.2:2c).

Emulsification process liquefy fat to emulsion and changed it color from yellow to pale yellow white (Fig.2:3b), the fat becomes

liquid and emulsified so it can be injected easily by small needle 27-gauge intradermally (Fig.2:3a) the injection started from medial aspect of the lower eyelids to lateral aspect (Fig.2:3c-d) followed by simple digital massage to injected area (Fig.2:3e) to prevent skin irregularity due to nanofat localization and also decrease post injection erythema and yellow discoloration .

2:5 Post-operative measure:

Dressing made with local eye ointment apply to the lower eyelids. Oral Antibiotics with local eye antibiotic ointment were continued for five days postoperatively, usually patients were return to normal life style on the 3th postoperative day. The patients were followed up (3 to 9 months post operatively) for the evaluation.

Postoperative patient's evaluation:

For each patient, informed consent, pre and post-operative photo were taken, and any postoperative complications were also noted. Assessment of the results by the surgeon through pre and postoperative photographs by 4 plastic surgeons were assessed (poor=1,fair=2,good=3 for pigmentation improvement and also for skin rejuvenation poor=1,fair=2,good=3), patients satisfaction also considered and assessed by scale system adapted from Mario Goisis et al (11) study (in which made the patients judge the short term results by simple scale with whom they could choose between: very good,good,bad,very bad)with simple modification(good=1,fair=2,poor=3).The final total score was=9(poor=1-3,fair=4-6,good=7-9) ,p value and Chi esquire were used for statistical analyses of the final result .

RESULTS

Twenty two female patients were included in this study ,there age range from 20 to 40 years,patients concern was variable between dark pigmentation alone or pigmentation with rejuvenation due to skin laxity as shown in Table & figure 3.1.

Patients concern was variable as shown in table 3.1.

All patients were treated by single stage nanofat injection in the lower eyelids ;Nanofat injected to improve the pigmentation and skin rejuvenation for all patients apart from four patients were also treated by lower eyelid blepharoplasty as they have excess skin in lower eyelids by transcutaneous subciliary incision to excise excess skin in the lower eyelids and then injected with intradermal nanofat.

All patients injected by Nanofat using small sharp needle 27-gauge in repeated fan-shaped patterns intradermally with 1 cc of nanofat in each side followed by Simple digital massage over the lower eyelids .

At the end of the injections erythema and a yellowish discoloration was noticed in whole lower eyelids; this discoloration disappeared within 5 weeks by a gradual lightening of the skin. After an average follow-up of six months (range 3–9 months).

Table 3:2 shows patients age, operative indications, pigmentation improvement ,skin rejuvenation result ,patients satisfaction ,score & result total score=9 (good=7-9, ,fair=4-6,poor=1-3)

The final result were good in 50%, fair 36.4 and poor 13.6 , chi square test used as test of significance. Chi-square value worked out to be 1.1 which is statistically highly significant ($p< 0.0001$) , as shown in table & figure 3.3;
The results as shown in table 3.3 :

There were no significant wound complications, no infections, no cysts, or permanent discolorations, or other side effects were observed right after the treatment and also at the follow up visit. ; Only 2 patients (9.1%) in this study had prolong ecchymosis as postoperative complications , as shown in table & figer 3.4 and all other patient healing pass smoothly and uneventful .

Only 2 patients (9.1%) in this study had postoperative complications as shown in table & figure 3.4

Some of the patient's results (six patients) are shown from photo 3.1 to photo 3.6.

DISCUSSION

One of the common Causes of lower eyelids dark pigmentation is translucent thin skin overlying the orbicularis oculi muscle which also led to visualization of the underlying vasculature (12) .Autologous fat injection has been reported as an effective method for treatment dark lower lids pigmentation caused by thin, translucent skin in which many modalities of treatment cannot treat it (13) But fat injection may cause visible lumps of fat, contour irregularities, or fat necrosis or fat loss as it injected subcutaneously (14).

Tonnard's et al change fat particles to semi liquid emulsify by s smechanical emulsification process change fat particles to nanofat which completely disrupts the adipose tissue structure so it can be injected by small gauge needle intradermal not subcutaneously in order not to have a volume-adding effect. But the major benefit of nanofat injection is to relate to stem cell activity (8). In this study we have use nanofat injection by the same steps used by Tonnard's et al. in which they inject in each lower lids 1.6 cc of nanofat intradermally ;instead we use to inject 1 cc of nanofat in each lower eyelids and use simple digital massage to decrease postoperative erythema and pale yellowish skin discoloration which last for around five week in compare to Tonnard's et al they notice that skin yellowish skin discoloration remained for 1 month postoperatively and eyelid skin erythema for three months after the procedure. In this study the final results was satisfactory, In all patients, healing was uneventful with no significant complications. The postoperative outcomes were satisfactory after an average follow-up of six months(range 3-9 months), assessment of the results by the surgeon were accepted in more than 80% of all of the cases (good in 50%, fair in 36.4% and poor in 13.6 of cases) patients satisfaction also accepted in more than 80% of all the cases (good in 59.1%, fair in 31.8% of cases and only 9.1) and nearly the same results were obtained by other study .Most patients showed Satisfaction ranging from fair to good ,improvement in skin texture the lighting of dark skin color in the lower eyelids and this agreed with both Dong et al and Tonnard's et al which shows also good improvement and rejuvenation of skin and lighting of dark pigmentation; postoperative complications was minimal ,neither fat lumps nor texture irregularities were notice; Apart from prolong ecchymosis without any skin pigmentation and this agreed with Dong et al(14) and Tonnard's et al (8)also observed no significant complications. Intradermal Nanofat injection shows both rejuvenating affect and skin lighting due its Capability of stem cell production rather than volume build as in fat injection which injected in subcutaneous plain. As Tonnard's et al shows in there study that a large number of good quality mesenchymal stem cells are still present in the nanofat sample (8).

Conclusion

Nano fat injection is one of the new modality of treatment which may consider an affordable option as an outpatient procedures that can be performed with ease in clinics to relive deep dark pigmentation and skin rejuvenation of the lower eyelids mainly caused by thin, translucent skin, its easy procedure done under local anesthesia with minimal complications and low cost with minimal side effects.

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Table 2.1: Number and percentage of patients according to their ages.

Age of patients	No. of Cases	Percentage
20-30 years	8	36.36 %
30-40 years	14	63.64 %

Table 3.1: Number and percent of patients concern.

Patient concern	No. of Cases	Percentage
Dark pigmentation	14	63.6%
Dark pigmentation + skin laxity	8	36.4%

Table 3:2 shows patients age, operative indications, pigmentation improvement ,skin rejuvenation result ,patients satisfaction ,score & result total score=9 (good=7-9, ,fair=4-6,poor=1-3) ,P=pigmentation ,L=skin laxity

Case	Age	Patients complain	pigmentation reduction	Skin rejuvenation correction	Patients satisfaction	Score	Results
1	38	P+L	2	2	2	6	Fair
2	25	P	2	3	3	8	Good
3	29	P	2	2	2	6	fair
4	37	P+L	3	2	3	8	Good
5	34	P+L	2	2	3	7	Good
6	30	P	1	1	1	3	Poor
7	26	P	2	2	2	6	Fair
8	32	P	3	2	2	7	Good
9	40	P+L	2	2	2	6	Fair
10	38	P+L	2	3	2	7	Fair
11	39	P+L	2	3	3	8	Good
12	26	P	0	1	2	3	Poor
13	35	P	2	2	3	7	Good
14	36	P+L	2	2	2	6	Fair
15	29	P	2	3	3	8	Good
16	25	P	3	2	3	8	Good
17	34	P	2	3	3	8	Good
18	26	P	2	2	2	6	Fair
19	39	P+L	2	2	3	7	Good
20	33	P	3	2	2	7	Good
21	32	P	1	0	1	2	Poor
22	27	P	2	2	2	6	Fair

Table 3.3: the result in Numbers and percent's .

Result	No. of Cases	Percentage
Good	11	50 %
Fair	8	36.4%
Poor	3	13.6%

Table 3.4: Postoperative complications

Postoperative complications	No. of Cases	Percentage
Prolong ecchymosis	2	9.1 %

figure 3.1: Number and percent of patients concern.

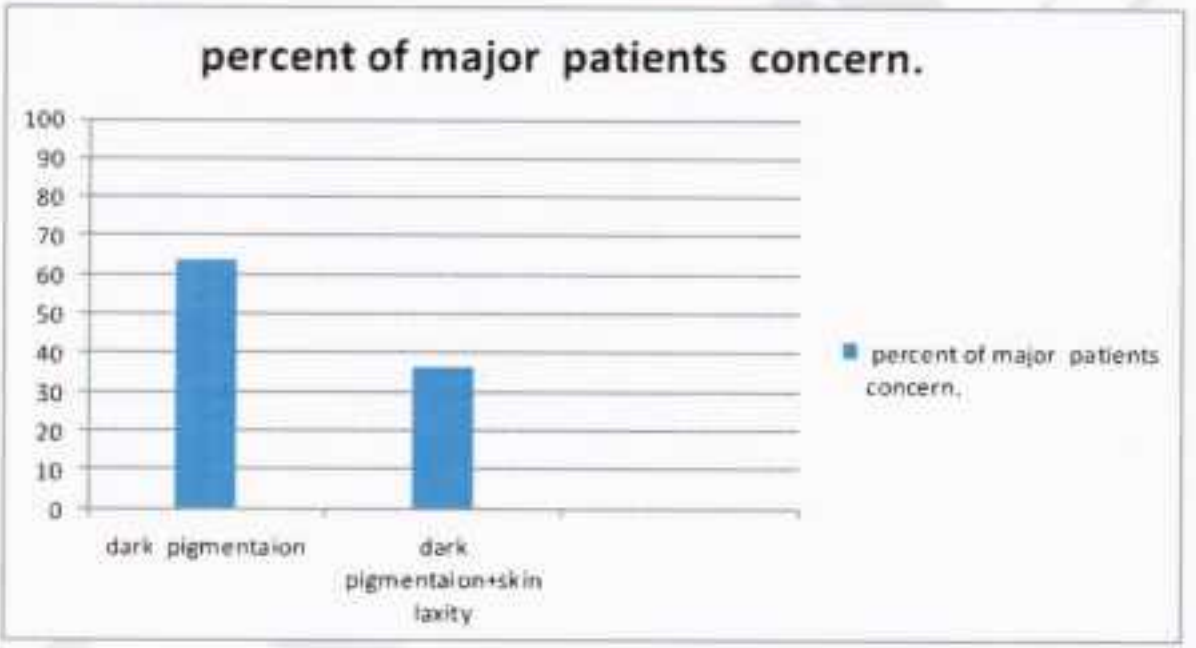


Figure 3.3: the result in Numbers and percent's

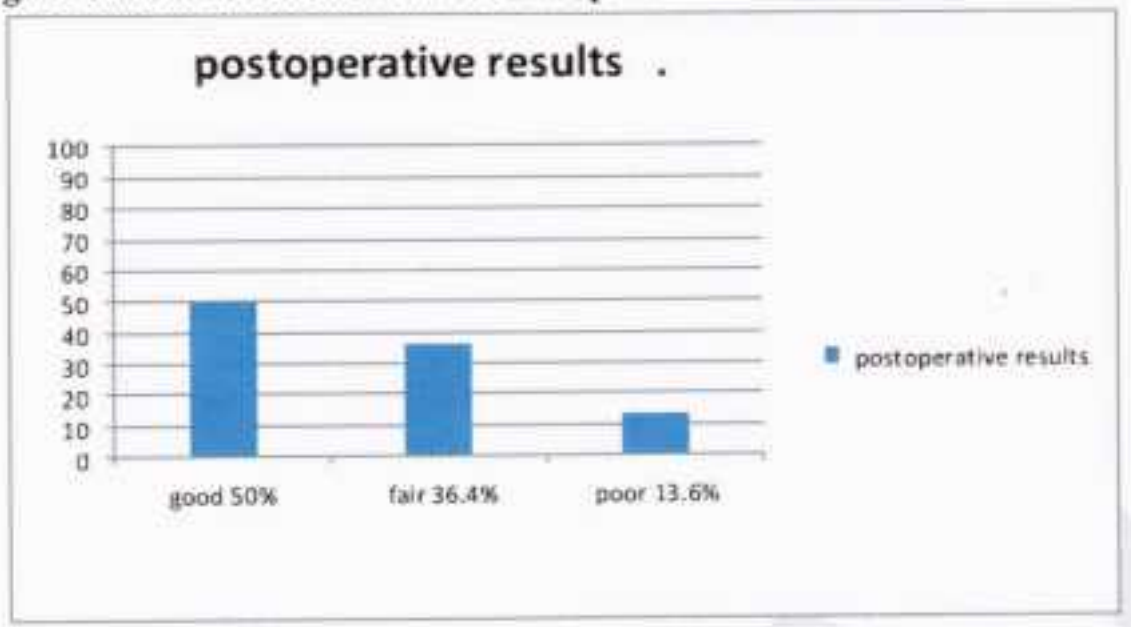


figure 3.4: Postoperative complications

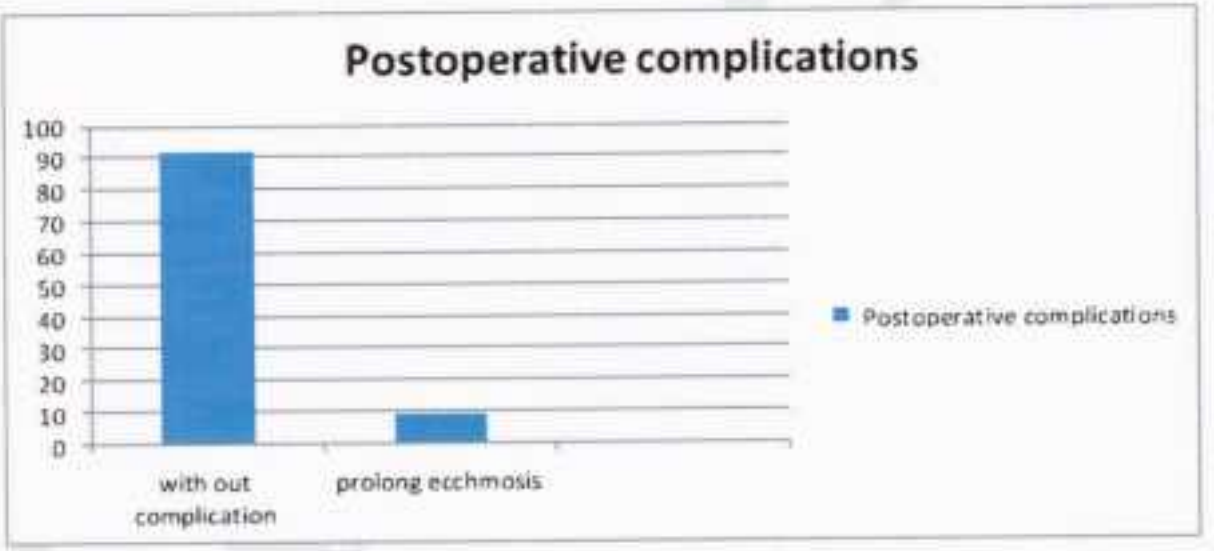


Fig 2:1 (a-d) Operative procedure: (a)-Lower abdomen draping (b-c)- infiltration with a modified Klein solution (d)-Closed syringe liposuction

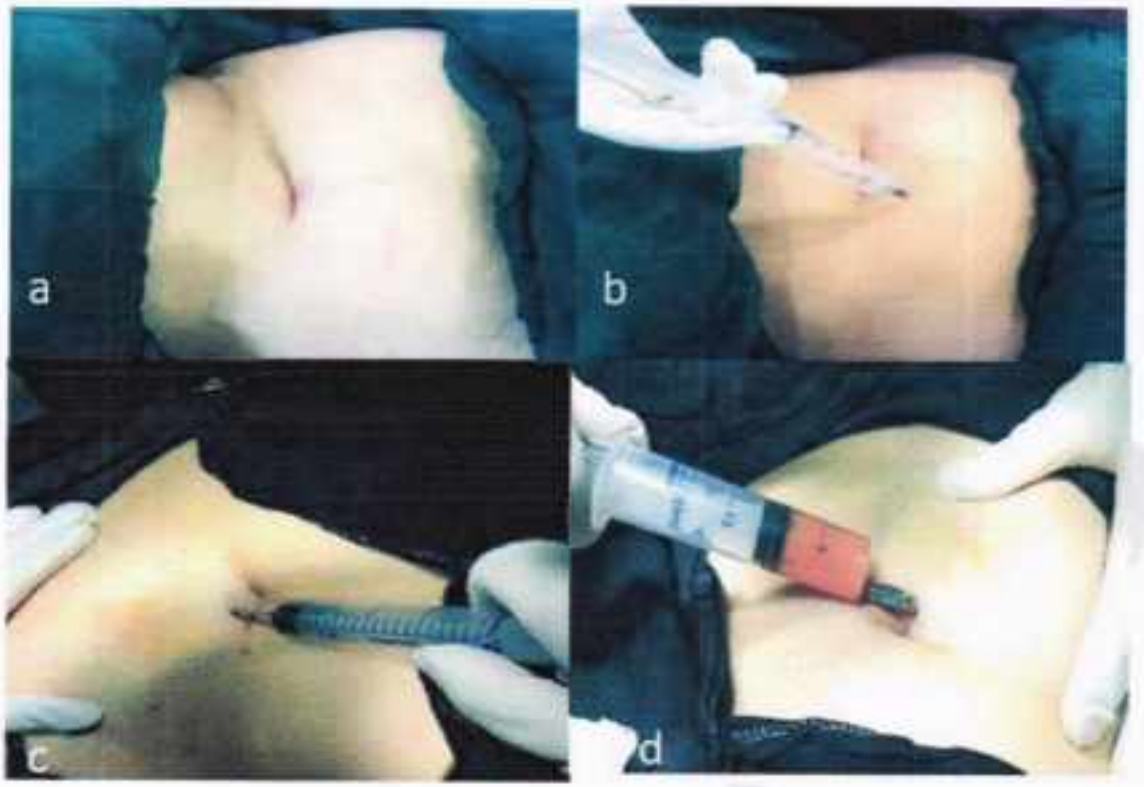


Fig 2:2 (a-c) Nanofat preparation: (a) - Collected fat (b) - lipoaspirated fat was rinsed with sterile saline (c) - Emulsification of lipoaspirate fat by achieved mechanically by 30 passes shifting between two 10-cc syringes connected each other by a female-to-female Luer-Lock connector

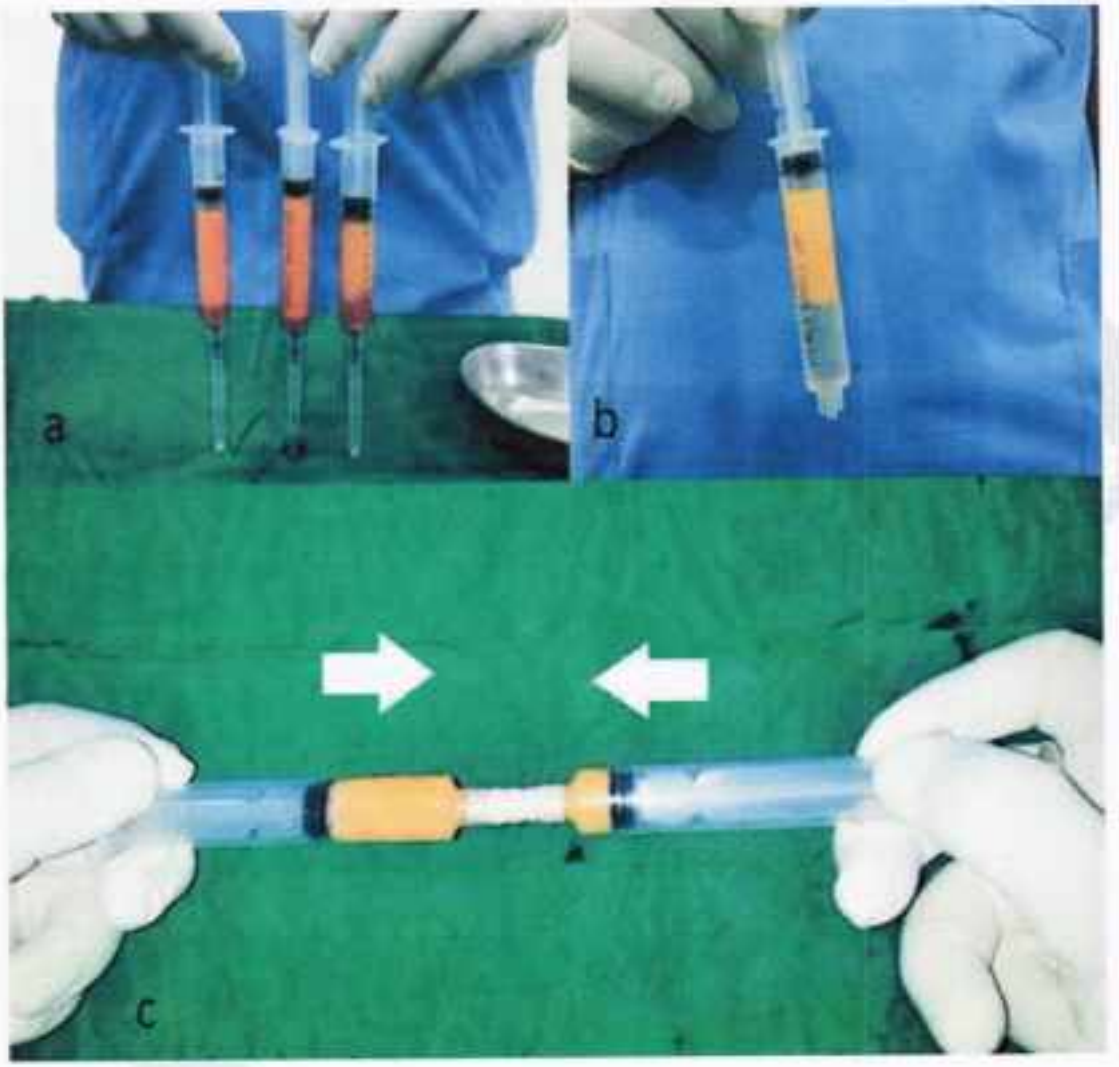
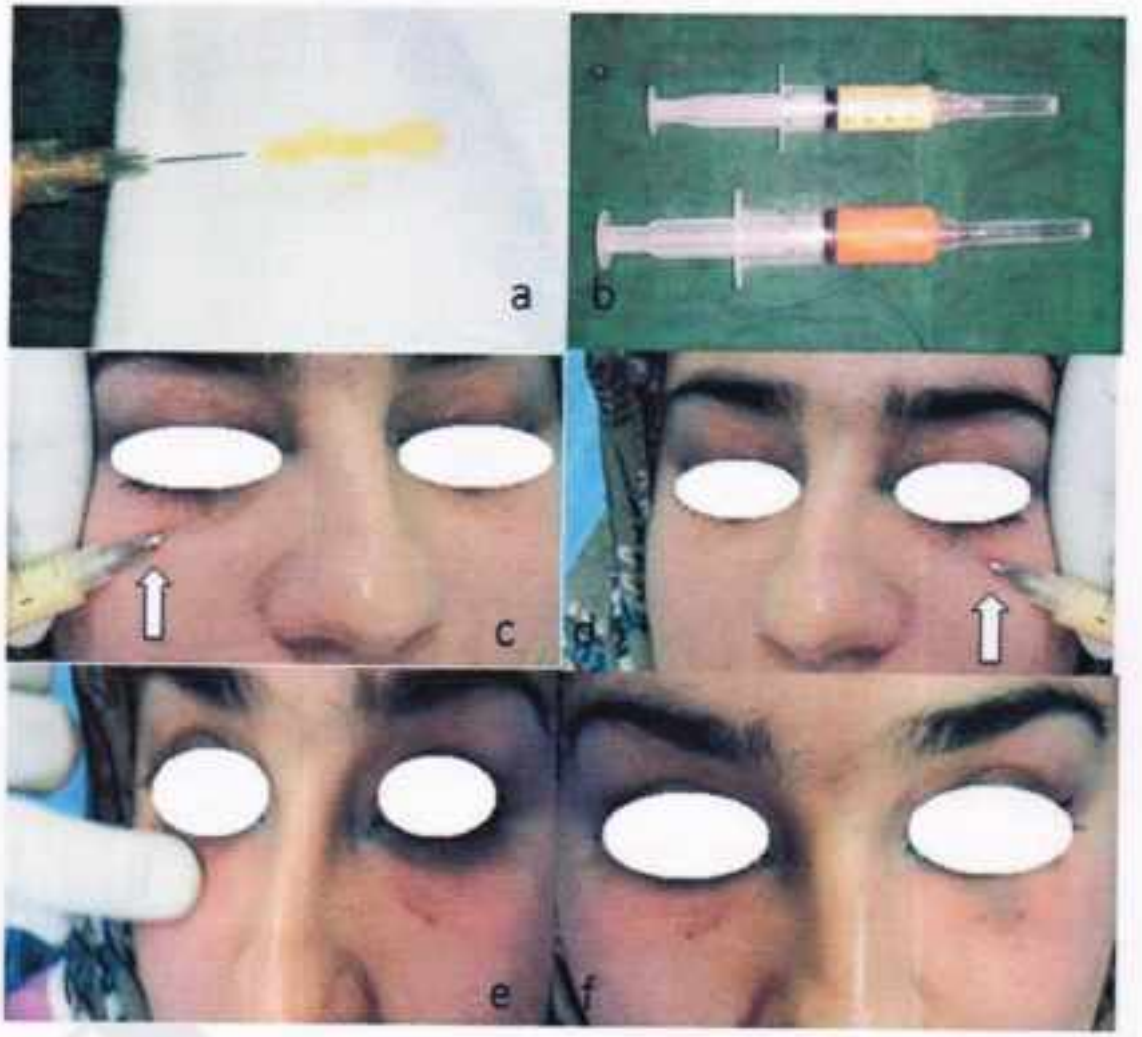


Fig 2:3 (a-f) Nanofat injection(a)-Nanofat injected easily by small needle 27-gauge (b)-Emulsification process alter fat color from yellow to pale yellow white (c-d)-Intradermal nanofat injection in both left and right lower lids (e)- Simple digital massage to the injected area (f)-post injection erythema and yellow discoloration.



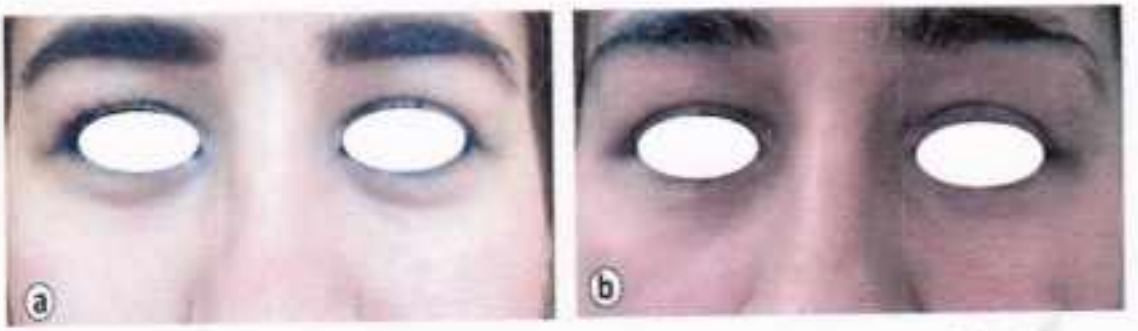


Fig 3:1 (a-b) photos view patient underwent nanofat grafting in lower eyelids.(a) preoperative view(b) Postoperative view after 6-months.

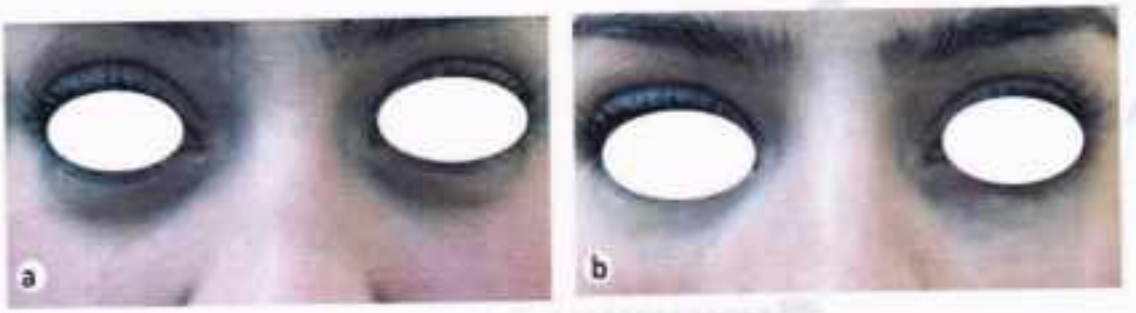


Fig 3:2 (a-b) photos view patient underwent nanofat grafting in lower eyelids.(a) preoperative view(b) Postoperative view after 8-months..

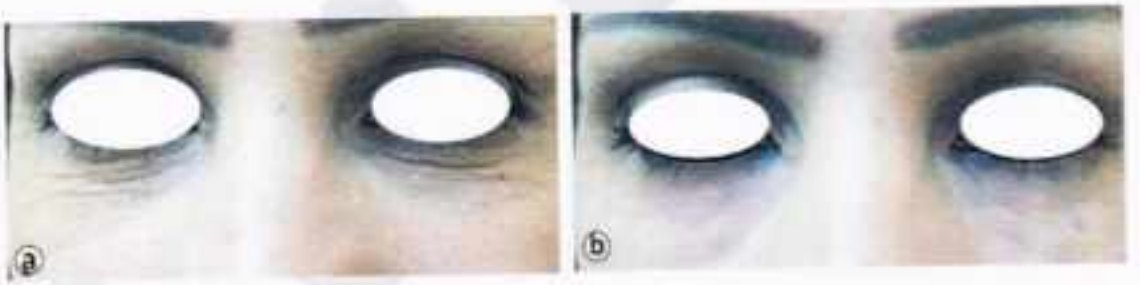


Fig 3:3 (a-b) photos view of patient whom underwent lower lid blepharoplasty with nanofat grafting in lower eyelids. (a) Preoperative view (b) Postoperative view after 9-months.

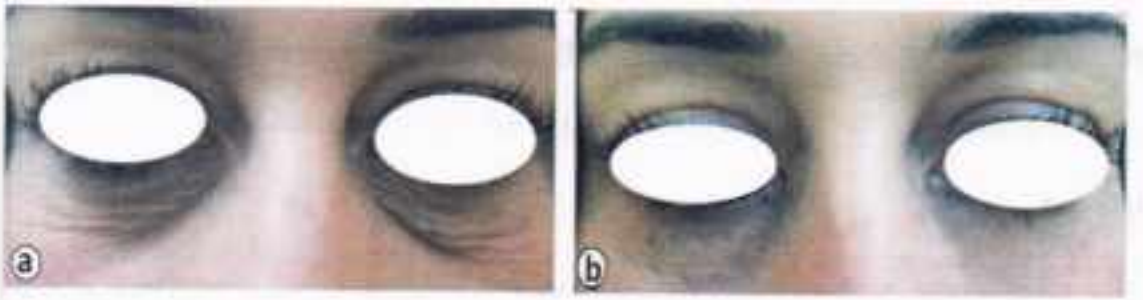


Fig 3:4 (a-b) photos view of patient whom underwent lower lid blepharoplasty with nanofat grafting in lower eyelids. (a) Preoperative view (b) Postoperative view after 7-months.

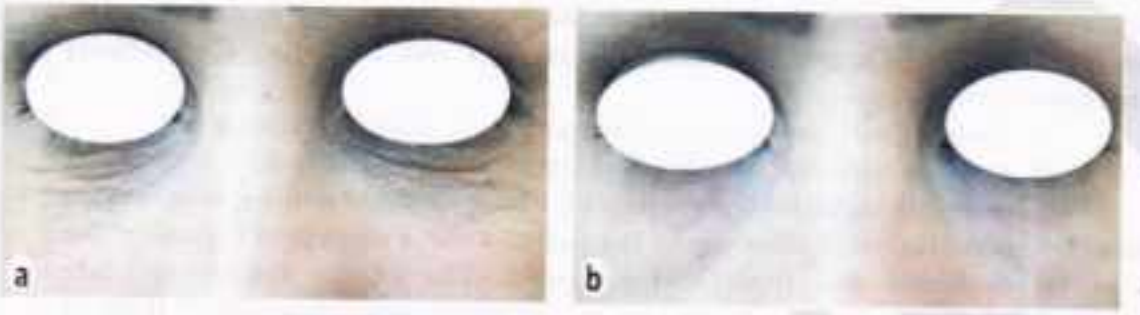


Fig 3:5 (a-b) photos view of two cases whom underwent lower lid blepharoplasty with nanofat grafting in lower eyelids. (a) Preoperative view(c) Postoperative view after 8-months.

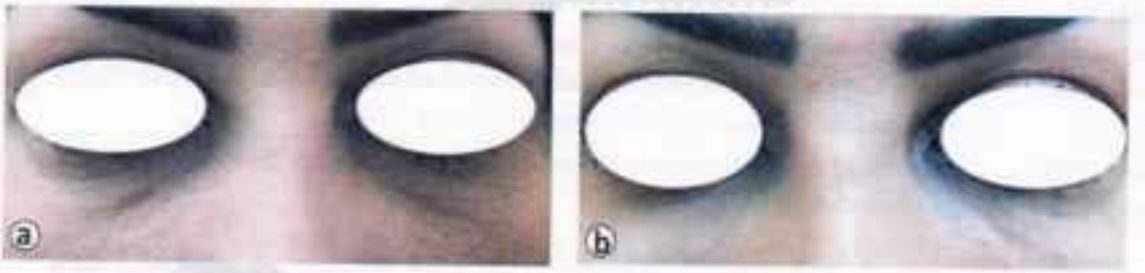


Fig 3:6 (a-b) photos view of patient underwent lower lid blepharoplasty with nanofat grafting in lower eyelids. (a) preoperative view(c) Postoperative view after 9-months.