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ORIGINAL ARTICLE OCULOPLASTIC

Outcomes of Surgical Treatment of Malar Mounds and Festoons

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Abstract

Background Malar mounds (congenital) and festoons (acquired) are persistent puffiness in the prezygomatic space between the orbicularis retaining ligament (ORL) and zygomatico-cutaneous ligament (ZCL). Non-surgical treatments often yield unsatisfactory results. This paper aims to demonstrate a surgical approach for the treatment of malar bags by outlining the author's surgical technique of treating malar mounds and festoons and reviewing outcomes in 89 cases.

Methods Correction of malar mounds and festoons was achieved with subciliary skin–muscle flap, release of the ORL and ZCL, midface lift, canthopexy, and muscle suspension. We performed a retrospective study of 89 patients, all of whom had surgical correction of malar mounds or festoons in the past 10 years and a follow-up period of at least 6 months. This study was conducted over the course of the past year and involved reviewing patient charts in the office. Specifically, patient data spanning 2012 to 2022 were analyzed.

The predictor variable in this study is the specific class of malar bags the patient has, as determined by the underlying pathophysiology. Outcome variables include the presence or absence of prolonged lid or malar edema, necessary re-excision of excess orbicularis oculi of the subciliary area, lid malposition, permanent visual changes, the need for additional non-operative treatment, and recurrence requiring reoperation.

Results The majority of patients presented with acquired festoons (81/89) with prior attempts of correction (49/89). The mean follow-up is 11.2 months. Persistent malar edema (> 6 weeks) was documented in 14 patients and mainly resolved with Medrol Dosepak (methylprednisolone) and hydrochlorothiazide. A two-proportion Z-test was conducted, comparing the proportion of patients with poor protoplasm who experienced postoperative malar edema to the proportion of those with excellent protoplasm who experienced postoperative malar edema. A p-value of $3.414e^{-7}$ was obtained, indicating a statistically significant difference of proportions between the two groups. Five patients received additional injections of deoxycholic acid and two needed fillers for smoother contour of the lower eyelids. Two patients with severe malar mounds required multiple reoperations including direct excision in one patient. One incidence of transient lid retraction was reported in a patient with previous facelift and facial nerve injury.

Conclusion Malar mounds and festoons present a unique challenge to plastic surgeons. They are persistent in nature and require close-interval, long-term follow-up as additional injections and reoperations are warranted. Our approach to malar mound and festoon correction is safe and effective and provides long-lasting results.

Level of Evidence IV This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

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Introduction

The word "festoons" was first described by Dr. Furnas in 1978 referring to persistent puffiness in the prezygomatic space [1]. This space is bound superiorly by the orbicularis retaining ligament (ORL) and inferiorly by the zygomatico-cutaneous ligament (ZCL). The floor consists of suborbicularis oculi fat (SOOF) from which the origins of the zygomaticus major and minor muscles emerge, while the roof is formed by the orbicularis oculi muscle [2–4]. These facial deformities are a source of intense insecurity, often leading those who experience them to isolate themselves from society and invest significant resources in treatments purporting to fix this issue.

Festoons are often poorly understood and defined. They belong to a spectrum of pathology termed malar bags which encompass malar edema, malar mounds or congenital festoons, acquired festoons, and combination [5]. Each entity has its own pathophysiology and therefore, treatment algorithm. We develop a classification system for malar bags and their respective treatment algorithm as detailed in Fig. 1.

- Malar edema's underlying pathology is the presence of pitting edema due to lymphatic obstruction and subsequent fluid collection in an enclosed space, in this case, prezygomatic space.
- Malar mounds or congenital festoons is defined by the presence of subcutaneous fat or anterior septal fat (ASF) which is suborbicularis, preseptal, and distinct from suborbicularis oculi fat (SOOF). These cases are often present at birth or early adulthood.
- Festoons (acquired) is due to senile laxity of the orbicularis oculi muscle. History of worsening of bags with injection of neurotoxins in this area confirms this diagnosis.
- Combination of two or more of such pathology is often due to iatrogenic insults such as filler injections or attempted correction with traditional blepharoplasty.

Traditional approaches to festoon correction, which include non-surgical modalities like fillers, laser, diuretics, sclerosing agents, as well as surgical treatment via traditional lower blepharoplasty, are inadequate to address such complex pathologies. Being able to diagnose and differentiate malar mounds and festoons is the first crucial step in determining the appropriate treatment course. Surgical management of these entities includes management of the lid–cheek junction and its ligamentous attachment, management of orbicularis oculi laxity, addressing periorbital fats while maintaining vigilance about lid malposition, and persistence with postoperative care.

Because of the complexity and challenging and persistent nature of this disease, many tend to stay clear. Of those who do not, many tend to see suboptimal results since traditional approaches to festoon and malar mound correction are not tailored to the underlying pathophysiology on a case-by-case basis. Poor results, in combination with fear of ectropion and other postoperative complications and morbidities, continue to discourage many plastic surgeons from attempting to operate on such patients.

This paper aims to outline the pathophysiology of each malar bag subtype and the author's algorithm for treating congenital and acquired festoons via a series of 89 patients from the past decade. We hypothesize that the pathophysiology of malar bags must be identified in order to properly treat them. It is our hope that a proper understanding of the pathophysiology of this spectrum of disease, along with an understanding of the surgical techniques described, will encourage more physicians to take on such cases and use a surgical approach in doing so.

Methods

Study Design and Sample Description

A retrospective review of malar mounds and festoon correction cases by a single surgeon [*REDACTED*] over a 10-year period was performed. This study was carried out in the author's New Jersey office over the course of the past year and involved reviewing patient charts. Inclusion criteria included a diagnosis of malar mounds (congenital festoons) or acquired festoons followed by appropriate surgical intervention and a minimum follow-up of six months. Cases with less than six-month follow-up were excluded. Demographics and outcome data were queried.

This study adhered to the Helsinki Declaration and reporting guidelines, and consent was obtained from all patients.

Study Variables and Surgical Technique

The predictor variable in this study was the specific class of malar bags the patient had, as determined by the underlying pathophysiology. Outcome variables included the presence or absence of prolonged lid or malar edema, necessary re-excision of excess orbicularis oculi of the subciliary area, lid malposition, permanent visual changes, the need for additional non-operative treatment, and recurrence requiring reoperation. Other study variables included the specific surgical procedures undergone by each patient.

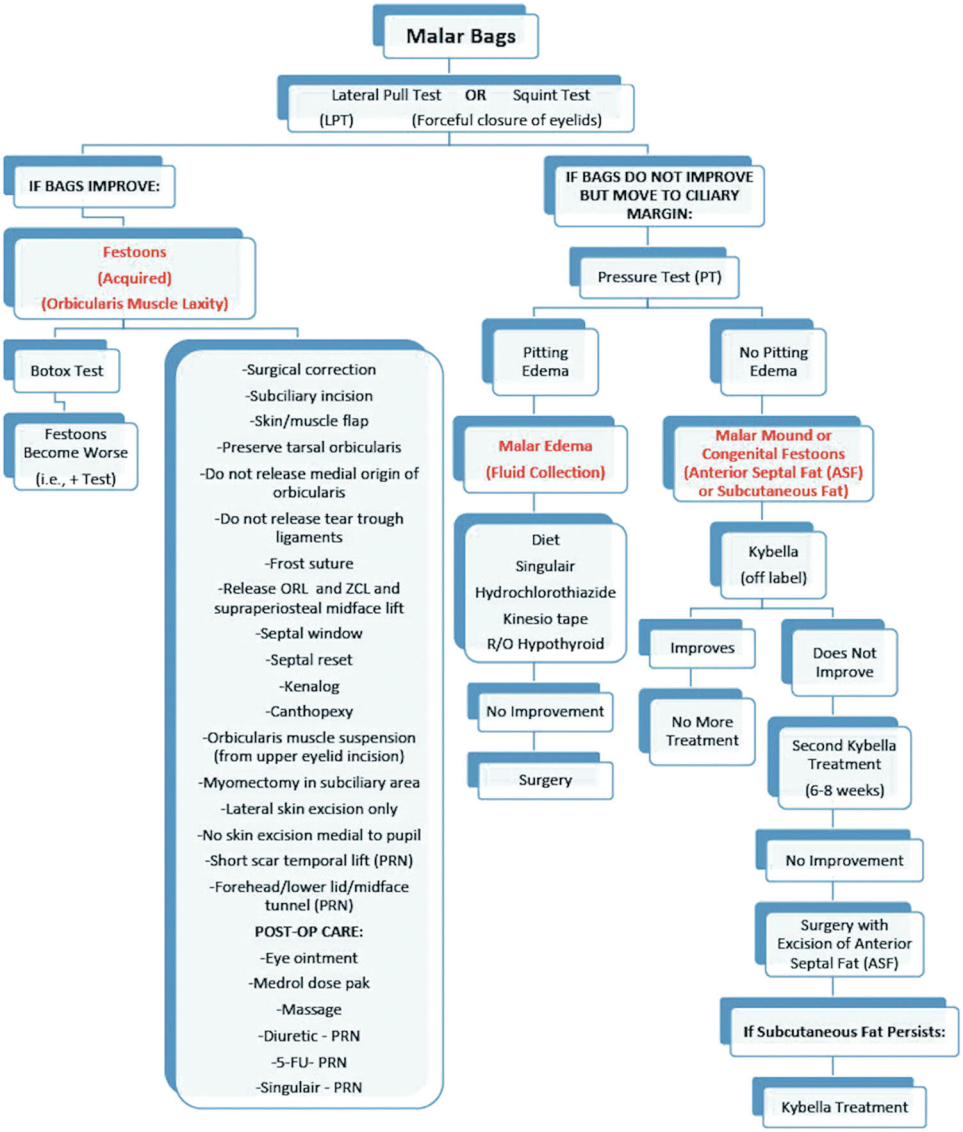

Fig. 1 *[REDACTED]* Algorithm for management of the malar bags (festoons, malar edema, and malar mound)

We diagnose patients with malar mounds or congenital festoons and acquired festoons using lateral pull test (LPT) and pressure test. LPT is performed by using an index finger to pull the lateral corner of the lower eyelid upward and laterally, simulating muscle suspension (Fig. 2). If bags improve, there is muscle laxity and therefore, the patient has acquired festoons (Fig. 3). History of worsening of symptoms with neurotoxin confirms this diagnosis as the festoons will worsen. If bags do not improve, a pressure test is done to differentiate between pitting edema in malar edema and non-pitting edema in malar mounds (Fig. 4).

Surgery is performed under general anesthesia. Preoperative medicines include antibiotics, 500 mg of Solumedrol IV, and 1 gram of tranexamic acid IV. About 10 mL of 1% lidocaine with 1:100,000 epinephrine solution is injected to lower eyelids and midface. Antibiotics are used as a prophylactic measure in all patients. 1–2 grams of cephalosporin is administered intravenously.

Tranexamic acid is administered routinely to all patients. Although the development of deep vein thrombosis has been associated with the use of tranexamic acid in obese patients and patients with a history of smoking, trauma, or multiple fractures, this risk is minimal and outweighed by the benefits. Furthermore, current literature has supported the safety and efficacy of using tranexamic acid in plastic surgery, especially in facial esthetics [6–10]. Since introducing tranexamic acid as a preoperative measure, our patients have experienced a significant decrease in postoperative ecchymosis.

Lateral pull test (LPT) is done preoperatively to also determine whether there is any fat to be removed or only transposed from medial and central pockets of the lower eyelids. If the bulging of the lower eyelids disappears, this

Fig. 2 Lateral pull test is **A** negative when bulging disappears, consistent with congenital festoons, and **B** positive when bulging persists, consistent with acquired festoons

Fig. 3 A 50-year-old male with acquired festoons, **A**, **B** preoperative, **C**, **D** 3 months postoperative **E**, **F** 6 months postoperative, and **G**, **H** 1 year 3 months postoperative following bilateral upper and lower blepharoplasty, septal window, septal reset, correction of festoons, canthopexy, orbicularis muscle suspension, midface lift, and short scar temporal lift

is called a negative test and no fat should be removed from medial and central fat compartments. Therefore, a limited lateral subciliary incision can be used. If bulging persists, the test is positive, and some fat should be removed from these pockets. A full subciliary incision is needed in this case. The lateral fat is removed aggressively in every patient via a septal window regardless of LPT [11].

Our surgical techniques include development of skin and muscle flap, release of the ORL and ZCL, management of postseptal fat pads, septal reset with 6-0 clear nylon, and direct excision of anterior septal fat if present. Anterior

Fig. 4 A 35-year-old female with congenital festoons or malar mounds, **A** preoperative, **B** 1 month postoperative, **C** 2 months postoperative, **D** 3 months postoperative, and **E** 5 months postoperative following bilateral lower blepharoplasty, correction of festoons, canthopexy, orbicularis muscle suspension, midface lift, and frost sutures

septal fat is a cluster of fat lobules found adherent to the undersurface of the orbicularis oculi muscle and is distinct from subcutaneous, postseptal fat and SOOF. This is often found in both congenital and acquired festoon cases in our experience (Fig. 5)/(Videos 1–3 in supplementary).

After a subciliary incision, we ensure to preserve the tarsal orbicularis of the lower eyelids. This skin and muscle flap is raised lateral to medial using Steven's scissors. After release of the ORL and ZCL, vertical spreading with scissors and blunt finger dissection (Video 4 in supplementary) mobilizes the entire midface over SOOF and the origin of the zygomaticus major muscle. The zygomaticofacial nerve is also preserved as well as the medial origin of the orbital orbicularis oculi muscle. This approach is safe since there is no facial nerve branches in this avascular plane of supraperiosteal dissection. The arcus marginalis is opened at this time along the inferior orbital rim and septal reset is performed with running 6-0 clear nylon suture. We

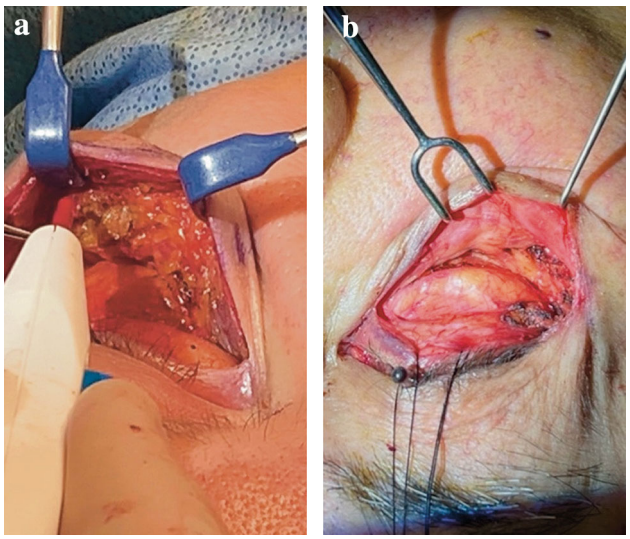

Fig. 5 **A** Anterior septal fat, cluster of fat adherent to undersurface of orbital orbicularis in the prezygomatic space often presents in congenital festoons, **B** lower eyelid with no anterior septal fat, red undersurface of orbicularis muscle is clearly demonstrated

aggressively removed fat from the lateral compartment via a small opening called septal window [11].

The lower eyelid contains three distinct pockets of fat, with the lateral pocket sitting higher than the central pocket and separated from the central pocket by the arcuate expansion. Lateral fat is usually under-resected in lower blepharoplasty, resulting in bulging of the lateral fat on the lower eyelid. Residual fat in the lateral compartment is thus one of the main complaints of secondary patients, indicating the need for aggressive fat removal from the lateral compartment. Because it is difficult to remove all of this fat through a transconjunctival approach, a septal window approach is preferable and can be achieved without disturbing the arcuate expansion between the lateral and central fat [11].

Septum orbitale covers the fat pockets. It is wide and thick laterally and becomes narrower and thinner as it approaches the nose. It is attached to the inferior orbital rim via the arcus marginalis. Septal reset involves opening the orbital septum from lateral to medial at the level of the arcus marginalis. The septum is later sutured from medial to lateral, starting from the medial origin of the orbicularis, which does not exist past the pupillary line. 6.0 clear nylon should be used to suture continuously through the muscle until SOOF is reached. Quit once you reach the area where you have opened the septal window above it.

Septal reset can be performed to address the central and medial compartments (Fig. 6). Fat from these pockets can be preserved, or a small amount can be removed and used to correct a tear trough deformity.

The orbicularis oculi muscle and superficial malar fat compartment are parts of the composite flap which is released and elevated after supraperiosteal midface lift and orbicularis muscle suspension to the temporal fascia in the lateral orbital area.

Several steps are taken to avoid ectropion following an extensive midface lift. Before the procedure, a thorough preoperative evaluation is performed on all patients to identify those at greatest risk of developing ectropion.

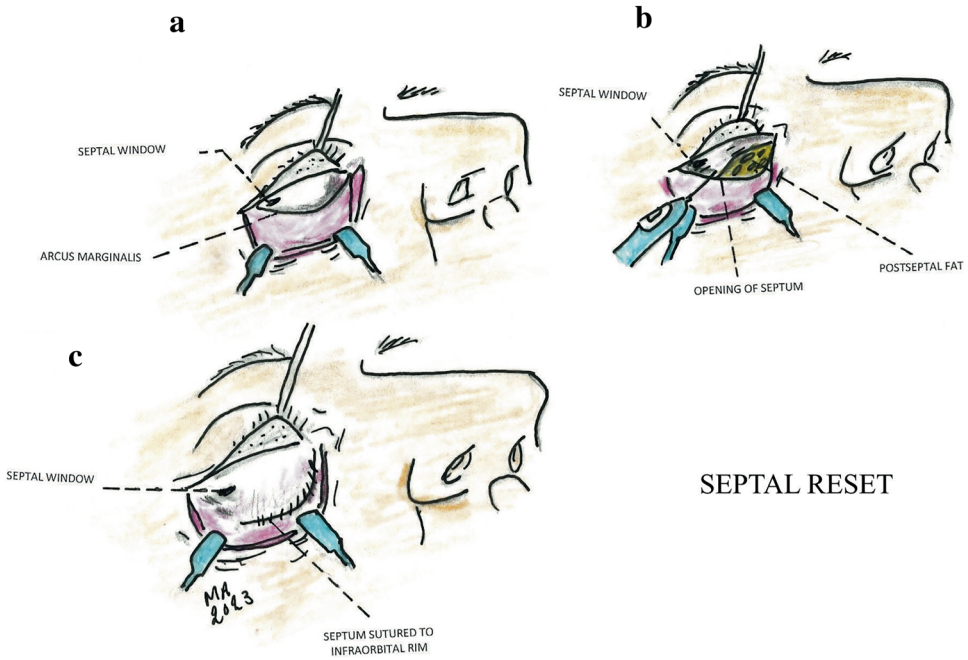

Fig. 6 Illustration of septal reset

Those most vulnerable include negative vector patients, secondary cases, patients with poor lower eyelid tone, and patients with poor protoplasm. Protoplasm, or the non-living substance of the cell, can be used as a surrogate measure of tissue quality and health. Scleral show below the limbus and the ability to pull the lower eyelid more than 8 mm from the globe are both indicators of poor protoplasm. These patients consistently experience more chemosis and eyelid edema than other patients and endure a prolonged recovery.

After evaluation, the following preventive measures are taken:

- Patients demonstrating scleral show undergo short subciliary incision only. A full incision is not performed in these patients to avoid generating any pull or scarring of the lid, either of which can result in ectropion.
- In all patients, release of both the tear trough ligament and the medial origin of the orbicularis muscle from the maxilla is avoided to minimize edema, bleeding, and the potential to disturb any branches of the facial nerve to the upper eyelids.
- Every patient undergoes canthopexy, in which the deep layer of the lower eyelid (the inferior retinaculum) is tightened to the inner aspect of the superior orbital rim to prevent lid retraction. In the normal eye, tightening is done at the level of the pupil. In negative vector patients, tightening of this suture is executed above the level of the pupil.
- The orbicularis is suspended (Fig. 7) and tightened to the orbital thickening area (lateral canthal area). The muscle is sutured to the temporal fascia, as opposed to the inferior orbital rim, and 2.5 mg of Kenalog (triamcinolone) is installed under the skin–muscle flap in the midface to prevent scar formation.
- When lower blepharoplasty is performed via full subciliary incision, 3–4 mm of tarsal orbicularis is left behind to provide support to the lower eyelid.

Fig. 7 Suspension of orbicularis muscle

- No skin is removed from the subciliary area medial to the pupils and lateral skin is removed conservatively. Because removal of the skin is what causes ectropion, this is a crucial precaution.
- Frost suture is used in all high-risk patients.
- Early use of 5-fluorouracil is implemented in cases where there is postoperative tightness of the lower eyelid.

Muscle suspension is best done through upper eyelid approach and under the tunnel in the area of orbital thickening with a clear 5-0 PDS on a P-3 needle. Because a substantial length of muscle is required to be tightened, muscle suspension is always achieved through the upper eyelid in cases where patients undergo midface lift or have very significant festoons.

Following muscle suspension, some patients experience bunching of the skin in the lateral canthal area. If bunching is minimal, the skin is left alone. In cases where the degree of bunching is significant, a short scar temporal lift is performed to correct it. This technique involves making an incision in the temporal area about 1–2 cm inside the hairline lateral to the zone of fixation. Conscious effort is made not to remove too much skin but rather re-drape it. Patients undergoing a short scar temporal lift ideally have thick hair and a short distance from the temporal hairline to the upper eyelid. This technique is not performed on balding patients.

We also perform a canthopexy with a clear 5-0 PDS on a P-2 needle, conservative trimming of the tarsal orbicularis muscle after muscle suspension, and lateral skin excision. Skin is closed with interrupted 6-0 black Nylon laterally and 6-0 silk in continuous fashion in the subciliary area. Frost sutures with 4-0 silk are used in high-risk cases, especially in reoperations, poor lid tone in the elderly, and negative vector patients.

Our post-op care includes Medrol Dosepak (methylprednisolone), TheraTears, TobraDex (tobramycin and dexamethasone ophthalmic ointment), massage, as well as diuretics, montelukast, and 5-fluorouracil injection as needed. Our diuretic of choice is hydrochlorothiazide. Patients take 25 mg orally twice a day. The use of montelukast is indicated only in patients who develop postoperative puffiness of the malar area. Dosage is 10 mg/day. Use is intended to be short term, terminated as soon as the edema subsides in that area. The use of 5-fluorouracil is indicated when there is tightness of the midface or lower eyelid or when there is scar tissue with the potential to start pulling the lower eyelid down. ½ cc of 5-fluorouracil (25 mg) with ½ cc of 1.0% xylocaine with 1:100,000 epinephrine solution is injected into the midface area with a 30 gauge needle every 7–10 days for as long as needed until the lower eyelid area becomes supple. Patients are followed closely at days 1 and 3, weeks 1, 2, 4, and 6, months 3 and 6, and yearly thereafter.

Patient with residual puffiness from preorbicularis fats are treated postoperatively with 2–4 injections of 0.1–0.15 cc of 10 mg/ml deoxycholic acid at 4–6 week and repeated as needed.

Data Management

Data for this study were collected by two associate editors and data collection was blinded. Excel was used for patient data compilation and for statistical analysis.

Specific measures are used to classify patients according to the quality of their protoplasm. Those with the best protoplasm are said to have "excellent protoplasm" while those with the worst protoplasm are said to have "poor protoplasm." The remainder of patients fall into distinct groups between these two extremes. A two-proportion Z-test was performed to determine whether the proportion of patients who experienced postoperative malar edema, the postoperative complication with the highest prevalence in this study, differed between patients deemed to have poor protoplasm and those classified as having excellent protoplasm. A significance level of 0.01 was used and a Z-score of 5.099 was generated with a corresponding *p*-value of $3.414e^{-7}$. Because $p < \alpha$, the results are statistically significant (Table 1).

Results

The average age of our study's patients was 54 years old, with our youngest patient being 28 and our oldest being 71. Of the 89 patients, 82 were female and 7 were male, while 81 presented with acquired festoons and 8 presented with malar mounds (congenital festoons). Of the patients included in this study, more than half (55%) had previous

Table 1 Two-proportion Z-test parameters

Poor protoplasm	
Sample size	14
Prolonged malar edema (> 6 weeks)	14 (1.000)
Excellent protoplasm	
Sample size	12
Prolonged malar edema (> 6 weeks)	0 (0.000)
Pooled sample	
Sample size	26
Prolonged malar edema (> 6 weeks)	14 (0.538)
Test statistic (Z-score)	5.099
P-value	$3.414e^{-7}$

attempts at festoon correction, including laser (8%), fillers (34%), micro-needling (23%), sclerosing agents (2%), and traditional blepharoplasty (42%), without much success. The mean follow-up is 11.2 months (Table 2).

Persistent malar edema (> 6 weeks) was documented in 14 patients, which mainly resolved with repeated short course of steroids and/or diuretics. A two-proportion Z-test was conducted, comparing the proportion of patients with poor protoplasm who experienced postoperative malar edema to the proportion of those with excellent protoplasm who experienced postoperative malar edema. A p-value of $3.414e^{-7}$ was obtained, indicating a statistically significant difference of proportions between the two groups at an alpha level of 0.01 (Table 1). Five patients received additional injections of deoxycholic acid and two needed fillers for smoother contour of the lower eyelids. Two patients with severe malar mounds required multiple reoperations including direct excision in one patient. One incidence of transient lid retraction was reported in a patient with previous facelift and facial nerve injury (Table 3).

Table 3 Postoperative outcomes

Complications longed chemosis > 4 weeks	Incidence
Prolonged lid edema > 4 weeks	12
Prolonged malar edema > 6 weeks	14
Orbicularis oculi muscle excess requires re-excision	0
Subciliary muscle excess requires re-excision	0
Lid malposition	2
Lid retraction/ectropion	1
Eye asymmetry	1
Permanent visual changes	0
Sensory deficit	0
Diplopia	0
Additional non-operative treatment	7
Deoxycholic acid	5
Filler	2
Reoperation for recurrence, direct excision	2

Discussion

The aim of this study was to discuss the pathophysiology behind edema of the malar area and the importance of treating malar mounds according to the underlying pathophysiology. We proposed that orbicularis muscle laxity is a defining feature of acquired festoons, while anterior septal fat (ASF) is predominantly seen in congenital festoons. Still, ASF occasionally presents in acquired cases.

Our series of 89 patients shows a predominance of acquired festoon with senile laxity of the orbicularis oculi muscle which again emphasized the importance of muscle suspension in these cases. In such patients, neurotoxin to the crow's feet area, which will inherently worsen malar bags, is absolutely contraindicated. Previous treatment algorithms and studies discussed the use of non-invasive treatment such as tetracycline injections, laser, micro-needling, radiofrequency, and chemical peel. Fractionated micro-needling and similar techniques are of no value in the treatment of festoons and malar bags, as they fail to directly address the underlying pathophysiology. Twenty of our patients reported previously undergoing this procedure and saw no benefit. Without clearly delineating the different festoon pathophysiology and its corresponding treatment [5, 12–16], this might further worsen festoons due to congestion of the lymphatics.

Table 2 Case summary and patient demographics

Number of cases	89
Mean age (years)	54
Sex	
Female	82
Male	7
Classification	
Congenital	8
Acquired	81
Previous intervention	49
Facial surgery	37
Injectables	30
Micro-needling	20
Laser	7
Sclerosing agents, PRP	2
Mean follow-up (months)	11.2

There are a multitude of approaches to surgical treatment of malar mounds and festoons in the past decades from liposuction, muscle suspension, midface lift, skin–muscle flap, ligamentous release, and resuspension [1, 2, 5, 17–19]. This reflects a level of complexity and diversity of the pathology. Our technique was developed after careful consideration of disease pathophysiology and indicated treatments with the focus of correction of festoon, support of the lower lids, and most importantly, not causing iatrogenic lid malposition.

Addressing festoons is a multi-prone approach for us. We are in agreement with Dr. Kpodzo, Nahai, McCord, Pessa, and Garza about the importance of ligamentous release (ORL and ZCL) in treating malar mounds and festoons [17, 19]. Another important component that needs to be addressed is the presence of atypical clusters of fat cells in both the suborbicularis (anterior septal fat—ASF) and preorbicularis planes that was previously treated with

liposuction by Rosenberg. They are clustered and grapelike in nature; and absorb fluid in the surrounding area, causing edema. This fat is distinct from subcutaneous, postseptal fat and SOOF (Fig. 5). ASF can be safely removed under direct visualization with a Bovie cautery, whereas preorbicularis fat is treated postoperatively with deoxycholic acid with great success in our experience.

As our patients are often at high risk for lid malposition from either previous surgery, non-operative treatments, chronic state of inflammation, or aging eyes with poor lid tone, secured lid support is our top priority. Our preventative measures include preserving the tarsal orbicularis, preservation of medial origin of orbicularis, the use of frost suture, canthopexy muscle suspension, and conservative skin and orbicularis trimming laterally only. This is especially important in elderly patients with poor lid tone or patients with negative vector. We only use limited lateral incision and dissection for patients with negative lateral pull test (LPT) to prevent disruption to the anterior lamella. We only have two cases of lid malposition: one in a patient with facial nerve injury from previous facelift and one in a patient that did not have canthopexy and experienced transient ectropion.

Due to the delicate and lymphatic rich tissue of the lower eyelid and malar region, it is no surprise that our most common postoperative morbidities included chemosis and eyelid and malar edema. Shoukath et al described a deep and superficial lymphatic system of the lower eyelids that is located laterally between the ORL and ZCL, and infraorbital, respectively. Dissection in these areas, especially lateral like in our technique, will undoubtedly put patients at high risk for operative chemosis and edema. In fact, every patient is expected to develop some degree of upper eyelid edema just above the eyelashes in addition to some chemosis. Our patients are extensively forewarned about these sequelae, which are frequently self-limiting within six weeks. We tend to treat these cases with a short course of oral steroids or diuretics. The most predictive factor for the development of chemosis is protoplasm quality, as patients with poor protoplasm tend to experience more chemosis. Lifestyle also plays an important role. Those who exercise, eat healthy, and do not smoke tend to develop only minimal chemosis. Thus, to minimize chemosis, it is recommended that all patients modify their lifestyle during the recovery period to achieve consistency with the fitness, dietary, and smoking habits associated with a better recovery.

To minimize the extent of chemosis, all patients are advised to try to keep their eyes closed and not to use a computer during the early postoperative period. Steroid eye drops are used in patients without glaucoma and regular use of TheraTears EXTRA eye drops is recommended to keep the eyes moisturized. In high-risk patients specifically, Frost sutures are used and less dissection is performed, especially in the lateral canthal area.

Despite all of the aforementioned efforts, caring for malar mounds and festoons in a patient remains challenging as there is a high rate of residual edema, puffiness, recurrence, or combination of. These patients often need close, lifelong follow-ups and "touch-ups" with fillers, deoxycholic acid, and medications, and even direct excision is sometimes needed. Patients are forewarned of the persistent nature of this disease and expectation management and patient compliance are keys to success.

A limitation of this study is its small sample size. It is also worth noting that if one is not familiar with the anatomy, attempting to implement this technique can lead to postoperative complications such as lid retraction and ectropion. Another disadvantage of the proposed technique is its longer recovery time due to its invasive nature. However, recovery mainly consists of upper eyelid edema and chemosis, both of which are related to patient protoplasm. Statistical analysis demonstrated that a significantly smaller proportion of patients with excellent protoplasm experienced postoperative malar edema compared to patients with poor protoplasm ($p = 3.414e^{-7}$). Thus, a patient with good protoplasm is unlikely to face an extensive recovery time.

One of our study objectives was to understand how anterior septal fat contributes to the pathophysiology of festoons. We hypothesized that this particular type of fat has more abundant lymphatics than fat in other areas of the body, facilitating fluid absorption and collection, and leading to edema. This theory is supported by the fact that upon removal of anterior septal fat in our patients, none of them experienced malar edema postoperatively and there was statistically significant difference in proportions ($p = 3.414e^{-7}$) of those with poor protoplasm and those with excellent protoplasm who experienced postoperative malar edema.

With this in mind, our current research centers around the detection and composition of anterior septal fat. Ultrasound and MRI imaging will be used to determine whether ASF can be detected on imaging. Further, ASF will be sent for comparative analysis to fat from various other parts of the body. The aim is to determine whether the lymphatics of fat in this area differs from the lymphatics of fat from other areas. From a surgical perspective, we also look forward to treating more patients with ASF to determine whether they achieve better outcomes once this fat is removed.

Conclusions

Malar mounds and festoons present a unique challenge to plastic surgeons. They are persistent in nature and require close-interval and long-term follow-up, as additional

Fig. 8 A 55-year-old female with congenital festoons or malar mounds, **A**, **B**, **C**, **D** preoperative, **E**, **F** 9 months postoperative, **G**, **H** 2 years 9 months postoperative, **I**, **J** 5 years postoperative, and **K**, **L** 6 years postoperative following correction of festoons, midface lift, bilateral upper and lower blepharoplasty, and orbicularis muscle suspension

Fig. 9 A 42-year-old female with acquired festoons, **A**, **B** preoperative, and **C**, **D** 1 year postoperative following bilateral upper and lower blepharoplasty, canthopexy, and correction of festoons

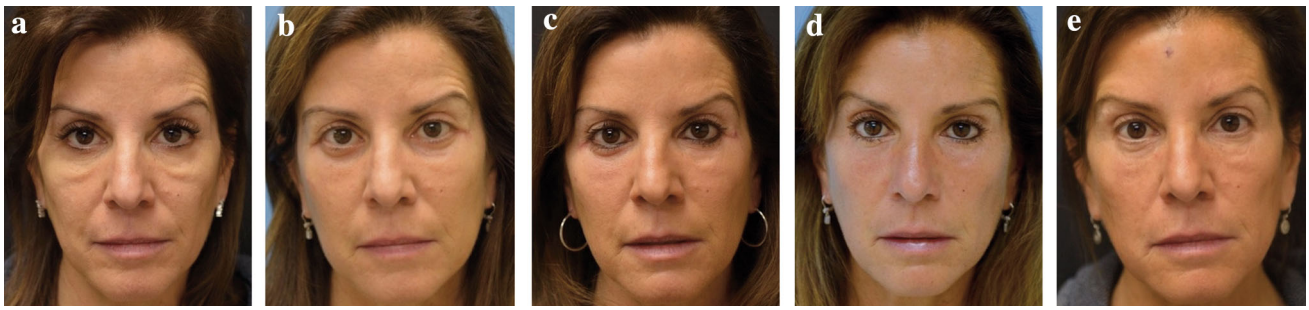

Fig. 10 A 53-year-old female with acquired festoons, **A** preoperative, **B** 1 month postoperative, **C** 2 months postoperative, **D** 1.5 years postoperative, and **E** 2 years postoperative following correction of festoons, lower blepharoplasty, midface lift, short scar temporal lift, canthopexy, and septal reset

Fig. 11 A 53-year-old female with acquired festoons, **A** preoperative, and **B** 9 months postoperative following bilateral upper and lower blepharoplasty, correction of festoons, canthopexy, midface lift, orbicularis muscle suspension, and short scar temporal lift

injections and reoperations may be warranted. Our approach to malar mound and festoon correction is safe, effective, and provides long-lasting results (Figs. 8, 9, 10 and 11), as we rely on the underlying pathophysiology to determine the proper treatment.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest to disclose.

Human or Animal Rights This article does not contain any studies with human participants or animals performed by any of the authors.

Consent to Participate Consent was obtained from all patients.

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