



# Rejuvenating the aging upper periorbital

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## Abstract

**Purpose** To investigate the efficacy of a comprehensive surgical approach in rejuvenating the aging upper periorbital.

**Methods** Three hundred and twenty eyes of 160 patients who were treated for dermatochalasis(D), eyebrow ptosis (EP) and blepharoptosis (BP) were included in the study. One hundred and ninety-eight patients had only dermatochalasis, 74 patients had D and EP, 39 patients had D and BP, 7 patients had D, EP and BP and 2 patients had D, EP and blepharospasm. The patients were evaluated before surgery, at 1 week, 1 month and 6 months after surgery. Dermatochalasis was scored between 0 and 3 points according to upper lid laxity and IP drooping. EP was scored between 0 and 2 points as normal, lateral EP and total

EP. Aging was classified as mild in those with a total score of less than 3 points, moderate in those with a score of 3–6 and severe in those above 6 points.

**Results** Of the patients, 121 were female and 39 were male, with a mean age of 52 (40–87) years. The surgeries were performed as follows: upper eyelid blepharoplasty (UEB) 197(61.6%) patients, UEB + browpexy(B) 77(24.1%) patients, UEB + B + levator resection(LR) 7(2.2%) and UEB + LR 39 (12.2%) patients. While a statistically significant improvement was observed in patients who underwent UEB + B ( $p < 0.001$ ), postoperative improvements were not found statistically significant compared to preoperative scores in other surgeries. The postsurgical scores showed statistically significant improvement in all age groups ( $p < 0.001$ ).

**Conclusions** A comprehensive surgical treatment can provide effective results in upper periorbital rejuvenation for patients with varying degrees of upper periorbital aging.

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This submission has not been published anywhere previously and that it is not simultaneously being considered for any other publication.

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## Introduction

Aging causes many morphological and functional changes in the periorbital region. Upper eyelid skin and orbital fat loosening by aging is not only affect the cosmetic appearance but also affect the visual

acuity by covering the visual field in the late stages [1]. Dermatochalasis is a common physiological process that simply describes the sagging of eyelids and relaxation of orbital adnexal tissue [2, 3]. In evaluating the periorbital area for aging, senile blepharoptosis is one of the significant factors not to be forgotten. Eyelids must be examined for the presence of real blepharoptosis to overcome the visual field covering and also aging [2, 4]. In addition to these factors, various degrees of eyebrow ptosis also contribute to the old and tired appearance of the periorbital area [5].

Many surgical procedures have been done for rejuvenating the aging periorbital area for years. Blepharoplasty of upper eyelids, double-eyelid blepharoplasty, levator resection surgery for senile blepharoptosis and browpexy are some of the procedures that have been used for this purpose [4–10]. However, aging of the upper periorbital area is a comprehensive process of change that is not only manifested by skin loosening but may also be concomitant with drooping eyebrows and senile blepharoptosis [5]. For this reason, we aimed to investigate the efficacy of a comprehensive surgical approach including upper eyelid blepharoplasty, browpexy and levator resection surgery and serve up our results to clear off the three main aspects that cause aging of the upper periorbital area: dermatochalasis, brow ptosis and blepharoptosis.

## Patients and methods

This nonrandomized observational study was approved by the ethics committee of University of Health Sciences Ankara Training and Research Hospital and conformed to the standards outlined in the Declaration of Helsinki. The details of the study were explained to all participants, and written informed consents were obtained.

Three hundred and twenty eyes of 160 patients with aging of the upper periorbital area treated in oculoplastic surgery department of our clinic between January 2000 and March 2020 were included in this study. The patients applied with varying degrees of dermatochalasis, eyebrow ptosis and involutional blepharoptosis. The patients with congenital ptosis were excluded from the study. The patients underwent routine hemogram, renal function and liver tests and electrocardiogram before operation and get approval from the internal medicine department for surgery.

The operations were performed by the same surgeon (YK), and all the photographs were taken with 1 m distance between the patient and the camera and flashlight-free mode of the camera by the same person (YK) preoperatively and 1 week, 1 month and 6 months postoperatively.

## Preoperative evaluation and classification

The cases were evaluated by modifying the classification of a previous study that investigate loose skin of the upper eyelid, eye socket depression and blepharoptosis [4]. In our comprehensive scale, aging-related conditions in the upper periorbital area including loose skin of upper eyelid, brow ptosis and blepharoptosis were taken into account. Dermatochalasis was graded according to the upper eyelid skin loosening: Natural: 0 point, mild skin loosening or reduced of the double eyelid: 1 point, loosened skin completely covering the eyelash root, 2 points; and skin covering eyelash root and the presence of the so-called “triangle eye,” 3 points. Brow ptosis was graded as follows: natural: 0 point, lateral brow ptosis: 1 point, total brow ptosis: 2 points. Blepharoptosis was graded according to the degree of eyelid drooping: upper eyelid margin 1–2 mm below the superior limbus (normal), 0 points; margin 4 mm below the superior limbus of the cornea, 1 point; margin 4–6 mm below the superior limbus of the cornea, 2 points; and margin 6 mm below the superior limbus of the cornea, 3 points. The total scores for each eye equaled the sum of the three scores, and the aging was graded according to these scores obtained from the scale: mild: less than 3 points, moderate 3–6 points and severe: more than 6 points.

## Surgical technique

### Blepharoplasty

Preoperative markings were made with the patient sitting upright in neutral gaze with the brow properly positioned. The eyelid crease was situated above the ciliary margin approximately 8–9 mm in women and 7–8 mm in men. The extent of excision was at least 10 mm from the inferior border of the brow for female patients and 12 mm for male patients. The upper lids

were injected superficially with 2% lidocaine containing 1:100,000 epinephrine using a 27–30-gauge needle. A skin incision was made with an empire tip by radiofrequency monopolar cautery. No orbicularis muscle excision was performed. Three absorbable sutures were used to incorporate the orbicularis from the lower and upper edges of the incision along with the superolateral arcus marginalis to form the upper lid crease. The skin incision was closed using running 6/0 polyglactin (Vicryl) sutures.

### Browpexy

Fixation of the brow to the supraorbital rim periosteum can provide elevation of the ptotic or lax brow. The desired location of the lateral brow is typically set by elevating the inferior brow to the superior orbital rim level in male patients and 1 cm above the superior orbital rim in female patients. Prior to the operation, the brow fixation point was marked at a point connecting the nasal ala and lateral limbus line, with patients in the sitting position. Upper blepharoplasty was performed with skin removal. A 5–0-polypropylene (Prolene) suture was passed transcutaneously from the lower edge of the brow hair into the previously dissected sub-brow space. The same suture was then sewn through the remaining sub-brow and periosteum above the orbital rim. The suture was then passed again into the sub-brow muscular tissue at the level of the original transcutaneously passed marking suture. The transcutaneous suture was removed, and the suture was tied using a loop over.

### Levator resection surgery

The orbicularis muscle and the septum were dissected 2–3 mm above the tarsus by monopolar thermal cautery following the upper eyelid blepharoplasty skin excision. The thermal cautery was also used to perform additional dissection until the preaponeurotic fat is identified. The preaponeurotic fat is dissected from the underlying levator aponeurosis, and the levator aponeurosis was disinserted from the anterior surface of the tarsus. Dissection is carried out between the levator aponeurosis and the underlying Muller's muscle by thermal cautery until the end of the aponeurosis. A double armed 6–0 Vicryl suture on a spatula needle is then placed in partial thickness through the anterior surface of the tarsus, 2 mm inferior to the

superior border of the tarsus. Each of the needles was placed through the levator aponeurosis, and temporary tie was placed. The patient was placed in a sitting position to inspect the height and contour. The height and contour are reinspected. The temporary tie was converted to a permanent tie. A portion of the redundant levator aponeurosis was excised, and the skin was closed by placing approximately three lid crease formation sutures. This suture incorporates the cut end of the levator aponeurosis into the skin closure by 6/0 polyglactin (Vicryl) suture. Additional 6/0 polyglactin (Vicryl) interrupted sutures were placed.

### Postoperative care

Ice application to the wound side was initiated immediately after the surgery and performed intermittently for 48 h postoperatively. Bacitracin and neomycin sulfate ointment (Thiocilline, Abdi İbrahim, Turkey) twice a daily, moxifloxacin (Moxai, Abdi İbrahim, Turkey) eye drop four times daily and polyvinyl povidone (refresh, allergan) eye drop four times daily were applied until the stitches were removed. In combined procedures, amoxicillin clavulanate (Augmentin 1000 mg, GlaxoSmithKline) oral antibiotics was used for the treatment. The patient was followed-up at 1 day, 1 week, 1 month, 3 months and 6 months postoperatively. The skin sutures were removed after 7 days.

### Statistical analysis

SPSS 22.0 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.) software program was used for statistical analysis. Shapiro–Wilk test was used to perform normal distribution of data and it was controlled by graphics. Normal distribution of data was not detected. The defined statistics were demonstrated as median(IQR) for numeric variables and the number and percentage for categorical variables. Wilcoxon test was used for pairwise comparison of dependent groups, and Chi-square test was used for comparison of categorical data. The *p* values less than 0.05 was defined as statistically significant.

### Power analysis

In the power analysis, when the alpha error was 0.05, the beta error was 0.20, and the effect size was

**Table 1** The distribution of the diagnosis

Diagnosis	<i>n</i>	%
D	198	61.9
D, BP	39	12.2
D, BP, EP	7	2.2
D, EP	74	23.1
D, EP, BSP	2	0.6

*D* Dermatochalasis, *BP* Blepharoptosis, *EP* Eyebrow ptosis, *BSP* Blepharospasm

**Table 2** The distribution of the surgeries

	<i>n</i>	%
UEB	197	61.6
UEB, B	77	24
UEB, B, LR	7	2.2
UEB,	39	12.2

*UEB* Upper eyelid blepharoplasty, *B* Browpexy, *LR* Levator resection surgery

0.25, it was determined that the minimum sample size required to obtain 80% power was a total of 128 patients.

## Results

One hundred and twenty-one (75.6%) of the 160 patients were female and 39 (24.4%) of the patients were male. The mean age of the patients was 52 (40–87) and the mean follow-up period was 7.5 (6–72) months. Of 320 eyes, 198 (61.9%) were



**Fig. 1** A 45-year-old woman complained of aging eyelids. She underwent bilateral upper eyelid blepharoplasty. Preoperative photograph 3A; postoperative photograph 3B, at 6 months, showing the tight eyelid skin and normal eyelid margin

diagnosed with dermatochalasis alone. The distribution of the other diagnosis was demonstrated in Table 1.

Upper eyelid blepharoplasty (UEB) was performed to 197(61.6%) of the total patients. The second most common surgery that performed to 77(24.1%) of the patients was UEB and browpexy(B) operation. The distribution of the other surgeries is shown in Table 2.

In the evaluation, a significant improvement was found in the preoperative scores in the group that underwent UEB+B surgery ( $p < 0.001$ ), while the preoperative scores in other surgeries improved in all patients, but were not statistically significant (Table 3). Figures 1, 2 and 3 demonstrate,

**Table 3** Preoperative and postoperative score distribution

		Preoperative score		Postoperative score		<i>p</i>
		Mild	Severe	Mild	Severe	
UEB	<i>n</i>	197	0	197	0	
	%	100	0	100	0	
UEB, B	<i>n</i>	38	39	77	0	<0.001
	%	49.4	50.6	100	0	
UEB,B, LR	<i>n</i>	3	4	7	0	0.395
	%	42.29	7.1	100	0	
UEB, LR	<i>n</i>	25	14	39	0	0.091
	%	64.1	35.9	100	0	

*n* number, % Percent,  $p < 0.05$  statistically significant



**Fig. 2** A 65-year-old woman complained of aging eyelids. She underwent bilateral upper eyelid blepharoplasty and browpexy. Preoperative photograph 2A; postoperative photograph 2B, at 6 months, showing the tight eyelid skin and normal eyelid margin



**Fig. 3** A 55-year-old woman complained of aging eyelids. She underwent bilateral upper eyelid blepharoplasty for dermatochalasis and right levator resection surgery for ptosis correction. Preoperative photograph 3A; postoperative photograph 2B, at 6 months, showing the tight eyelid skin and normal eyelid margin

respectively, the preoperative and postoperative views of UEB, UEB+B and UEB+LR surgeries. Comparison of preoperative and postoperative follow-up

scores and score differences in each group were shown in Figs. 4 and 5.

A statistically significant improvement was found in preoperative scores in all age groups ( $p < 0.001$ ). Postoperative scores improved in 10 eyes aged 40–49, 11 eyes aged 50–59, 17 eyes aged 60–69 and 19 eyes aged 70 and over ( $p < 0.001$ ) (Table 4).

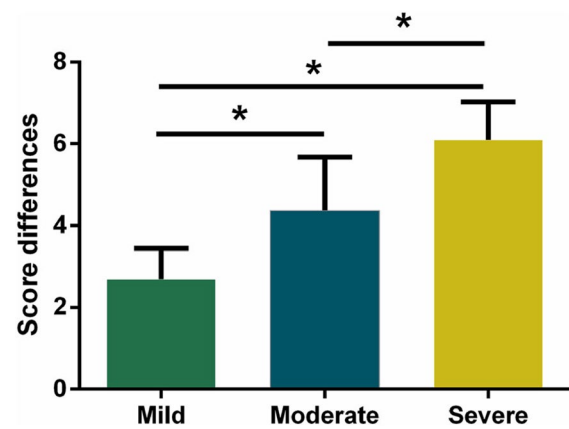
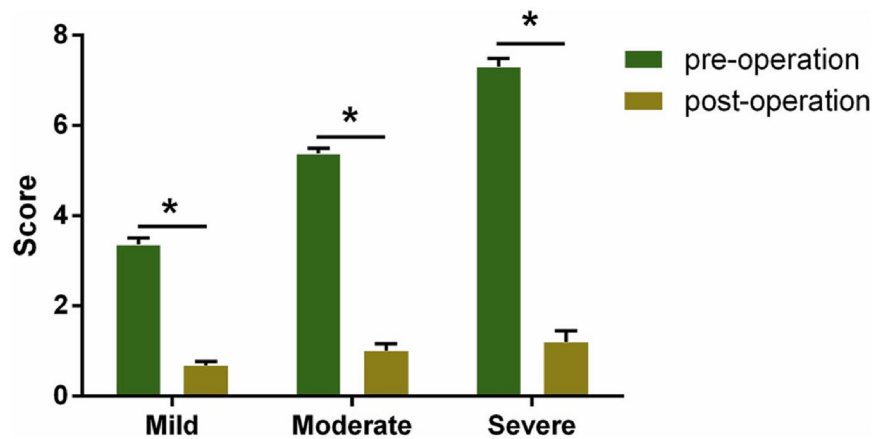
Direct brow lift is performed almost exclusively in patients who are not candidates for a conventional eyebrow-forehead lift because age or an unwillingness to have a forehead lift because of the extent of the surgery. In patients who desire an upper blepharoplasty but have significant brow ptosis, an upper blepharoplasty will not improve the upper lid without elevating the brow directly. A direct brow lift requires a short incision just above the central brow hairs; it produces minor scar visibility. We applied this technique in cases with moderate-to-severe lateral eyebrow ptosis.

## Discussion

Aging of the periorbital area is a comprehensive process that upper eyelid and eyebrow should be considered as an aesthetic unit. It is manifested not only by upper eyelid loosening but also by eyebrow droop and senile blepharoptosis [11]. When evaluating the patient, it is not sufficient to make a decision based on the patient's appearance alone. A detailed medical and ocular history (especially traumas) should be taken along with a complete ophthalmologic examination. The best-corrected visual acuity, palpebral fissure height and contour, upper eyelid position, eyelid crease and crease distance, eyebrow position and accompanying dry eye disease should be examined [12, 13].

Conventional upper blepharoplasty technique involves resection of the loose upper eyelid skin and orbicularis muscle with or without fat excision [14]. Previous conventional studies failed to achieve excellent upper eyelid rejuvenation because they focused on solving only one aspect of aging and did not comprehensively address all issues about aging periorbital [7, 11, 15–18]. To this end, we propose a comprehensive surgical approach for the treatment of aging of the upper eyelids, which includes appropriate removal

**Fig. 4** Comparison of preoperative and postoperative follow-up scores in each group



**Fig. 5** Comparison of preoperative and postoperative score differences in each group

of loose skin, reduction of brow droop and correction of blepharoptosis.

Blepharoptosis frequently occurs concomitantly with dermatochalasis. A moderate blepharoptosis may occur with similar symptoms to upper eyelid dermatochalasis. If there is an accompanying blepharoptosis, blepharoplasty procedure is completed with levator surgery. In the combined procedure, the levator aponeurosis is repositioned on the tarsal plate, and the upper eyelid height is adjusted. *Carraway* recommends performing upper eyelid blepharoptosis correction at the same time as blepharoplasty in his study. He presents the most commonly used surgical techniques, levator aponeurosis plication and levator aponeurosis reinsertion [19].

In most cases, the etiology of blepharoptosis is age-related levator separation. Infections, trauma, tumors or inflammation can also cause separation.

**Table 4** Preoperative and postoperative score distribution according to age

		Preoperative score		Postoperative score		<i>p</i>
		Mild	Severe	Mild	Severe	
40–49	<i>n</i>	104	10	114	0	<0.001
	%	91.2	8.8	100	0	
50–59	<i>n</i>	81	11	92	0	<0.001
	%	88	12	100	0	
60–69	<i>n</i>	45	17	7	0	<0.001
	%	72.6	27.4	100	0	
>70	<i>n</i>	33	19	52	0	<0.001
	%	63.5	36.5	100	0	

*n* number, % Percent, *p* < 0.05 statistically significant

Other less common causes include myasthenia gravis, trauma, orbital or eyelid tumors, congenital ptosis, third nerve paralysis or Horner's syndrome [2, 7]. Our blepharoptosis cases were involutional ptosis caused by levator aponeurosis detachment. Before attempting repair, it is important to evaluate the patient to ensure that levator detachment is the cause of the ptosis. If there is minimal levator function (less than 4 mm), advancing the levator does not provide sufficient lift and the frontalis suspension technique is used to lift the eyelid. Direct injury of the levator muscle intraoperatively can also lead to ptosis. It can occur without direct injury to the muscle, as seen in intraocular surgeries such as cataract surgery. In such cases, a levator surgery that can be performed from the same incision is required. Apart from this, atrophy and fatigue of the Müller muscle are may also worsen blepharoptosis [2, 4].

Eyebrow ptosis is a frequent finding commonly coexisting with dermatochalasis and blepharoptosis. It is important to understand the eyebrow position for good aesthetic and functional results [20–22]. Before determining the amount of upper eyelid fold resection, the eyebrow level and contour should be determined. If the eyebrow is prominently ptotic, an eyebrow aesthetic should be considered before upper eyelid blepharoplasty. It can result further lowering of brow position with negative functional and cosmetic consequences. If the lateral side of the brow is more drooping, a small temporal direct browplasty can be combined to blepharoplasty or an external browpexy can be combined with a blepharoplasty for minimal lateral brow ptosis [5, 10]. Several techniques have recently emerged to improve aesthetic outcomes in upper blepharoplasty such as internal brow sculpting, nasal fat repositioning, increasing lateral upper eyelid fullness, preserving the orbicularis oculi, lacrimal gland repositioning and glabellar myectomy, but the state-of-the-art technique has not been found yet, [23–29]. Internal brow sculpting and elevation while not as effective as other methods of eyebrow lifting is a susceptible way to elevate eyebrow without the need for additional incisions. Burroughs et al. [23] evaluated 100 patients who underwent internal brow elevation for cosmesis associated with upper blepharoplasty and found that reproducibly safe and effective technique to improve eyebrow appearance without fixation.

Xu et al. evaluated 116 patients with aging upper eyelids. Each eye was scored on upper eyelid laxity, degree of blepharoptosis and upper eyelid socket depression. Based on average scores of both eyes, three degrees of aging were considered: mild, moderate and severe. Depending on its condition, loose skin was appropriately removed, and the levator was corrected in patients with degenerative ptosis. Meanwhile orbital septum fat was released or periumbilical fat mass was used as a filler to correct upper eyelid socket depression. They found the preoperative and postoperative scores of the three groups were significantly different after 6 months. In our study, we used a similar score system as the study of Xu et al. [4].

Our results show that all combined surgeries in which we aimed to rejuvenate periorbita (upper eyelid blepharoplasty + browpexy; upper eyelid blepharoplasty + levator resection surgery; upper eyelid blepharoplasty + browpexy + levator resection surgery) demonstrated improvement when we compare the preoperative scores with postoperative ones. Moreover, upper eyelid blepharoplasty combined browpexy surgery was found to have statistically significant outcomes.

Based on the results of this study, our recommendation for patients suffering from aging upper periorbita is to evaluate the patient for every aspects; not only skin and orbital fat removal surgery for dermatochalasis, but also possible accompanying eyebrow ptosis or senile blepharoptosis and to offer a satisfactory solution with a comprehensive surgical approach.

**Author contributions** TC-YA wrote the main manuscript DB did statistical analysis and data collection AB done critical analysis

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**Data availability** Data available on request due to privacy/ethical restrictions. The data that support the findings of this study are available on request from the corresponding author, [TC]. The data are not publicly available due to [restrictions, e.g., their containing information that could compromise the privacy of research participants].

**Declarations**

**Conflict of interest** Authors confirmed that there are no conflict of interest.

## References

- Oh SR, Chokthaweesak W, Annunziata CC, Priel A, Korn BS, Kikkawa DO (2011) Analysis of eyelid fat pad changes with aging. *Ophthalmic Plast Reconstr Surg* 27(5):348–351
- Pottier F, El-Shazly NZ, El-Shazly AE (2008) Aging of orbicularis oculi: anatomophysiological consideration in upper blepharoplasty. *Arch Facial Plast Surg* 10(5):346–349
- Fagien S (2010) The role of the orbicularis oculi muscle and the eyelid crease in optimizing results in aesthetic upper blepharoplasty: a new look at the surgical treatment of mild upper eyelid fissure and fold asymmetries. *Plast Reconstr Surg* 125(2):653–666
- Xu P, Huang H, Zhang S, Yin X, Zhang Q, Du Y (2021) Comprehensive approach to upper eyelid rejuvenation surgery aesth plast surg. *Aesthetic Plast Surg* 45(3):1047–1055
- Kashkouli MB, Abdolalizadeh P, Abolfathzadeh N, Sianati H, Sharepour M, Hadi Y (2017) Periorbital facial rejuvenation; applied anatomy and pre-operative assessment. *J Curr Ophthalmol* 29(3):154–168
- Fagien S (2002) Advanced rejuvenative upper blepharoplasty: enhancing aesthetics of the upper periorbital. *Plast Reconstr Surg* 110:278–291
- Gentile RD (2005) Upper lid blepharoplasty. *Facial Plast Surg Clin North Am* 13(4):511–524 (v-vi)
- Lieberman DM, Quatela VC (2013) Upper lid blepharoplasty: a current perspective. *Clin Plast Surg* 40(1):157–165
- Knize DM (1996) An anatomically based study of the mechanism of eyebrow ptosis. *Plast Reconstr Surg* 97(7):1321–1333
- Parikh S, Most SP (2010) Rejuvenation of the upper eyelid. *Facial Plast Surg Clin North Am* 18(3):427–433
- Lai HT, Weng SF, Chang CH, Huang SH, Lee SS, Chang KP, Lai CS (2017) Analysis of levator function and ptosis severity in involutional blepharoptosis. *Ann Plast Surg* 78(3 Suppl 2):S58–S60
- Hicks K, Sclafani AP, Thomas JR (2019) Evolution of blepharoplasty. *Facial Plast Surg* 35(4):340–352
- Rohrich RJ, Coberly DM, Fagien S, Stuzin JM (2004) Current concepts in aesthetic upper blepharoplasty. *Plast Reconstr Surg* 113(3):32e–42e
- Damascono RW, Cariello AJ, Cardoso EB, Viana GA, Osaki MH (2011) Upper blepharoplasty with or without resection of the orbicularis oculi muscle: a randomized double-blind left-right study. *Ophthalmic Plast Reconstr Surg* 27(3):195–197
- Saalabian AA, Liebmman P, Deutinger M (2017) Which tissue should be removed in upper blepharoplasty? Analysis and evaluation of satisfaction. *World J Plast Surg* 6(3):324–331
- Kiang L, Deptula P, Mazhar M, Murariu D, Parsa FD (2014) Muscle-sparing blepharoplasty: a prospective left-right comparative study. *Arch Plast Surg* 41(5):576–583
- Hoorntje LE, van der Lei B, Stollenwerck GA, Kon MJ (2010) Resecting orbicularis oculi muscle in upper eyelid blepharoplasty—a review of the literature. *Plast Reconstr Aesthet Surg* 63(5):787–792
- Moon KC, Yoon ES, Lee JM (2013) Modified double-eyelid blepharoplasty using the single-knot continuous buried non-incisional technique. *Arch Plast Surg* 40(4):409–413
- Carraway JH (2003) Combining blepharoplasty with upper eyelid ptosis correction. *Aesthet Surg J* 23(1):59–62
- Lam SM, Chang EW, Rhee JS, Williams EF 3rd (2004) Perspective: rejuvenation of the periocular region: a unified approach to the eyebrow, midface, and eyelid complex. *Ophthalmic Plast Reconstr Surg* 20(1):1–9
- Branham G, Holds JB (2015) Brow/Upper lid anatomy, aging and aesthetic analysis. *Facial Plast Surg Clin North Am* 23(2):117–127
- Lee JW, Baker SR (2013) Esthetic enhancements in upper blepharoplasty. *Clin Plast Surg* 40(1):139–146
- Burroughs JR, Bearden WH, Anderson RL (2006) Internal brow elevation at blepharoplasty. *Arch Facial Plast Surg* 8:36–41
- Massry GG (2011) Nasal fat preservation in upper eyelid blepharoplasty. *Ophthalmic Plast Reconstr Surg* 27:352–355
- Gulyas G (2006) Improving the lateral fullness of the upper eyelid. *Aesthetic Plast Surg* 30:641–648
- Sozer SO, Agullo FJ, Palladino H (2010) Pedicled fat flap to increase lateral fullness in upper blepharoplasty. *Aesthet Surg J* 30:161–165
- Greco M, Vitagliano T, Fiorillo MA, Greto CA (2012) A new technique of upper eyelid blepharoplasty using the orbicularis muscle flap. *Aesthetic Plast Surg* 36(1):18–22
- Friedhofer H, Orel M, Saito FL (2009) Lacrimal gland prolapsed: management during aesthetic blepharoplasty: review of the literature and case reports. *Aesthetic Plast Surg* 33:647–653
- Yang C, Guo X, Du L, Song G, Zong X, Zhang D, Du H, Dong X, Zhao J, Jin X (2021) A modified procedure for singleeyelid asian females with lacrimal gland prolapse lacrimal gland reposition combined with fat transposition in double-eyelid operation. *Aesthetic Plast Surg* 45(4):1611–1619

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