Combined Upper Blepharoplasty with Plasmage Exeresis: A Synergistic Approach to Periorbital Rejuvenation

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Purpose: The aging process affects skin in the periorbital and upper eyelid areas, leading to wrinkling, thinning, and drooping. Upper blepharoplasty is a commonly performed surgical procedure, but optimal excision technique remains debated. This study's goal is to evaluate the effectiveness and safety of plasmage exeresis as a supplementary procedure following upper blepharoplasty.

Methods: In this observational study, 50 patients with moderate upper blepharochalasis were enrolled to recieve plasmage exeresis technology (Plexr® device) as treatment following upper blepharoplasty, the study was conducted at Alexandria University Hospital, Egypt from the period from 1st of January 2021 to 30th of January 2022.

Results: The study includes 50 patients aged 15 to 57 years (median 34 years), with a significant male-female ratio (34% male, 66% female) ($p < 0.023$*). Pre-treatment margin-crease distance ranged from 0.5 to 3 mm (median 1 mm), with no significant difference ($p > 0.252$). Complications were minimal, predominantly eye swelling (100%), while satisfaction evaluation at 6, 8, and 12 months showed significant improvements in pre margin-crease distance ($p < 0.0001$*), underscoring Plexr®'s lasting efficacy for upper eyelid rejuvenation.

Conclusions: Plasmage exeresis as a supplementary procedure following upper blepharoplasty demonstrates favorable efficacy and safety outcomes. The study findings highlight minimal complications, predominantly eye swelling, and significant improvements in pre margin-crease distance, indicating the lasting efficacy of Plexr® for upper eyelid rejuvenation. This combined approach holds promise as an effective treatment option for upper blepharochalasis.

Keyword; Blepharoplasty; dermatochalasis; non-invasive; eyelid; plasma

INTRODUCTION

Skin aging is caused by a mixture of internal and external factors, which affects different areas of the face, including the upper eyelids. Even in younger individuals, these factors can lead to thinning, sagging, and wrinkling especially of the upper eyelids.1

Upper blepharoplasty is a commonly performed surgical procedure that rejuvenates the appearance of the upper eyelids by removing excess skin and fat, resulting in a more youthful and refreshed look; however, the optimal technique and excision design remain subjects of ongoing scientific debate2

While the procedure generally yields satisfactory outcomes, achieving consistently perfect results remains uncertain due to individual variations and inherent limitations. These limitations in upper blepharoplasty include variations in eyelid anatomy and tissue quality, which can impact surgical outcomes. The dynamic nature of the aging process and individual differences in aging patterns can also affect results. Patient expectations and surgical technique further contribute to the variability in achieving optimal outcomes.3,4

Another approach proving effective is the medical blepharoplasty, a non surgical procedure based on the new method of plasmage exeresis technology.5

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The use of the Plexr® device allows for accurate sublimation of the upper layers of the skin, including the epidermis and superficial dermis, resulting in skin retraction with minimal negative consequences. This device has demonstrated effectiveness in treating different skin conditions, providing a remodeling and lifting effect for concerns such as skin laxity or hypertrophy, addressing issues like fine wrinkles around the mouth, wrinkles on the neck, keloids, and various types of scars. 5,6

This phenomenon occurs due to a difference in electrical potential between the skin or mucosa of the individual and the cordless Plexr® device. When the device is brought within 1mm proximity to the application surface, a small electrical arc of short time span is produced. The electrical signal utilized in Plasmage exeresis causes the evaporation of fluids within the superficial layer of the skin, while ensuring the preservation of the deeper layers. Histopathological studies have confirmed that Plexr® spots maintain a safe distance from the skin's basal membrane and do not penetrate it.7 This unique approach to exeresis not only achieves the desired skin lifting and retraction but also promotes rapid wound healing, thereby minimizing the risk of infection.8

Previous studies focused on each approach alone so, this study aims to evaluate the outcomes and potential synergistic effects of combining upper blepharoplasty with plasmage exeresis technology for rejuvenating the periorbital and upper eyelid areas.

METHODS

This observational study was to evaluate Plasmage exeresis technology (Plexr® device) in treating moderate upper blepharochalasis. The study included participants of both genders who were over 18 years old. They were undergoing blepharoplasty, a cosmetic surgery for the eyelids. The study excluded specific individuals who met certain criteria, including those who had recently undergone eyelid injections, periocular botulinum toxin or filler injections within the past 6 months, individuals with immunosuppression, prior surgical procedures on the eyelids, abnormal eyelid conditions such as entropion, ectropion, severe brow ptosis, eyelid dystopias, facial nerve palsy, and individuals with eye or periorbital area infections. The study aimed to evaluate the post-treatment outcomes, including pain levels, sensation of heat during application, occurrence of scabs, complications, and long-term results up to 12 months post-treatment. 50 patients with moderate level of upper blepharochalasis were enrolled to be given treatment using plasmage exeresis technology (Plexr® device). The study was conducted at Alexandria University Hospital, Egypt from the period from 1st of January 2021 to 30th of January 2022..

Ethics:

The study was conducted in accordance with the Helsinki declaration and was approved by the Institutional Review Board.

Ethical approval was obtained from the Alexandria University Hospital, Egypt faculty of medicine ethical committee before the initiation of the study.

Statistical Plan:

Patients were evaluated at intervals of 6, 8, 12 months after treatment to assess subjective satisfaction and long-term results. Pain levels, sensation of heat, occurrence of scabs, complications, and post-treatment margin-crease distance were recorded and analyzed. Subjective

satisfaction was measured on a scale from 0% to 100%.

Procedure:

All the patients underwent surgical upper blepharoplasty, and had an application of topical anesthesia with lidocaine 2.5% and prilocaine 2.5% 30 minutes before the procedure. The surgeon made an incision along the natural crease of the upper eyelid, which is located about 1/2 inch above the eyelashes. The incision was extended into the eyelid crease to allow for the removal of excess skin and fat. The amount of skin and fat removed will vary depending on the individual patient's needs. After the excess skin and fat were removed, the incision was closed with dissolvable stitches. Following the surgical procedure, the patients then underwent nonsurgical "blepharoplasty" using the Plasmage® device. The Plasmage® device was used according to a spot technique, with triangles drawn on the upper eyelid's skin fold to be flattened. The procedure's duration was within 10 to 20 minutes. Post-treatment care instructions were provided to patients, including cleaning, avoiding sun exposure, and refraining from physical activity.

Evaluation and Follow-Up:

Post-treatment evaluation included assessing pain levels, sensation of heat, complications, average post-treatment margin-crease distance, and subjective satisfaction at intervals of 6, 8, and 12 months. Photographs were taken before, directly after, and 3 weeks after the session.

By adhering to the aforementioned methodology, this study aimed to comprehensively evaluate the outcomes and potential synergistic effects of combining upper blepharoplasty with plasmage exeresis technology for rejuvenating the periorbital and upper eyelid areas.

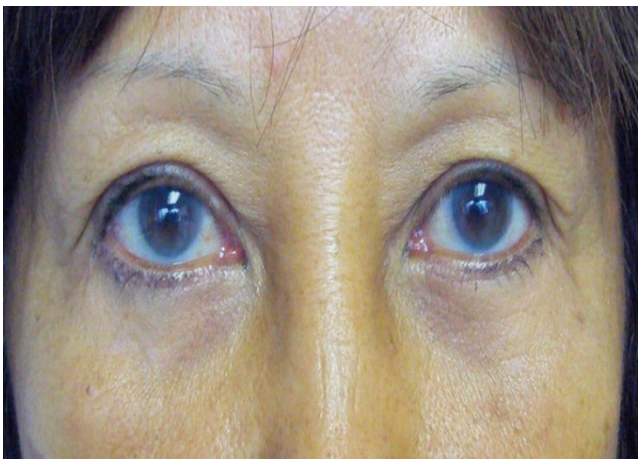

Figure (1) - Pretreatment photographing female (49 years-old).

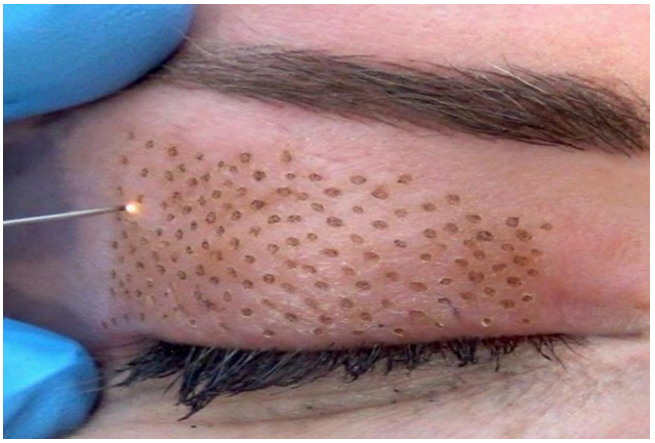

Figure (2) - Intra treatment with plasma generator (Plasmage®, by Brera Medical Technologies Srl, Italy)

RESULTS

Among the total 50 patients; the age was ranged 18 - 57 years-old, the number of males was 17 with a significant male-female ratio of 34% for males and 66% for ($p < 0.023$) and the pre-margin-crease distance (mm) was ranged between 0.5 - 3 mm with median distance 1 mm.(Table 1)

During applications included sensation of heat, low pain, moderate pain, and tolerable ($p < 0.0023$) which showed statistically significant differences. The most common complication observed among all patients was eye swelling affecting 50 individuals (100%), in addition to eye swelling other observed complications include skin irritation, dyschromia, burning,

exacerbation of eyelid, and infection 0 (0%). Furthermore, there were cases of allergic reaction, redness, edema and inflammation which occurred in one patient (2%). Two patients (2%) experienced both skin irritation and skin retraction, while five patients (10%) reported tearing. It is important to note that 34 individuals (68%) among the patients did not experience any complications. Overall, the observed complications, with a P value exceeding 0.432, were found to indicate statistically non-significant differences. (Table 2)

Table (1): Demographic Data of the included patients.

Demographic Data		**P-Value**
Age		
Mean±SD	32.5 ± 8.376	< 0.005
Median (Min. - Max.)	34 (18 - 57)	
Gender		
Male (n%)	17 (34%)	< 0.023
Female (n%)	33 (66%)	
Pre-Margin crease distance (mm)		
Mean±SD	3.05 **±** 2.19	> 0.252
Median (Min. - Max.)	1(0.5 - 3)	
n=Number of patient; Max=Maximum; Min=Minimum; SD = Standard Deviation; %=Percentage; Pre = Pre-treatment; < = statistically significant difference; > = statistically non-significant difference; * statistically highly significant difference		

Table (2): Post treatment evaluation of the included patients

Post-treatment Evaluation		**P Value**
During Application		
Sensation of Heat	8 (16%)	
Low Pain	10 (20%)	< 0.0023
Moderate Pain	2 (4%)	
Tolerable Pain	30 (60%)	
Complications		
No Complication	34 (68%)	
Skin irritations	2 (4%)	
Skin Hyperpigmentation	0(0%)	
Dyschromia	0(0%)	
Eye Swelling	50(100%)	
Skin Retraction	2(4%)	
Allergic Reaction	1 (2%)	> 0.432
Redness	1 (2%)	
Tearing	5(10%)	
Burning	0(0%)	
Exacerbation of Eyelid	0(0%)	
Edema	1(2%)	
Inflammation	1(2%)	
Infection	0(0%)	

Satisfaction evaluation after 6 months P < 0.043 which was statistically significant, pre margin-crease distance was ranged between 1 - 3 with average 2 mm, P < 0.0001* which was statistically significant, after 8 months P > 0.073 which was statistically non-significant and after pre margin-crease distance was ranged between 3 - 5 with average 4 mm, P < 0.0002* which was statistically highly significant, and after 12 months P < 0.0071 which was statistically significant, pre margin-crease distance was ranged between 2 - 3 with average 2.5 mm, P - < 0.0001* which was highly significant. (Table 3)

Table (3): Satisfaction Evaluation of the included patients

Satisfaction		**P Value**
After 6 Months		< 0.043
Dissatisfaction	5 (10%)	
Average Satisfaction	15 (30%)	
Very Satisfaction	30 (60%)	
Pre Margin-crease distance (mm)		
Median (Min. - Max.)	2 (1 - 3)	< 0.0001*
After 8 Months		> 0.073
Dissatisfaction	3 (6%)	
Average Satisfaction	10 (20%)	
Very Satisfaction	37 (74%)	
Pre Margin-crease distance (mm)		
Median (Min. - Max.)	4 (3 - 5)	< 0.0002*
After 12 Months		< 0.0071
Dissatisfaction	2 (4%)	
Average Satisfaction	5 (10%)	
Very Satisfaction	43 (86%)	
Pre Margin-crease distance (mm)		
Median (Min. - Max.)	2.5 (2 - 3)	< 0.0001*

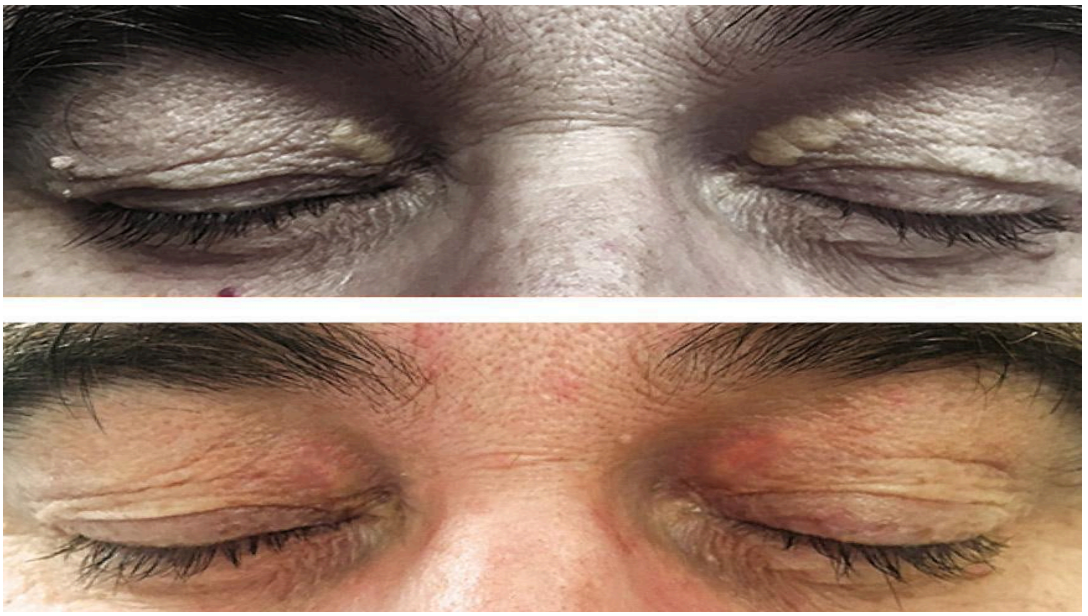

Figure (3) - Before and after treatment. After 6 months of follow-up (Male, 57 years-old)

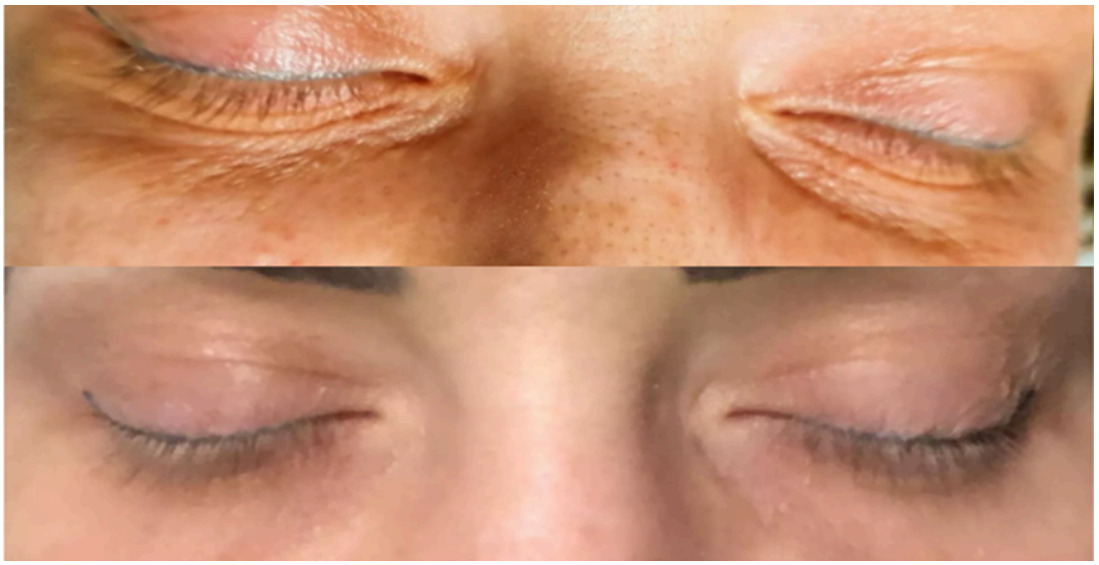

Figure (4) - Before and after treatment. After 8 months of follow-up (Female, 53 years-old)

Figure (5) - Before and after treatment. After 12 months of follow-up (Female, 48 years-old)

DISCUSSION

Upper blepharoplasty and plasmage exeresis are procedures performed to rejuvenate the upper eyelids, providing both aesthetic and functional benefits. They are particularly effective in treating conditions such as blepharochalasis.

In this retrospective cohort study, fifty patients with moderate upper blepharochalasis received a combination of surgical upper blepharoplasty and the Plasmage® device. The results indicate that this combination is both safe and effective. Although all patients experienced eye swelling, there were no serious complications reported. Our study showed that patient satisfaction was high after combined treatment. Patients were most satisfied with the results at 6 months post-treatment with an average increase in margin-crease distance from 1mm to 2mm.

This suggests that combining the two procedures may lead to better long-term results and satisfaction. Perhaps due to the fact that surgical upper blepharoplasty primarily focuses on improving the look of upper eyelids by the removal of fat and extra skin, while the Plasmage® device is designed to tighten the skin and diminish wrinkles.

The present study primarily assessed the effects of the combined treatment approach, whereas Pilkington et al.9, conducted a study over 2 years using the medical Plexr® blepharoplasty only; however, both studies showed overall patient satisfaction with the results.

Our findings are in line with former literature, as indicated by Kahn and Shaw10, Leen and Yen11, and Naik12, all of whom reported the absence of major complications following the use of Plasmage®. In another study, Baroni13 conducted a study in which they observed positive clinical improvements in the appearance of patients with eyelid dermatochalasis, without any negative side effects. This suggests that plasma technology can be a suitable option for addressing this condition. Similarly, Rossi et al.14 shared their experience with plasma radiofrequency ablation technology for medical blepharoplasty in 2018. Both studies reported that patients tolerated the procedures well, achieved favorable cosmetic outcomes, experienced no major adverse events, and expressed great levels of satisfaction.

In a study conducted by Jung, G. S. 15 also combined both incisional and non-incisional approaches as a result one patient developed asymmetry and underwent revision surgery while our study showed no major complications, another point of discrepancy is that Jung used a mixture of 1% lidocaine and 1:200,000 epinephrine which was administered into the subcutaneous layer prior to the procedure. In our practice, we utilized a local anesthesia comprised of 2.5% lidocaine and 2.5% prilocaine, administered 30 minutes prior to the procedure. Including epinephrine in the local anesthetic during upper blepharoplasty is a complex decision that should be determined individually for each case. Additional research is necessary to establish the optimal anesthesia with an optimal dosage for future procedures.

In conclusion, Plasmage exeresis as a supplementary procedure following upper blepharoplasty demonstrates favorable efficacy and safety outcomes. The study findings highlight minimal complications, predominantly eye swelling, and significant improvements in pre-margin crease distance, indicating the lasting efficacy of Plexr® for upper eyelid rejuvenation. This combined approach holds promise as an effective treatment option for upper blepharochalasis.

Limitations

The study only included 50 patients and was conducted in a single center, so it may not be applicable to other settings. Additionally, the study didn't compare the effectiveness of combining surgical upper blepharoplasty with Plasmage® device to other treatments for moderate upper blepharochalasis. Despite these limitations, the study's results show promise in using this combination treatment for moderate upper blepharochalasis. Still, further research is necessary to verify these findings.

Take-home message

- The combination of surgical upper blepharoplasty and Plasmage® device is a safe and effective treatment for moderate upper blepharochalasis.
- The most common complication was eye swelling, which was experienced by all

patients. However, no serious complications were reported.

- Patient satisfaction was high after combined treatment, with an average increase in margin-crease distance from 1mm to 2mm.
- This combined approach holds promise as an effective treatment option for upper blepharochalasis.

CONCLUSION

Plasmage exeresis as a supplementary procedure following upper blepharoplasty demonstrates favorable efficacy and safety outcomes. The study findings highlight minimal complications, predominantly eye swelling, and significant improvements in pre margin-crease distance, indicating the lasting efficacy of Plexr® for upper eyelid rejuvenation. This combined approach holds promise as an effective treatment option for upper blepharochalasis.

REFERENCES

1. Tsioumas G. Sotiris, Georgiadis Nikolaos, Georgiadou Irini, Plexr: The Revolution in Blepharoplasty. Pinnacle Medicine & Medical Sciences 1 (2014): 423- 427.
2. Asgari M, Latifi N, Heris HK, et al. In vitro fibrillogenesis of tropocollagen type III in collagen type I affects its relative fibrillar topology and mechanics. Sci Rep 7 (2017): 1392.
3. Lieberman D, Quatela V, Upper lid blepharoplasty - a current perspective; Clin Plast Surg 40 (2013): 157- 165.
4. Pham M. MIXTOSX, Aesthetic trends (2007): 35-37.
5. Bogle, M. A., Arndt, K. A., & Dover, J. S.. Plasma skin regeneration technology. Journal of Drugs in Dermatology, 2017;6(11), 1110–1112.
6. Castro, E., & Foster, J. A. Upper lid blepharoplasty. Facial Plastic Surgery, 2019;15, 173–181.
7. Heinlin, J., Morfill, G., Landthaler, M., Stolz, W., Isbary, G., Zimmermann, J. L Plasma medicine: Possible applications in dermatology. Journal der Deutschen Dermatologischen Gesellschaft, 2019; 8(12), 968–976.
8. Morozov, A. I. Introduction to plasma dynamics. Boca Raton, FL: CRC Press. 2019
9. Pilkington, S. J., Belden, S., & Miller, R. A. The tricky tear trough: A review of topical cosmeceuticals for periorbital skin rejuvenation. The Journal of Clinical and Aesthetic Dermatology, 2015;8(9), 39–47.
10. Kahn, D. & Shaw, R. Aging of the bony orbit: A threedimensional computed tomographic study. Aesthetic Surgery Journal, 2018; 28(3), 258–264.
11. Lee, S., & Yen, M. T. Nonsurgical rejuvenation of the eyelids with hyaluronic acid gel injections. Seminars in Plastic Surgery, 2017;31(1), 17–21.
12. Naik, M. Blepharoplasty and periorbital surgical rejuvenation. Indian Journal of Dermatology, Venereology and Leprology, 2013;79(1), 41–51.
13. Baroni A. Non - surgical blepharoplasty with the novel plasma radiofrequency ablation technology, Skin Res Technol 2019
14. Rossi E, Farnetani F, Trakatelli M, et al. Clinical and Confocal Microscopy Study of Plasma Exeresis for Nonsurgical Blepharoplasty of the Upper Eyelid: A Pilot Study, Dermatol Surg 2018; 283-290.
15. Jung GS. Modified Upper Blepharoplasty Using Combination of Incision and Nonincision Surgical Approaches. J Craniofac Surg. 2019;30(1):235-236.