Upper eyelid blepharoplasty using Plasma exeresis: Evaluation of outcomes, satisfaction and symptoms after procedure

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Abstract

Background: Facial care treatments have grown a remarkable demand for effective and minimally invasive techniques with fast recovery time. Plasma technology is a non surgical alternative technique for skin rejuvenation.

Objectives: We assessed patient satisfaction and symptoms after upper eyelid blepharoplasty with plasma technology.

Methods: Observational study including 16 patients submitted to upper eyelid blepharoplasty using plasma technology to treat dermatochalasis. Patient satisfaction, symptoms and quality of life were assessed using 2 questionnaires at follow-up days 7 and 30. Also, the answers were correlated with age, Fitzpatrick skin type and quantity of eyelid skin treated with plasma.

Results: All 16 patients were treated and completed the survey. Fourteen (87.5%) were female and the mean age was 50.5 years. Physical appearance was the most relevant factor impacting on quality of life at first week postoperative. Regarding satisfaction with results, most patients stated higher level of satisfaction at day 7 follow-up analysis ($p=0.038$). Less impact on quality of life and higher satisfaction were associated with eyelid treated area ($p=0.044$ and $p=0.036$) and Fitzpatrick skin type ($p=0.043$) at 7 and 30 days after procedure respectively. Eyelid edema and itching were the symptoms most reported at 7 and 30 days respectively.

Conclusions: Upper blepharoplasty with plasma is a minimally invasive treatment with low impact on quality of life. However, overall patient satisfaction is questionable when considering less willing of undergoing procedure again and decreased expectation with results over postoperative period. Symptoms are reported mainly at the first week after procedure.

INTRODUCTION

Upper blepharoplasty is one of the most common plastic surgeries performed worldwide for dermatochalasis treatment, to achieve functional and aesthetical eyelid

improvement.[1,2] Skin excess affects more males and the prevalence is about 16% among patients aged more than 45 years.[2] Moreover, periorbital region surgery is an important key to facial rejuvenation and skin quality of the eyelid. However, infrequent complications have been associated to traditional blepharoplasty, such as lagophthalmos, asymmetric eyelid crease, persistent hematoma, eyelid retraction, ptosis, suture dehiscence and unpleasant scar appearance. [3-5]

Some patients may reject the idea of undergoing surgery for dermatochalasis when considering possible unsatisfactory postoperative results or undesirable scar-related issues that may not be repaired. Therefore, novel minimally invasive cosmetic technologies may be preferred over traditional technique. Plasma technology is an alternative non surgical technique for dermatochalasis treatment. Plasma ablation consists of a handpiece producing ionized energy from the air gap that causes superficial tissue heating without any direct contact. A controlled and limited thermal damage transforms solid tissue into gaseous state and creates mild coagulation, resulting in increased collagenosis and contraction of local epidermal and dermal skin.[6-8]

Jett Plasma Lift Medical® is a portable eletrocautery used for skin treatment. Indicated for elimination of small vessel bleeding, removal of small warts, acne, scars, stretchmarks and pigmentation. This technology is based on an electrical discharge (“spark") generated by direct current (DC) voltage. Jett Plasma® device uses DC fulguration (lightning) with a small spark flow area of 1 mm² which is more effective and precise to remove lesions without damaging surrounding tissue and creating undesirable results. In contrast, alternating current (AC) fulguration has a wide beam with treatment area of 1 cm².

Sequences of sparks discharges are created using a breakdown voltage of 5 kV, in a constant distance of 2 mm between the tip of the device and conductively interconnected skin of the patient. Air that contains free electrons at the point of discharge must absorb a great amount of energy that leads to air breakthrough, which stops being an insulator and starts to lead an electric current. The air is ionized and it becomes plasma.

Several studies have assessed satisfaction, quality of life and symptoms of patients submitted to surgical blepharoplasty.[9,10] Regarding plasma technology, little evidence about a defined protocol is available.[7] Furthermore, few studies describing symptoms and quality of life after upper blepharoplasty treatment with plasma were found on PubMed. We evaluated

satisfaction, motivation and tolerance of patients submitted to upper eyelid blepharoplasty with plasma, described symptoms and related complications applying 2 questionnaires.

MATERIAL AND METHODS

Research Ethics Committee: This study was approved by the Research Ethics Committee (number 29423619.4.0000.5479). This research is in compliance with the tenets of the Declaration of Helsinki and appropriate informed consent forms were obtained from all patients.

This prospective study was conducted at Oculoplastics Clinic from Ophthalmology Department, from July 2019 to December 2019. Sixteen patients were submitted to upper eyelid blepharoplasty with plasma.

Patients from both genders were included and had previous diagnosis of upper eyelid dermatochalasis with no other concomitant eyelid diseases, like ptosis, tumors, entropion, ectropion, palsy and dry eye symptoms. Other exclusion criteria were patients younger than 18 years, current pregnancy, presenting cognitive deficit, patients with Fitzpatrick skin types V or VI[11] and cardiac pacemaker, due to risk of electric current interference.

Blepharoplasties were performed with Jett Plasma Lift Medical® (Compex Spol. s.r.o, Brno, Republica Checa). The same oculoplastic surgery specialist performed the treatment for all 16 patients. The size of the dermatochalasis was assessed on the patient sitting, and the inferior marking of the blepharoplasty was standardized at 10 mm above the upper eyelid margin. Then, the skin excess gathered with a McPherson forceps determined the superior marking with a 5-mm safety margin from the superior orbital rim (Figure 1). The extent of treated area was quantified by the measured height between the inferior and the superior markings across the pupillary line. About 3 ml of local anesthesia with 2% lidocaine (Xylestesin®, Cristália, Brazil) was injected subcutaneously with a 30-gauge disposable needle. The target areas were treated with the device setting power 8 and a single-pass treatment using "dot by dot" technique, applying single spots for 2 seconds spaced closely together. Postoperatively, patients were advised to wear SPF 50 facial sunblock 4 times/day for 90 days. Photographs and questionnaires were carried out by an independent oculoplastic surgeon to avoid any possible bias.

Results at follow-up days 7 and 30 were analyzed applying a specific questionnaire for upper blepharoplasty with plasma adapted from Q-Blefaro, the original questionnaire that measures the impacts of surgical blepharoplasty on quality of life and was standardized based on a validated questionnaire widely used to evaluate patients with psoriasis.[9]

The adapted questionnaire consisted of 10 questions with four-point scale answers, divided into 2 sections: impacts on quality of life and post treatment costs (section A); and satisfaction during the procedure and with results, willingness to undergo the procedure again and to submit to further facial aesthetics procedures (section B). (Table 1)

All patients were photographed and submitted to ophthalmic examination at 7 and 30 days after treatment, and careful attention was paid to detect any early or late complications.

The second questionnaire comprised data from a previous study that reported symptoms after upper blepharoplasty with different techniques[10] in addition to other possible symptoms after plasma treatment[6,7] to provide complete information regarding post treatment symptoms.

Patients were asked to grade the following symptoms: edema, hematoma, itching and local hyperemia, ranging from none (0), mild (1), moderate (2) or severe (3); and also, whether treated area presented hyperpigmentation or hypopigmentation. Then, the surgeon classified the patient´s Fitzpatrick skin type, from I to IV. (Table 2)

Statistical Analysis

Statistical analysis was performed with IBM Statistics SPSS v20.0 software and p values <0.05 were considered statistically significant. Demographics and questionnaire scoring were reported. The scoring systems were standardized in 4 grades.

Non-parametric tests were used since 16 patients were enrolled and data obtained from the scores were ordinal variables. Wilcoxon test was used for variables that were not normally distributed to compare scores between day 7 and day 30; correlations between scores, age, skin area treated and Fitzpatrick skin types were analyzed using Spearman rank correlation test.

RESULTS

Sixteen patients were submitted to upper blepharoplasty with Jett Plasma Lift Medical®. The mean (± standard deviation) age was 50.5 ± 6.42 years and 14 (87.5%)

patients were women. Classification by Fitzpatrick skin type were 4 (25%) type II patients, 8 (50%) type III and 4 (25%) type IV.

No hypopigmentation was noted, but two patients presented hyperpigmentation at follow-up day 7; only one was spontaneously resolved by follow-up day 30. One month after treatment, a new instance of hyperpigmentation was observed. Then we decided to treat both patients with Tyrosinase inhibitors for 3 weeks and mild skin hyperpigmentation was resolved within this period. All 3 patients were Fitzpatrick skin types III.

Figure 2 presents the weighted mean score for each question calculated upon a follow up comparison between 7 and 30 days after treatment. When analyzing Q1 to Q7 (section A), related to questions about impacts on quality of life and daily habits on a scale of 1 to 4, mean scores were low and mostly rated as 1 (did not interfere). Exception was found for Q6, regarding necessity of wearing accessories such as sunglasses, hat or scarf during postoperative follow up, when patients stated more interference and mean score 2 was observed ($p<0.05$).

Although answers to questions Q8 to Q10 (section B) concerning to surgical factors were more variable among patients, statistical significance was observed only in Q9, which evaluated the willingness to undergo the same procedure again. If necessary, nine subjects stated less certain at follow-up day 30 than at day 7, in contrast to 3 subjects that stated more certain ($p=0.038$).

Additionally, scores were also correlated to age, quantity of skin excess treated and Fitzpatrick skin types. Statistical differences ($p<0.05$) were observed in 3 associations: at follow-up day 7, Q2 ($p = 0.044$) and Q3 ($p = 0.036$) related to treated area; and Q10 ($p = 0.043$) at follow-up day 30, related to Fitzpatrick skin types. More skin excess was associated to less negative impacts on quality of life (section A); and darker subgroups of Fitzpatrick skin types were associated to higher satisfaction levels and willingness to undergo the same procedure again (section B).

For the second questionnaire, weighted mean scores were also calculated and the 4 symptoms showed statistically significant differences ($p<0.05$). Scoring was higher at 7 days after treatment, when all 16 patients stated at least 2 symptoms, whereas at 1-month follow-up, symptoms were reported by 3 patients. (Figure 3)

No statistically significant differences were observed between symptoms, age, quantity of skin treated and Fitzpatrick skin types at follow-up day 7. Only at the 1-month follow-up, significant differences were found; more skin excess was associated with higher probability of itching ($p = 0.025$) and darker subgroups Fitzpatrick skin types reported less eyelid hyperemia ($p = 0.033$).

DISCUSSION

Upper eyelid blepharoplasty is one of the most common surgeries performed on the face, to obtain rejuvenation, aesthetical and functional eyelid improvement.[1,2] Innovative and minimally invasive procedure such as plasma technology has been studied and continuously growing as an alternative technique proposed to decrease surgery risk and complications, obtain rapid recovery time and achieve satisfactory results. [12,13] Rossi and colleagues used reflectance confocal microscopy to evaluate "in vivo" collagen remodeling after nonsurgical blepharoplasty with plasma and found clinical improvement and skin morphology remodeling, suggesting a valid solution for dermatochalasis treatment.[8]

Plasma technology devices have been also available for aesthetic treatments, facial rejuvenation procedures, removing xanthelasma[14,15] and also perioral rhytides.[16]

Besides Jett Plasma Lift Medical® there are other devices available on the market that uses plasma treatment for dermatochalasis and facial rejuvenation. However, how plasma is produced can differ from one device to another, for example, using radio-frequency instead of eletrocautery. Moreover, each device can have different functions and energy settings (intensity, continuous or fractionated mode and fraction levels).[3,13]

Dermatochalasis reduction and improvement of aged skin with similar outcomes to traditional blepharoplasty is a goal to be achieved with novel and minimally invasive techniques.[3,7,16-19] Pleasant postoperative results have been accomplished using plasma skin regeneration; hence its popularity has increased on the market. Information about efficacy, safety and satisfaction are important factors that influence precise procedure indications.[12,13]

Previous studies have assessed satisfaction, quality of life and postoperative symptoms of patients submitted to surgical blepharoplasty.[9,10] However, the questionnaires applied were not specific to ophthalmic subject; therefore various medical fields may use these rating scales to study other diseases and whether, and to what extent, it causes

limitation to quality of life.[20-22] Facial plastic surgeons particularly evaluate surgery outcomes based on subjective degrees of satisfaction and quality of life, to better define the achieved procedure success or failure.[23]

In agreement with previous studies, we observed that patients seeking cosmetic procedures, either surgical or not, were mostly women and typically over 40 years, the same for other facial and skin rejuvenation procedures. [6,9]

Although the entire process of skin remodeling may take over a year to be completed[9], tissue healing process has been described as mostly completed by 3 to 4 weeks after treatment [7,12] since plasma application over the eyelids is controlled and less invasive.[7] Based on this rapidly healing, we believe assessment of satisfaction and symptoms were possible at 1 month postoperative. (Figure 4)

In regards to perception of impacts on quality of life after upper blepharoplasty using plasma technology, the majority of patients had no complaints besides the necessity of wearing accessories, such as sunglasses, hat and scarf within the first week after procedure. We assume that in order to keep privacy about undergoing aesthetical procedures, patients may report more need of wearing accessories to mask any surgery signs.

Bogle and col. applied plasma technology for cosmetic facial procedure and observed the treated skin presented complete reepithelialization after 4 days.[12] Therefore, less healing time is an advantage to be considered over surgical blepharoplasty, since eyelid edema, hyperemia, hematoma and scar formation may take longer to resolve with traditional technique.[9,10,13]

Most patients (75%) were willing to undergo the same procedure again if necessary. However, the majority of them (75%) showed more certain at the first week rather than at 1 month postoperative. We suggest expectations with satisfactory results were greater at earlier follow-up period, but were not aligned with the final outcomes delivered later and a good satisfaction degree was not reached.

Bogle et al achieved satisfactory aesthetic results using a protocol of full-face plasma treatment repeated 3 times for skin rejuvenation.[12] Moreover, Sotiris observed improvement of eyelid skin appearance by 30% for each plasma treatment session.[13] High satisfaction rates with 2 session treatment were also demonstrated by Baroni using a visual analog scale to evaluate the effectiveness of plasma ablation.[24] We could explain that pleasant results

obtained in previous studies diverge from this study due to the protocol used. Our Hospital is a public health provider and patients were treated with a single session, but perhaps repeated sessions would likely be more successful.

The quantity of eyelid skin excess showed the more skin treated, the less impact on quality of life was reported at 7 day follow-up. We assume that among patients with more excessive skin redundancy and, therefore more skin treated, even a little reduction of dermatochalasis at first week postoperative was more noticeable than for patients with mild skin excess. Also, patients with more severe dermatochalasis tend to create higher expectations and get more satisfied with results.

Hyperpigmentation after plasma exeresis is one of the side effects feared among patients with darker Fitzpatrick skin types. In this study, patients with Fitzpatrick skin types III and IV reported more satisfaction and willingness to undergo treatment with plasma again, if indicated.

As consequence to surgical stress, traditional upper blepharoplasty technique leads to metabolic and hormonal disturbance. These changes trigger a variety of signs and symptoms in variable magnitude and duration postoperatively, such as edema, itching, hematoma and pain. [10]

Damasceno et al submitted patients to traditional upper blepharoplasty and compared symptoms after surgery with and without resection of orbicularis oculi muscle. The group with orbicularis excised reported more symptoms at postoperative day 7.[10] Therefore, the more invasive the procedure, the more symptoms were reported postoperatively. But later on, after 1 and 3 months, no more significant difference was found.

Regarding blepharoplasty with plasma exeresis, patients reported at least 2 symptoms at first week following treatment, possibly due to local anesthesia injected subcutaneously and the plasma application itself. However, at the 1-month follow up, scoring of symptoms was significantly lower compared to the seventh day and symptoms observed were hyperemia and itching, reported by 3 (18,7%) patients. Thus, similar to traditional blepharoplasty, symptoms reported at 7 days after treatment with plasma exeresis are expected to improve considerably by the first month postoperative.[(6)]

We highlight that, although symptoms were infrequently reported at 1-month follow-up, mild itching and moderate hyperemia, could have been caused by sunscreen with alcohol

formulation and other allergens added to sensitive skin, resulting in hypersensitivity reaction. Therefore, sunscreen containing minerals, like titanium dioxide and zinc oxide should be prescribed. It acts like a mirror and reflects sunlight, protecting skin and avoiding eczema.

Age, quantity of skin excess and Fitzpatrick skin types were not associated with symptoms at follow-up day 7. However, itching was significantly worse at the 1-month follow-up in patients with more severe dermatochalasis. We suppose greater volume of skin excess required a wider area of plasma application; and consequently greater amount of neurotransmitters were released, such as histamine.[10,25] Also, at the 1-month follow-up, patients with darker Fitzpatrick skin types reported less hyperemia, because probably perception of redness was less noticeable for patients with darker and more pigmented skin. Although statistically significant, these associations were observed for 1 and 2 subjects respectively.

Despite all results previously discussed, we point out some limitations. The follow-up was limited and we believe plasma treatment with additional sessions could have resulted in better patient satisfaction in late postoperative period. However, we could justify this improvement by the effectiveness of new plasma applications and long lasting effects obtained with repeated sessions instead of extended time of recovery itself (3 to 6 months) after a single session treatment, as authors report early changes in skin after plasma application that were found in histology of tissue samples in recent postoperative period.[12] Additionally, although patients stated side effects after treatment, the use of subcutaneous anesthetic injection is likely to have caused local symptoms during first week follow-up and sunscreen may have caused local symptoms in later postoperative period.

In conclusion, plasma exeresis is a promising alternative to non surgical blepharoplasty, but clinical information should be analyzed with caution, as satisfaction degree may be questionable. Defined treatment protocol and procedure indications are needed and further studies should be carried out with a larger sample.

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Table 1: Questionnaire "QBlefaro" modified for Upper Blepharoplasty with Plasma technology

Section A: regarding impacts on quality of life

Scores Q1 - Q7 1: no interference 2: little 3: moderate 4: extreme

Q1: At first week following treatment: did blepharoplasty with plasma technology interfere with your daily habits, like shopping, driving, housework, cooking, washing and ironing?
Q2: Did blepharoplasty with plasma technology interfere with work or study activities?
Q3: At first week, did blepharoplasty with plasma technology interfere with your social life or recreation time?
Q4: At first week, did blepharoplasty with plasma technology interfere with relationship with your partner, close friends or relatives?
Q5: At first week, did blepharoplasty with plasma technology interfere with your sex life?
Q6: At first week, did blepharoplasty with plasma technology interfere with your physical appearance and was there necessity to wear sunglasses, scarf or hat?
Q7: Regarding financial condition, did blepharoplasty with plasma technology have any impact?

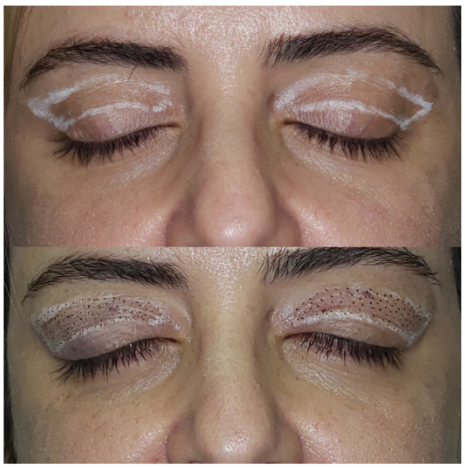
Section B: regarding procedure

Scores Q8 - Q10 1: absolutely 2: very 3: little 4: not at all

Q8: At the moment, how much satisfied are you with results after blepharoplasty with plasma technology?
Q9: At the moment, after experiencing blepharoplasty with plasma technology, procedure results and healing, how certain are you about undergoing the procedure again?
Q10: At the moment, how much blepharoplasty with plasma technology encourages you to undergo other aesthetical treatments (surgical or non surgical)?

Table 2: Symptoms after Blepharoplasty with plasma technology

Rate degree: 0: none 1:mild 2: moderate 3: severe
1:Edema
2:Hematoma
3:Itching
4:Hyperemia
- Hypopigmentation or hyperpigmentaion observed ?
- Fitzpatrick Skin Type (I - IV):



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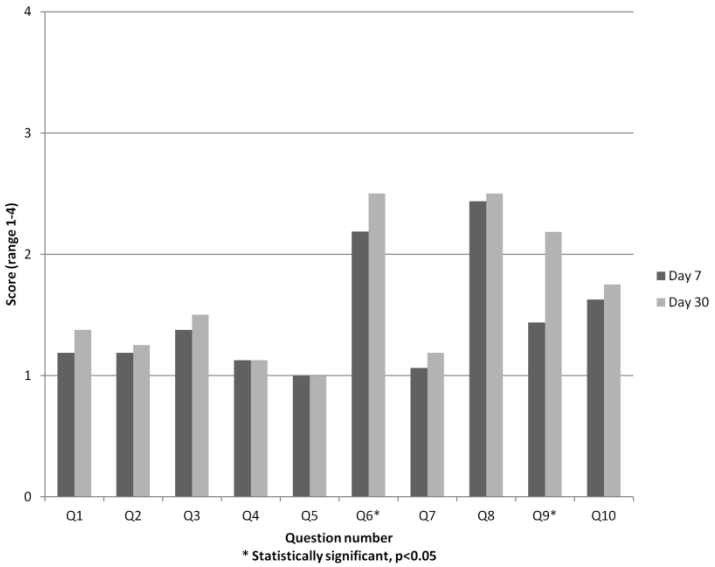

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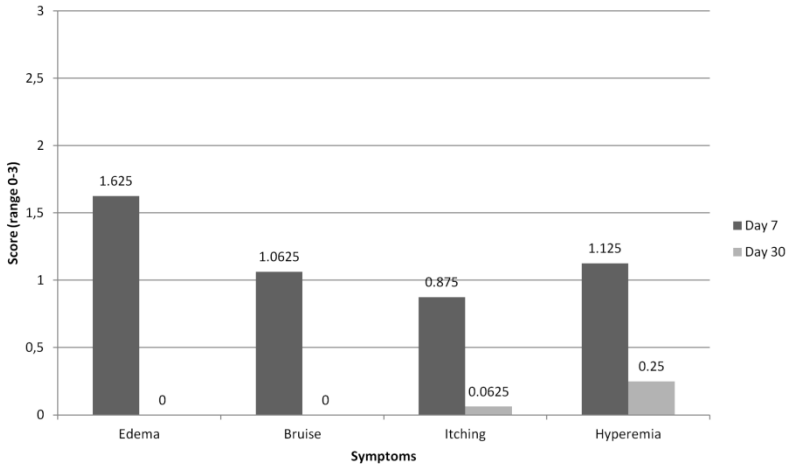

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