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Quantitative and qualitative evaluation of upper blepharoplasty: a retrospective longitudinal study

Avaliação quantitativa e qualitativa da blefaroplastia superior: um estudo longitudinal retrospectivo

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ABSTRACT

Introduction: The eyelids have specific functions, such as eye protection. Aging can lead to excess upper eyelid skin (upper dermatochalasis), causing functional and aesthetic impairment. Subjective assessments of improvement pre- and post-blepharoplasty may be underestimated, since even small increases in palpebral fissure height (PFH) can improve the visual field.

Objective: To measure PFH to check for improvements in dermatochalasis after upper blepharoplasty performed by dermatologists and compare the subjective assessments of independent dermatologists and patients.

Methods: Medical record review of patients who underwent upper blepharoplasty. Photographs taken before and two months after the procedure were compared. Independent dermatologists evaluated the photographs (subjective assessment). Patients' subjective perception was also assessed. PFH before and after the procedure was calculated in millimeters (mm).

Results: A total of 170 eyelids were analyzed. There were significant differences in mean PFH values before and after the procedure (7.088 vs. 8.618 mm; $p < 0.001$) and in patient self-assessment ($p = 0.001$), but no differences between the subjective assessments by independent dermatologists ($p = 0.665$).

Conclusion: There was an improvement in mean PFH after blepharoplasty, which probably resulted in improved visual field. Dermatology is a specialty qualified to perform the procedure.

Keywords: Blepharoplasty; Eyelids; Skin Aging; Eye.

RESUMO

Introdução: *As pálpebras desempenham funções específicas, como a proteção ocular. O envelhecimento pode levar ao excesso de pele palpebral superior (dermatocálase superior), causando prejuízos funcionais e estéticos. As avaliações subjetivas de melhora, pré e pós-blefaroplastia, podem ser subestimadas, já que mesmo um aumento mínimo na altura da fenda palpebral pode melhorar o campo visual.*

Objetivo: *Verificar, por meio da aferição da altura da fenda palpebral, se houve melhora da dermatocálase após a blefaroplastia superior realizada por dermatologistas, e comparar as avaliações subjetivas de dermatologistas independentes e dos pacientes.*

Métodos: *Estudo baseado na revisão de prontuários dos pacientes submetidos à blefaroplastia superior. Fotografias obtidas antes e 2 meses após a cirurgia foram comparadas. Dermatologistas independentes avaliaram as imagens (avaliação subjetiva), e a percepção subjetiva dos pacientes também foi verificada. A altura da fenda palpebral, em milímetros, foi calculada antes e após as cirurgias.*

Resultados: *Foram analisadas 170 pálpebras. Houve diferenças significativas nas médias da altura da fenda palpebral pré e pós-cirurgia (7,088 versus 8,618 mm; $p < 0.001$) e na autoavaliação dos pacientes ($p = 0,001$), mas não entre as avaliações subjetivas dos dermatologistas independentes ($p = 0,665$).*

Conclusão: *Houve aumento da média da altura da fenda palpebral após blefaroplastia, o que provavelmente resultou em melhora do campo visual. A dermatologia é uma especialidade apta a realizar o procedimento.*

Palavras-chave: *Blefaroplastia; Pálpebras; Envelhecimento da Pele; Olho.*

Original Article

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INTRODUCTION

The eyelids are complex structures with specific functions, such as protecting the eyeball from trauma, shielding it from excessive light, and executing movements towards the tear drainage system, in addition to contributing to the eye's beauty and expression.[1,2] Some factors, primarily chronological skin aging, may lead to loss of elasticity and excess upper eyelid skin (upper dermatochalasis), causing visual impairment and impacting periocular aesthetics.[3] Lower dermatochalasis has greater impact on cosmetic appearance.[4] Laser and radiofrequency may be used to treat dermatochalasis,[5] but a surgical procedure (blepharoplasty) is still the most widely used technique, given its low cost and low invasiveness.[3] Traditionally, ophthalmology and plastic surgery are the two medical specialties that perform blepharoplasties.[3,4,6] However, given the current public health care scenario, both specialties are in high demand, leading to extremely long waiting lists for blepharoplasty. Dermatology, as a medical-surgical specialty, can also perform the procedure, and having dermatologists perform blepharoplasties is an alternative to help reduce waiting times.[7] In addition, it would be important to assess whether dermatology is able to achieve satisfactory postoperative outcomes. However, considering the subjective assessment of primary surgeons themselves alone would be suboptimal, and including the assessment of other physicians, combined with objective evaluation, would lower potential performance biases.[3,6] A previous study proposed assessing the surgical outcomes of upper blepharoplasty performed by dermatologists objectively by comparing pre- and postoperative measures of palpebral fissure height (PFH).[3] However, that study had a limited sample size (only nine patients) and suggested additional studies should be conducted.[3] The aim of the present study was to determine if there was any improvement in dermatochalasis after upper blepharoplasty performed by a local dermatology service, thus investigating the qualification of that specialty to perform the procedure. The improvement was assessed both quantitatively, by comparing pre- and postoperative PFH measures, and qualitatively, based on the pre- and postoperative subjective assessments by independent dermatologists and the patients themselves.

METHODS

Study design

A retrospective longitudinal study reviewed the medical records and photographs of patients who underwent upper blepharoplasty performed at the dermatology service of the university where the study was conducted.

Inclusion and exclusion criteria

The patient inclusion criteria for this study were having undergone upper blepharoplasty at the dermatology service between April 1, 2014, and March 31, 2023. The exclusion criteria, in turn, were absence of return after surgical procedure, lack of data that could not be obtained through invitations or by telephone, photographs taken by professionals other than the lead investigator, and use of cameras other than a Canon T3i.

Assessment methods

Photographs taken at a standardized distance of 50 cm with a Canon® T3i camera and 55 mm macro lens, before the procedure and 2 months after, were compared using the Scion Image 4.0 software. PFH, defined as the distance from the upper eyelid to the lower eyelid passing through the pupil, was calculated based on the stored photographs (Figure 1). The Pixel Converter software application was used to convert pixels into millimeters, using decimal thousandths to assign the PFH values in millimeters.

The photographs taken before and after the procedures were distributed to three independent dermatologists for assessment, without telling the specialists which had been taken before and which after the procedure (photograph A vs. photograph B). Next, the professionals assigned a numerical score comparing the evolution of photograph A to B and of photograph B to A, according to the following scale developed by the researchers: significant worsening (-3), moderate worsening (-2); mild worsening (-1), no change or no improvement (0), mild improvement (+1), moderate improvement (+2), and significant improvement (+3). Only the researchers knew that, for instance, a -3 score might actually indicate a +3 improvement. Patients' subjective assessments were also scored based on functional (visual

FIGURE 1: Palpebral fissure height measurement
A - Pre-blepharoplasty.
B - Post-blepharoplasty

field) and/or aesthetic improvement, using the following scale: improvement (+1), no improvement (0), and worsening (-1).

Statistical analysis

The data were provided via survey forms developed by the researchers themselves. The information collected was compiled into a Microsoft Excel spreadsheet for statistical analysis using the Stata® (version 13.0, StataCorp, Texas) and Jamovi software applications. Fisher's exact test was used to compare categorical variables and the chi-square test for trends. Continuous variables were analyzed using the Wilcoxon-Mann-Whitney test. After checking the normality of quantitative variables using the Shapiro-Wilk test, nonparametric Mann-Whitney and Kruskal-Wallis tests were used to compare the results. Statistical significance was set at $p < 0.05$, with a 95% confidence interval. The minimum sample size calculation resulted in 170 eyelids (85 patients), considering a significant difference of at least 0.900 mm in PFH between pre- and post-blepharoplasty measurements, with a significance level of 5%, power of 80%, and a standard deviation of 0.300 mm.

Research Ethics Committee

The study was approved by the Human Research Ethics Committee of the hospital where the study was conducted, and received Certificate of Presentation for Ethical Evaluation number 69513623.0.0000.5231.

Detailed description of surgical technique

a) With the patient in horizontal supine position and eyes closed, a fusiform marking of the skin to be excised was made using a surgical marking pen or methylene blue. The lower limit was drawn at a distance greater than 8 mm from the lash line, and the upper limit of the fusiform area was marked more than 10 mm from the lower edge of the eyebrow (measures adopted to avoid lagophthalmos).[1] At the lateral ends, a slight arching was performed. (Figure 2)

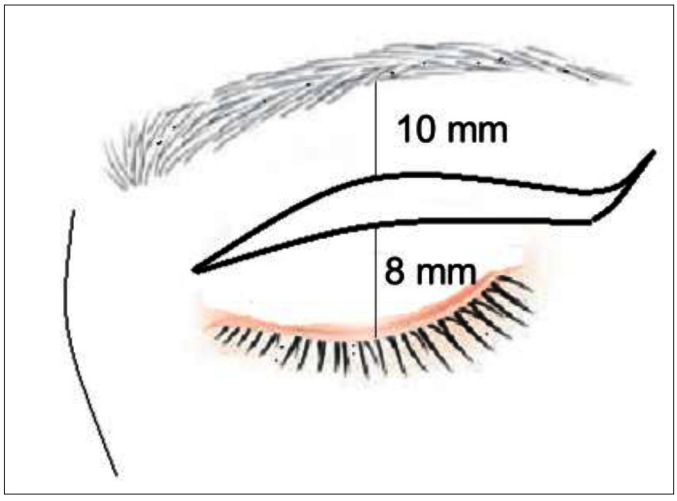


FIGURE 2: Marking of fusiform area. The inferior margin should be at least 8 mm from the ciliary edge, at the midpalpebral line. The upper edge should be 10 mm from the lower edge of the eyebrow

B) Antisepsis with topical 10% polyvinyl-iodine solution;
C) Subcutaneous infiltration of upper eyelid with 2% lidocaine and vasoconstrictor;
D) Incision of the marked area with a 15 blade and excision of tissue to subcutaneous depth;
E) Hemostasis;
F) Sutures with 6-0 Mononylon, single stitches;
G) Cleaning and dressing with sterile Micropore tape.

RESULTS

Table 1 lists the main findings of the present study. The study analyzed 170 eyelids of 85 individuals, with mean age of 61.4 years, predominantly female (83.5%) and White (85.9%). There was a significant difference in mean pre- and post-blepharoplasty PFH (7.088 vs. 8.618 mm; $p < 0.001$). Graph 1 compares pre- and postoperative PFH measurements.

For dermatologists, a subjective assessment of mild improvement (52.9%) predominated over all other findings (47.2%) ($p = 0.665$). Comparing rates of improvement vs. non-improvement, the post-blepharoplasty outcome was significant (94.3 vs. 4.7%; $p = 0.001$). In patient self-assessments, however, a significant improvement was found (96.5 vs. 3.5%; $p = 0.001$). Graph 2 shows the assessments of dermatologists and patients.

Regarding PFH correlations after blepharoplasty, there was an inverse correlation with patient age ($r = -0.230$; $p = 0.032$). Dermatologists' assessments and patient self-assessments were not significantly correlated with post-blepharoplasty PFH ($p > 0.05$) (Table 2). However, comparing dermatologists' assessments to patient self-assessments (disregarding PFH measurements), the result was statistically significant ($r = 0.351$; $p < 0.001$).

DISCUSSION

The sample was predominantly comprised of female patients, with mean age higher than 60 years, consistent with the literature.[8,9] Mean preoperative PFH was 7.088 mm and mean postoperative PFH was 8.618 mm ($p < 0.001$), values close to those found by Schellini et al.[3] Mean PFH without dermatochalasis, ie, in the young adult population, can vary by race, country, and sex. A Turkish study found an average of 10.4 mm for females and 10.3 mm for males.[10] There are no consolidated data on mean post-blepharoplasty PFH. However, Schellini et al.[3] report a postoperative mean PFH of 7.92 mm for nine patients, also smaller than the mean average observed in individuals without dermatochalasis, and similar to the results of the present study. Subjective assessments by dermatologists and patient self-assessments were not correlated with postoperative PFH ($p > 0.05$).

Table 1: Clinical and demographic profile

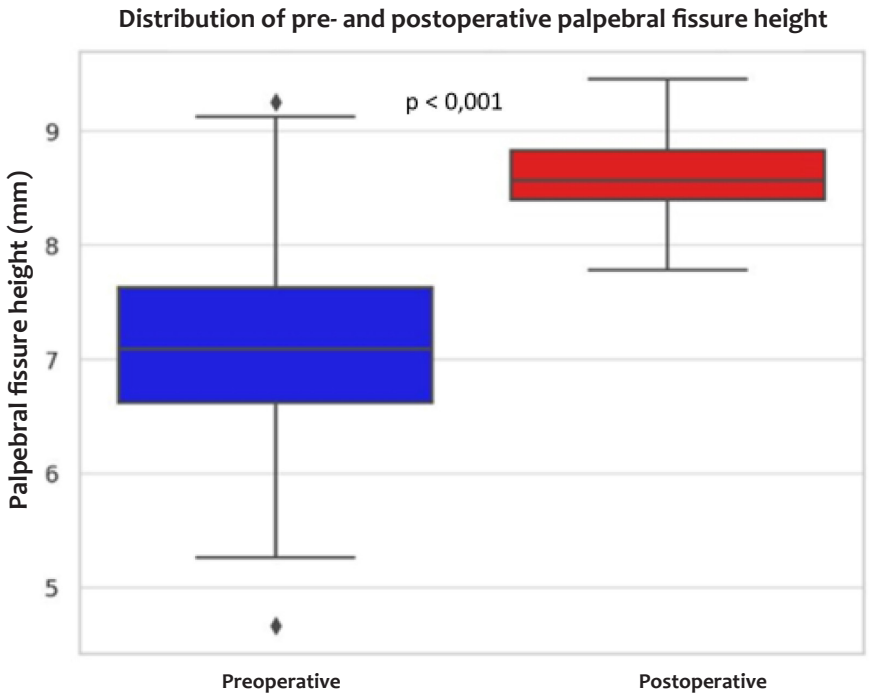
Characteristics	Preoperative (n = 170)	Postoperative (n = 170)	p
Age (years)			
Mean ± SD	61.4 ± 8.0	61.4 ± 8.0	NA
Minimum – Maximum	48 – 88	48 – 88	
Sex, n (%)			
Male	14 (16.5)	14 (16.5)	NA
Female	71 (83.5)	71 (83.5)	
Race, n (%) #			
White	73 (85.9)	73 (85.9)	NA
Non-White	12 (14.1)	12 (14.1)	
Occupation, n (%) &			0.675
Homemaker	38 (44.7)	38 (44.7)	
Nursing assistant	10 (11.8)	10 (11.8)	
Doorman	3 (3.5)	3 (3.5)	
Social worker	3 (3.5)	3 (3.5)	
Other	31 (36.5)	31 (36.5)	
Medical assessment, n (%) ⋆			0.665
Significant improvement	NA	17 (20.0)	
Moderate improvement	NA	19 (22.4)	
Mild improvement	NA	45 (52.9)	
No improvement	NA	4 (4.7)	
Mild worsening	NA	0 (0.0)	
Moderate worsening	NA	0 (0.0)	
Significant worsening	NA	0 (0.0)	
Self-assessment, n (%) ¶			0.001
Improvement	NA	82 (96.5)	
No improvement	NA	3 (3.5)	
Worsening	NA	0 (0.0)	

SD = standard deviation.
NA = not applicable.
 # racial self-identification every patient provides when filling out their registration form at the hospital.
& seamstress, sales clerk, manicurist, general services assistant, administrative assistant, radiology technician, shopkeeper, farmer, cleaning woman, construction worker, security technician, civil servant, unemployed.
⋆ subjective assessment by three independent dermatologists without the aid of measurement devices.
¶ patient self-assessment.

Table 2: Correlation coefficients between postoperative measurement of palpebral fissure height (mm) and selected characteristics (n = 170)

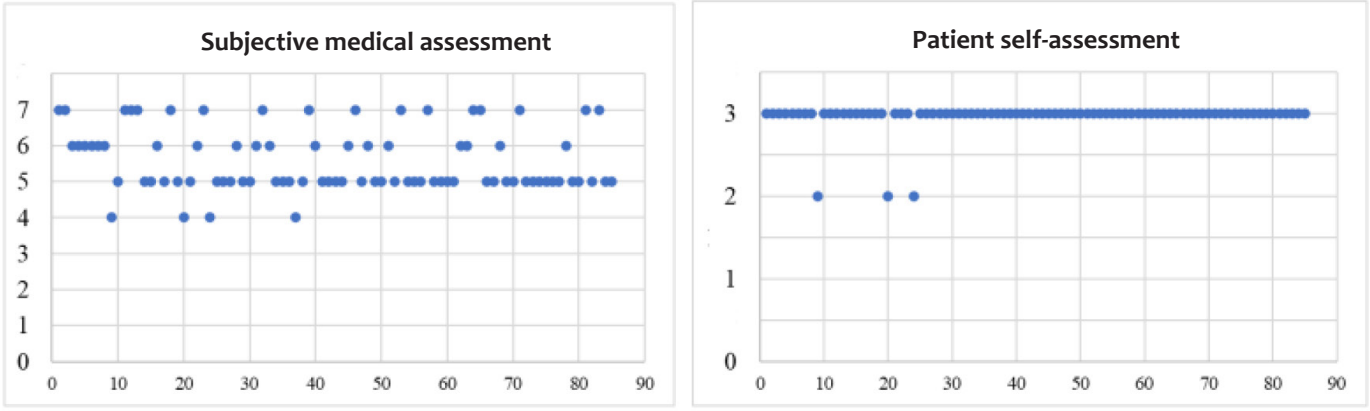
Variable	r	p
Age	-0.23	0.032
Medical assessment	0.04	0.692
Patient assessment	0.06	0.578

r = Pearson's correlation coefficient
For medical and patient assessments, results were ranked from 1 to 7 and 1 to 3, respectively.



Graph 1. Distribution of pre- and postoperative PFH

PFH = palpebral fissure height.



Graph 2: Comparative scatterplot of subjective assessments. The subjective medical assessment was ranked from 1 to 7 (1 = significant worsening; 2 = moderate worsening; 3 = mild worsening; 4 = no change or no improvement; 5 = mild improvement; 6 = moderate improvement; 7 = significant improvement). Self-assessments were ranked from 1 to 3 (1 = worsening; 2 = no change or no improvement; 3 = improvement)

The authors considered the hypothesis that pre- and post-blepharoplasty comparisons are barely perceptible to the naked eye, given that no assessment indicated a worsening ($p < 0.05$). That finding might suggest that even small improvements in PFH, measured in millimeters, would favor visual acuity. Visual field tests are the standard examination to assess the visual field before and after a blepharoplasty. However, that test depends on information provided by the patient and is also a subjective parameter.[8] This test was not performed in our study, as was also the case in the work of Schellini et al. Surgical indication was based on the patient's complaint and the physical examination of excess upper eyelid skin. To date, there are no studies in the plastic surgery literature that employ PFH or some other objective measurement to assess upper blepharoplasty. Furthermore, no study has concomitantly applied three methods of assessing surgical outcomes (PFH, assessment by independent specialists, and patient

self-assessment). Study limitations include the absence of visual field tests, which could have provided additional information, and the fact that it was conducted in a single referral center. In addition, 10 patients had to be excluded due to information bias, with 10 others from the consecutive listing included to maintain the sample size. Despite these limitations, the authors replicated a quantitative assessment (PFH)[3] and compared it to qualitative parameters, finding superior postoperative outcomes in a more objective manner, evidence that dermatology may also be qualified to perform upper blepharoplasty.

CONCLUSION

By analyzing a quantitative parameter (PFH), the present study found a significant improvement in patients who underwent upper blepharoplasty performed at a dermatology service, indicating that the specialty may also be qualified to perform this type of procedure. ●

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