

Correlation between increase in margin-crease distance and patient satisfaction after upper blepharoplasty

Correlação entre o aumento da distância margem-sulco e satisfação do paciente após blefaroplastia superior

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ABSTRACT

Objective: To quantitatively and qualitatively evaluate postoperative outcomes and patient satisfaction after upper blepharoplasty and to correlate the findings with changes between preoperative and postoperative eyelid measurements using a digital imaging system. **Methods:** A total of 60 eyelids in 30 patients with dermatochalasis who were treated in the ambulatory center of the Department of Oculoplastic Surgery at the Anápolis Ophthalmology Hospital were evaluated. Patients ranged from 40 to 80 years of age. Photographs were taken before the upper blepharoplasty procedure and 90 days after as well. The images were transferred to the ImageJ 1.34n program. The parameters analyzed were palpebral fissure height in primary position and margin-crease distance. The correlations between these measurements and patient satisfaction 90 days after surgery were evaluated. **Results:** This study revealed an increase in the margin-crease distance after upper blepharoplasty and a high positive correlation (0.64) between the increase in this height and the level of satisfaction that the patients attributed to the surgery. There was no statistically significant difference between preoperative and postoperative palpebral fissure heights. **Conclusion:** The margin-crease distance may serve as a quantitative measurement of a good cosmetic and functional outcome, since it has been found to be strong correlated with patient satisfaction.

Keywords: Eyelids/surgery; Eyelid disease/surgery; Blepharoplasty/methods; Treatment outcome; Image processing, computer-assisted; Patient satisfaction

RESUMO

Objetivo: Avaliar de maneira quantitativa e qualitativa o resultado pós-operatório e a satisfação de pacientes submetidos à blefaroplastia superior e correlacionar com as medidas palpebrais antes e após a cirurgia utilizando o sistema de imagem digital. **Métodos:** Foram avaliadas 60 pálpebras de 30 pacientes com dermatocálase atendidos no ambulatório de Plástica Ocular do Hospital Oftalmológico de Anápolis, com idade entre 40 e 80 anos. Foram realizadas fotografias antes e 90 dias após blefaroplastia superior. Essas imagens foram transferidas para o programa Image J 1.34n e analisados os parâmetros de altura da fenda palpebral em posição primária do olhar e distância margem-sulco palpebral. Foram avaliadas as correlações dessas medidas com a satisfação do paciente após 90 dias de pós-operatório. **Resultados:** O estudo mostrou um aumento da distância margem-sulco palpebral após blefaroplastia superior e uma correlação fortemente positiva (0,64) entre o aumento dessa medida e a nota de avaliação atribuída pelo paciente à cirurgia. Não houve diferença estatisticamente significativa na altura da fenda palpebral antes e após a cirurgia. **Conclusão:** A utilização da medida da distância margem-sulco pode servir como parâmetro quantitativo de um bom resultado estético e funcional, apresentando uma forte correlação com a satisfação dos pacientes no pós-operatório.

Descritores: Pálpebras/cirurgia; Doenças palpebrais/cirurgia; Blefaroplastia/métodos; Resultado do tratamento; Processamento de imagem assistida por computador; Satisfação do paciente

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Approved by the Ethics Committee of the Anápolis Ophthalmology Hospital
No financial support received

Os autores declaram não haver conflito de interesses.

Recebido para publicação em 11/10/2016 - Aceito para publicação em 19/11/2016.

INTRODUCTION

Dermatochalasis is a pathology that commonly affects middle-aged and elderly individuals. It is defined as an excess of skin on the upper eyelid, on the lower eyelid, or on both lids, and it may include an excess of fat and hypertrophic muscle tissue ⁽¹⁾.

Advanced loss in elasticity and weakening in muscle tissue are characteristics of the periocular aging process, which results in eyelid flaccidity. Intrinsic and extrinsic aging mechanisms are involved in this process. They include alcohol consumption, chronic exposure to sunlight, smoking, and diet ^(2,3).

Individuals who exhibit dermatochalasis of the superior eyelid may experience symptoms such as blurred vision, tearing, visual fatigue and discomfort, reductions in the superior and peripheral fields of vision, corneal astigmatism, and migraines due to the use of the surrounding muscles to attempt to raise the eyelids ^(1,2,4). Pseudoptosis may be induced by the increase in periorbital tissue weight ⁽²⁾.

Blepharoplasty is the procedure of choice for correcting dermatochalasis. It consists of the excision of the excess skin using a cutaneous incision that involves the anterior lamella of the eyelid. Depending on each case and on patient anatomy, orbicular muscle tissue and fat pads may also be excised or repositioned ^(1,4,5,6). A complete ophthalmologic exam must be performed in the preoperative assessment so that limitations in visual acuity and to the visual field can be documented, as well as pathologies such as dry eye and any others for which the procedure is contraindicated. Eyebrow position and any association with blepharoptosis should be determined. In cases of superior dermatochalasis associated with eyelid ptosis or brow ptosis, it is important that all aspects be corrected ^(7,8).

Though ophthalmologists commonly perform this procedure, there is no standardization or consensus for evaluating the severity of superior dermatochalasis. Evaluations are subjective and depend on each examiner's observations. Measurements are typically taken using rulers and compasses. With the advancement of digital photography and software to analyze these photos, more precise measurement scales can be used to compare surgical outcomes and to correlate them with the success of a procedure (or lack thereof), as well as with patient satisfaction with the results ^(7,9,10).

The objective of this study is to quantitatively and qualitatively evaluate postoperative outcomes and patient satisfaction after upper blepharoplasty and to correlate these results with the measurements taken using preoperative and postoperative digital photography.

METHODS

A prospective interventional case series study was performed between January and June 2015 in an ophthalmology teaching hospital. The sample was composed of 30 patients who had upper dermatochalasis and who were treated in the Oculoplastic Surgery ambulatory center of the aforementioned hospital. These patients agreed to participate in the study and signed the Informed Consent Form (ICF), which had been previously approved by the institution's Ethics Committee. The study was performed in accordance with the Helsinki Declaration.

The inclusion criteria were treatment in the Oculoplastic Surgery ambulatory center, age between 40 and 80 years, cosmetic or functional indication for the upper blepharoplasty procedure,



Figure 1: A: Digital measurement of palpebral fissure height (right eye), measurement of the margin-crease distance (left eye), and millimeter ruler attached to the slit lamp
B: Margin-crease distance measurement reflecting a postoperative increase (left eye).

and agreement to participate in the study (which was determined after patients signed the ICF).

The exclusion criteria were age younger than 40 years or older than 80 years, a history of facial trauma, eyelid ptosis, ectropion, entropion, hyperthyroidism, the presence of a clinical contraindication for performing the procedure, and the use of blood thinners or antiplatelet agents.

The digital photographs were obtained through the use of a Sony W50 digital camera and analyzed in the ImageJ 1.34n program, which converts the measurements taken with a ruler into pixels, thus creating a pixel per millimeter (mm) scale.

The patients were seated with their heads positioned in a Haag-Streit slit lamp BQ 900[®] so that the measurements could be taken. Millimeter rulers were attached vertically to the lateral support of the slit lamp in order to standardize the measurements. Each patient was instructed to remain in primary position while the measurements were taken (Figure 1).

As mentioned previously, there is no consensus regarding dermatochalasis severity. Therefore, the authors measured the distance between the superior lid margin and the superior lid crease, as suggested by Frantz et al. ⁽⁸⁾ at the level of the center of the lid (margin-crease distance) in primary position.

Next, palpebral fissure height was measured (defined as the distance from the superior lid margin to the inferior lid margin, passing through the center of the pupil) and the margin-crease distance (defined as the distance from the superior lid margin to the lid crease along the pupillary line) before and 90 days after blepharoplasty.

In each patient, preoperative superior dermatochalasis was determined to be either mild (margin-crease distance of 2 mm or greater), moderate, (margin-crease distance of 0.1 to 1.9 mm), or severe (0 or negative distance). We considered dermatochalasis to be severe in cases in which the skin touched the lash line or surpassed it (negative distance), as shown in figure 1.

All of the surgeries were performed by ophthalmology residents in training; all were directly supervised by the same oculoplastic surgeon. The amount of skin to be excised had been

outlined prior to the procedure. The patients were sedated using midazolam intravenously, and local anesthesia was then applied (2% lidocaine and 0.75% bupivacaine, both with epinephrine).

The cutaneous incision of the superior lid was made using a #15 blade along the previously outlined markings in order to remove the excess skin, subcutaneous tissue, and preseptal orbicularis muscle using an EMAI brand electronic scalpel, model number BP 150. When necessary, meticulous hemostasis was performed and medial fat pads were removed. The surgical wound was closed using nylon 6-0 suture with two to three simple suture followed by a running suture. Finally, antibiotic ointment and a bandage were applied for 24 hours. The sutures were removed seven days after surgery.

The data on patient satisfaction was collected using qualitative questionnaires applied in the immediate postoperative period and 90 days after the blepharoplasty. Patients were questioned regarding their reason for undergoing the procedure (cosmetic, functional, or both); the extent of postoperative pain (measured on a scale of 0 to 10, in which 0 reflected a lack of pain, 1 to 3 reflected mild pain, 4 to 5 reflected moderate pain, 7 to 9 reflected intense pain, and 10 reflected the most pain ever experienced).

In terms of satisfaction with the final outcome of the procedure, the patients were instructed to give a subjective score of 0 to 10, in which 0 meant "completely unsatisfied" and 10 reflected "extremely satisfied" and the patients were also asked if they would undergo the procedure again.

Patients were also asked for their subjective assessments of scarring on a scale of 0 to 3 (0: invisible; 1: minimally visible; 2: moderately visible; and 3: highly visible).

The statistical analysis was performed using the SPSS software. The normality of the data was evaluated using the Kolmogorov-Smirnov test. Student's t-test was used to compare the average preoperative and postoperative palpebral fissure heights, as well as the average preoperative and postoperative margin-crease distances. Pearson's correlation coefficient was used to evaluate the correlation between the final margin-crease distance and patient satisfaction scores.

In this study, results with a 95% confidence interval were considered statistically significant ($p < 0.05$).

When Student's t-test was applied to compare the average preoperative palpebral fissure height (8.5 mm; SD: 0.91) to average postoperative palpebral fissure height (8.6 mm; SD: 0.85), no statistically significant distance was found ($p = 0.44$). However, the average preoperative margin-crease distance was 1.4 mm (SD: 1.19), while the average postoperative margin-crease distance was 3.8 mm (SD: 0.49). The p value was 0.02, which reflects statistical significance (Table 2).

RESULTS

A total of 60 upper blepharoplasties were performed on 30 patients. The population's average age was 54.8 years (range 41-74 years of age); 88% were female. Forty-four percent of patients presented no preexisting comorbidities, 48% had systemic hypertension, 15% had hypothyroidism, and 12% had diabetes.

When asked about their reasons for undergoing the surgery, 32% of the patients reported only cosmetic reasons, 33% reported only functional reasons, and 35% reported both cosmetic and functional reasons. The questionnaire also found that 96% of the patients would undergo the surgery again (4% would not).

In the assessment of superior dermatochalasis, 9 patients

Table 1
Patient profiles

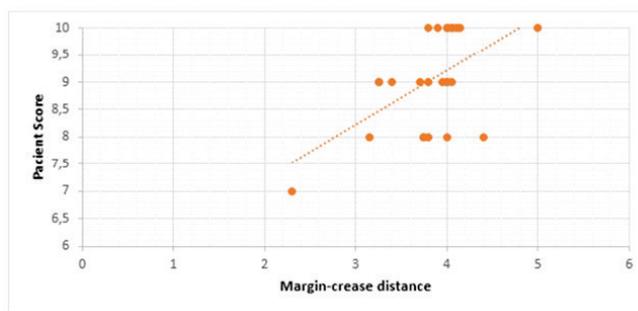
Gender	88% female
Age	54.8 years (41-74)
Comorbidities	48% SH*
Reason for procedure	68% cosmetic
Intensity of dermatochalasis	70% moderate/severe
Would they perform the procedure again?	96% yes

*SH: Systemic hypertension

Table 2:
Digital eyelid measurements
in millimeters (mm) (mean and range)

	Preoperative mean	Postoperative mean	p value
Palpebral fissure height	8.5 (7 – 10)	8.6 (7.1 – 10)	0.44
Margin-crease distance	1.4 (0 – 3.8)	3.8 (2.3 – 5)	0.02

Graph 1
Correlation between higher margin-crease distance and patient satisfaction score (all patients)



(30%) were found to have mild dermatochalasis, 11 patients (36%) were found to have moderate dermatochalasis, and 10 patients (34%) were found to have severe dermatochalasis. In this study, no cases of asymmetry were found, meaning there were no cases in which the patient exhibited different dermatochalasis intensities in each eye (Table 1).

When Student's t-test was applied to compare the average preoperative palpebral fissure height (8.5 mm; SD: 0.91) to average postoperative palpebral fissure height (8.6 mm; SD: 0.85), no statistically significant distance was found ($p = 0.44$). However, the average preoperative margin-crease distance was 1.4 mm (SD: 1.19), while the average postoperative margin-crease distance was 3.8 mm (SD: 0.49). The p value was 0.02, which reflects statistical significance (Table 2).

The study also found a strong positive correlation (0.64) between the margin-crease distance and patient satisfaction score, the average of which was 9.04 out of 10 (7-10; SD: 0.88) (Graph 1). Among subjects less than 60 years of age, the positive correlation was 0.64 (strong) and among subjects greater than 60 years of age, the positive correlation was 0.33 (weak).

The average score patients gave to pain was 2.5 out of 10 (1-5; SD: 1.10). When asked about scarring, 22 patients (73%)

QUESTIONÁRIO DE DERMATOCÁLASE

NOME: _____

SEXO: () M () F

IDADE: _____

ANTECEDENTES PESSOAIS:

() HAS () DM () HIPOTIREOIDISMO () HIPERTIR () OUTROS _____

SINTOMAS VISUAIS: () "PESO" PALPEBRAL () ALTERAÇÕES DE CV

() FOTOFOBIA () LACRIMEJAMENTO

() OUTROS _____

MOTIVAÇÃO PARA A CIRURGIA

() ESTÉTICA () FUNCIONAL () AMBAS

EXAME CLÍNICO – MEDIDO COM IMAGE J

FENDA PALPEBRAL PRÉ: OD:

DISTÂNCIA MARGEM SULCO PRÉ: OD:

OE:

OE:

FENDA PALPEBRAL PÓS: OD:

DISTÂNCIA MARGEM SULCO PÓS: OD:

OE:

OE:

ESCALA DE DOR PÓS-OPERATÓRIA DE 0 A 10 =>

AVALIAÇÃO SUBJETIVA DA CICATRIZ: 0 A 3 => _____

(0: invisível, 1: minimamente visível, 2: moderadamente visível e 3: muito visível.)

NOTA FINAL DA CIRURGIA SUBJETIVA – 0 A 10 =>

(0 totalmente insatisfeito e 10 extremamente satisfeito)

FARIA O PROCEDIMENTO NOVAMENTE? () SIM () NÃO

subjectively rated their scarring as invisible or minimally visible, and 8 patients (27%) rated their scarring as moderately visible. None of the patients exhibited highly visible scarring, according to their own assessments

DISCUSSION

Upper blepharoplasty is one of the most common aesthetic procedures performed in the United States and Brazil^(1,11). Aesthetics improvements can be made with a short operation that can be performed under intravenous sedation. This procedure offers many benefits to patients and which most of the times results in high patient satisfaction. In our study, there was a higher percentage of female patients (88%), and patients averaged approximately 55 years of age. This data is compatible with the higher interest among this patient profile for cosmetic procedures, whether surgical or not. Regardless of cosmetic benefits, most of the times functional issues are present in patients who wish to undergo upper blepharoplasty. Common complaints before surgery include a feeling of excess weight above the eyes, a decreased superior and peripheral visual field, and asthenopia.^(9,10) These findings are consistent with those published by Lessa et al.⁽¹¹⁾. Dermatochalasis is also associated with a loss in the peri-

pheral visual field, which further affects patients' quality of life⁽¹²⁾.

To achieve the digital measurements, a digital image must be produced, which means attributing spatial values (x, y) and luminance values to the points (pixels) that form the image⁽¹³⁾. Once available in digital form, the image can be processed by programs that mathematically manipulate the pixels. The use of digital processing allows for more refined quantitative analyses of the oculoplastic parameters that may be of clinical or surgical importance and which may be correlated with qualitative analyses of surgical outcomes⁽⁷⁾. These parameters are traditionally measured using rulers and compasses, a method which may result in differences between examiners. The digitalization and computerized analysis of these measurements offer a more precise result and eliminate examiner bias.

In our study, the increase in postoperative palpebral fissure height was not statistically significant, a finding which was also reported by Starck et al.⁽¹⁴⁾. Schellini et al.⁽⁷⁾ found significant changes in palpebral fissure measurements before and after upper blepharoplasty, a result which may be explained by the presence of many patients with mechanical ptosis due to severe dermatochalasis in their study. The average postoperative palpebral fissure measurement in our study was 8.6 mm. Cruz et al.⁽¹³⁾ analyzed palpebral fissure height in 70 eyes and found a mean value of 9.02

mm, consistent with our findings.

Our study found a significant increase in the preoperative and postoperative measurement of margin-crease distance. The preoperative distance was 1.4 mm, while the postoperative distance was 3.8 mm ($p < 0.02$). Statistically significant increases have also been reported by Schellini et al.,⁽⁷⁾ Starck et al.⁽¹⁴⁾ and Lessa et al.⁽¹¹⁾. An analysis of this data shows that our finding was expected, given the fact that the excision of the skin above the preseptal orbicularis muscle has the effect of aesthetic placement of the supratarsal crease, since it is no longer covered due to superior dermatochalasis.

Though many studies have analyzed preoperative and postoperative measurements involved in upper blepharoplasties, we are unaware of any studies that correlate postoperative measurements with the extent of patient satisfaction. In what may be considered a factor in a good outcome for upper blepharoplasty, a quantitative increase in margin-crease distance in primary position, which exposes pretarsal skin (hollow upper eyelid sulcus) and, particularly among women, allows for the use of cosmetic products in this region, was found to be subjectively correlated with greater patient satisfaction in this study. Another important quantitative criterion is a lack of a decrease in palpebral fissure, since this decrease may lead to a certain degree of blepharoptosis, an outcome which is not desired after upper blepharoplasty.

The majority of oculoplastic surgeons have been concerned with volume preservation in upper blepharoplasty. However, in this study, the strong positive correlation between higher margin-crease distance and patient satisfaction, shows that, in patient evaluation, the hollow upper eyelid sulcus has been preferred to full upper eyelid sulcus. Bielory et al.⁽¹⁵⁾ found that the preference for hollow or full upper eyelid sulcus could be accounted based on age. In their study, subjects greater than 45 years of age preferred a hollow upper eyelid sulcus (higher margin-crease distance) over a full eyelid⁽¹⁵⁾. In another study, Hwang et al.⁽¹⁶⁾, showed the effect of "single" versus "double" eyelids on the perceived attractiveness of Chinese woman and considered the presence of a medium upper eyelid crease to be the most significantly attractive eyelid shape. These findings are consistent with our study, that showed patient preferences to higher margin-crease distance.

Qualitative criteria include invisible or minimally visible scarring in a good location (coinciding, in most cases, with the original eyelid crease), decreased sensations of excess weight above the eyes and of asthenopia⁽¹⁷⁻¹⁹⁾, improved superior and peripheral visual fields⁽²⁰⁻²⁴⁾, and an associated absence of complications such as lagophthalmos and dry eye. These criteria are associated with an ideal outcome.

In our study, we found a strong positive correlation between greater margin-crease distance and patient satisfaction (determined by the score attributed by the patient to the final outcome of the procedure). We conclude that this measurement may serve as a quantitative parameter of a good cosmetic and functional outcome, particularly in teaching hospitals where medical residents need clinical parameters to evaluate their results. This measurement may be beneficial in cases of careful surgical indication and the correct use of the surgical technique.

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