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PROCENA REZULTATA HIRURŠKE KOREKCIJE GORNJIH KAPAKA-OBJEKTIVNO MERENJE I ZADOVOLJSTVO PACIJENTA

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Abstract

**Background/Aim.** Upper blepharoplasty is one of the most often performed aesthetic operations and is indicated for periorbital rejuvenation or for correction of some functional problems. Goal of this study was to evaluate outcome of this procedure and to assess patients’ satisfaction and possibilities of objective measurement of results. **Methods.** A two year prospective, observational study was conducted among 50 patients who had upper blepharoplasty done by same surgeon. Data were collected from medical documentation, questionnaire and objective measurements conducted via standardized digital photographs that were taken before and two months after surgery by same surgeon. Tarsal platform show (TPS) and brow fat span (BFS) were measured in three points before and two months after the surgery. Questionnaire that was conducted before surgery and two months after included general complaints considering upper eyelids (visual field narrowing, fallen eyelids, sensation of heavy eyelids, raising head backward in order to enhance vision, headache), patients assessment of eyelid asymmetry and after surgery questions for surgeon and patient concerning satisfaction with outcome. **Results.** This study involved 50 patients between 33 and 67 years (49.98±8.6). There is statistically significant difference in all points for TPS and BFS before and after operation. No significant asymmetries were notices between eyes neither before, nor after surgery. There is statistically significant difference in operation success between 3 age categories in TPS-P1 (chi square=13.089, df=2, p=0.001) and TPS-P2 (chi square=8.386, df=2, p=0.015) with best results achieved in older patient (>55). There is strong positive and statistically significant correlation between patients’ and surgeons’ satisfaction (r=0.704, p=0.002), and also between patients’ satisfaction and age of the patient (r=0.704, p=0.002). **Conclusion.** Realistic expectations, adequate information about surgery and possible complication, are essential to a satisfied patient. Objective measurements correlate with patient satisfaction and together with photographs can be useful tool in communication with patient.

**Keywords:** blepharoplasty, tarsal platform show, brow fat span, upper eyelid, surgery evaluation, patients` satisfaction
Apstrakt

Uvod/Cilj. Blefaroplastika je jedna od najčešćih estetskih hirurških procedura koja je indikovana u cilju podmlađivanja ili kod nekog funkcionalnog problema. Cilj ove studije bio je da evaluiramo rezultate ove procedure, procenimo zadovoljstvo pacijentkinja i mogućnost objektivnog merenja rezultata. Metode. Studija je prospektivna i uključuje 50 pacijentkinja kojima je uradjena korekcija gornjih kapaka na Klinici u periodu od dve godine, od strane jednog hirurga. Podaci su prikupljeni iz medicinske dokumentacije, upitnika i objektivnog merenja standardizovanih digitalnih fotografija koje je hirurg napravio pre i dva meseca nakon operacije. Mereni su “tarsal platform show” (TPS), i “brow fat span” (BFS) u tri tačke pre i dva meseca nakon operacije. Upitnik koji je sproveden pre i dva meseca nakon operacije sadržao je pitanja koja se odnose na najčešće simptome pacijentkinja u vezi kapaka (smanjeno vidno polje, pali kapci, osećaj težine u kapcima, zabacivanje glave unazad kako bi se olakšalo gledanje, glavobolja) i upitnik nakon operacije pitanja usmerena na hirurga i pacijentkinju koja procenjuju zadovoljstvo ishodom operacije. Rezultati. Ova studija je uključila 50 pacijentkinja između 33 i 67 godina (49.98±8.6). Uočena je statistički značajna razlika u sve tri tačke za TPS i BFS pre i posle operacije. Nije verifikovana značajna razlika u uspješnosti operacije za tri starosne kategorije za TPS-P1 (chi square= 13.089, df=2, p=0.001) i TPS-P2 (chi square=8.386, df=2, p=0.015) sa najboljim rezultatom postignutom kod starijih pacijentkinja (>55). Postoji izražena pozitivna i statistički značajna korelacija između zadovoljstva pacijentkinja i hirurga (r=0.704, p=0.002), kao i između zadovoljstva pacijentkinja i njihove starosti (r=0.704, p=0.002). Zaključak. Realna očekivanja, adekvatna informisanost pacijenta o operaciji i mogućim komplikacijama, su bitni za zadovoljstvo pacijenta. Objektivna merenja koreliraju sa zadovoljstvom pacijentkinja, a zajedno sa fotografijama pre i posle operacije mogu biti korisno sredstvo u komunikaciji sa pacijentom.

Ključne reči: blefaroplastika, tarsal platform show, brow fat span, gornji kapci, procena hirurgije, zadovoljstvo pacijenta
Introduction

Upper blepharoplasty is one of the most often performed aesthetic operations in general. Usually involves resection of excess skin of eyelid, sometimes segment of orbicular muscle and if needed reduction of retroseptal fat pads. There are different adjuvant procedures which can be added to conventional surgery in order to achieve better, aesthetically more pleasing result.\textsuperscript{1,2} There are no strict guide how to resolve aesthetic problem and every patient has to be analyzed individually and operation planed keeping in mind different surgical options and desired result. On the other hand there are no universal beauty standards and precise evaluation of specific anatomical features, possibilities and patients’ desires are necessary before surgery.

This procedure has high rate of patient satisfaction, but in light of social media pressure expectations can be unrealistic and patient can be unsatisfied with result as with any other aesthetic procedure.\textsuperscript{3} Sometimes surgeons’ satisfaction with outcome does not correlate with patients’ satisfaction therefore, objective measurements could be useful tool in explaining to patient what have we achieved with surgery. Also, objective measurements and standardized scales could allow comparison of different techniques or establishing criteria for exclusion of patient that could not benefit much from surgery.

Key measurements when we analyze upper eyelids are tarsal platform show (TPS) and brow fat span (BFS). Changes in those parameters can simply illustrate what we have achieved with surgery. Besides these features every patient has different orbital bone structure, sometimes prominent eyebrow ridge, sometimes fatty periorbital region prone to edema. All these factors have to be analyzed as they will influence final result and sometimes limit possibilities of surgery. Preexisting asymmetries have to be noticed and discussed with patients as they are sometimes unaware of them. Surgeon is trying to reach balanced appearance that will ultimately please the patient. Usually that’s not obliterated tarsal platform, but also not unnaturally elongated, less fluffy eyelid appearance, nor hollow old looking eye.
Methods

Study protocol

This research was designed as prospective, observational study that included 50 consecutive patients who underwent upper eyelid blepharoplasty by the same surgeon during the period of two years, between October 2016 and October 2018, at the Clinic for Plastic and reconstructive surgery, Clinical center of Vojvodina, Serbia. The exclusion criteria were previous eyelid surgery or trauma, brow lift operation, hiper/hipothyreoidism, eyelid ptosis, neurotoxin treatment in less than 6 month before surgery, patient with facial nerve paresis, male gender (as there was only one male patient in this period).

Data were collected from medical documentation, questionnaire and objective measurement conducted via standardized digital photographs that were taken before surgery and 2 months after surgery during standard follow up procedure. All photographs were taken with patient in upright position, primary gaze, frontal and lateral view, with frontal muscle fully relaxed. All measurements were conducted with photo size calibrated to 11,5 mm cornea diameter. All photographs, computer calibrations and measurements were done by the same person. We measured tarsal platform show (TPS) and brow fat span (BFS) in three points. TPF was defined as distance between upper eyelid margin and palpebral crease and BFS as distance between upper margin of the brow to palpebral crease with the patient gazing in the primary position. TPS and BFS were measured along the vertical meridian at three points (the center of the pupil-P1, lateral corneal limbus-P2, eyelid lateral canthus-P3) before and two months after surgery (Figure 1).
Fig. 1- Illustration of TPS and BFS measurements in three points (P1-center of pupil, P2-lateral corneal limbus, P3-lateral canthus)

Patient survey was conducted using two questionnaires: one before operation considering eyelid asymmetry, problems and symptoms that bother patient and are connected to upper eyelids; and two months after surgery, considering patients’ and surgeons’ satisfaction with overall outcome, improvement in symptoms, perceived difference in eyelid symmetry. Overall result concerning patients’ and surgeons’ satisfaction was graded by Lickerts’ scale were 0 was aesthetically poor/completely unsatisfied and 5 was aesthetically excellent/completely satisfied.

Surgical Technique

All blepharoplasties were done by single surgeon in local anesthesia as one day surgery procedure. A marking pen was used to mark planned skin resection. After that local anesthetic was infiltrated in this area and redundant skin was resected. If there was redundant orbicular muscle narrow strip of muscle was separately resected. Orbital septum was opened in order to expose both restroseptal fat pads (nasal and central), which were evaluated and trimmed with cauterization if needed. Wound edges were closed with continuous nonabsorbable suture (nylon 6.0.) that involved skin-muscle-skin in order to better define supratarsal fold. Muscle was not sutured separately from the skin. Adhesive tapes were applied and patient was advised to cool upper eyelids during first 48 hours with cold pads, to protect eyes with sunglasses, clean the face with running water as usual and to use artificial tear eye drops if needed. The skin sutures were taken off after one week. After that they were advised to use silicone gel with SPF 50 for scar treatment and to avoid exposure to sun. They were scheduled for another control in two months.

Statistical Analyses

Statistical analysis was performed with the software SPSS 20. Kolmogorov-Smirnov test was used to examine whether variables follow normal distribution. Descriptive statistics was shown using mean, standard deviation, minimum and maximum values. Wilcoxon test was used to determine existence of statistically significant differences between the two dependent samples for variables that doesn’t follow normal distribution. Man-Whitney Independent samples t-test was used to determine existence of statistically significant
differences between the two independent groups for variables that doesn’t follow normal distribution. Kruskal-Wallis test is used as non-parametric tool to discover statistically significant differences in more than 3 independent groups. Spearman correlation was used to measure the strength and direction of association between two ranked variables. All tests were performed on 0.05 significance level.

Results

This study involved 50 patients aged between 33 and 67 years (49.98±8.6). Most of the patients belonged to 45-55 age group (46%), 22% had more than 55 and 32% less than 45 years.

According to the results of the normality test for TPS and BFS measured before and two months after the operation all variables display deviation from normal distribution. As consequence, non-parametric test was used in the remaining analysis. Descriptive statistics of all TPS points measured before and after operation is shown in Table 1.

Table 1

Tarsal platform show and brow fat span measurement in three points for every upper eyelid (n=100)

|                  | Mean (mm) | Std. Deviation | Minimum (mm) | Maximum (mm) |
|------------------|-----------|----------------|--------------|--------------|
| TPS-P1 pre op    | 1.080     | 1.3271         | 0.0          | 5.0          |
| TPS-P1 post      | 3.820     | .9307          | 2.0          | 6.0          |
| TPS-P2 pre op    | .800      | 1.0987         | 0.0          | 4.0          |
| TPS-P2 post      | 3.525     | .8858          | 2.0          | 5.0          |
| TPS-P3 pre op    | .89       | 1.222          | 0            | 4            |
| TPS-P3 post      | 3.360     | .8471          | 2.0          | 5.0          |
| BFS-P1 pre op    | 16.775    | 2.7810         | 10.0         | 29.0         |
The results of testing difference in TPS and BFS for all three points between before and after the operation is shown in Table 2. According to the results there is statistically significant difference in all points before and after the operation.

Table 2
Wilcoxon test: Difference in TPS points before and after operation

|            | TPS-P1 | TPS-P2 | TPS-P3 | BFS-P1 | BFS-P2 | BFS-P3 |
|------------|--------|--------|--------|--------|--------|--------|
| TPS-P1     |        |        |        |        |        |        |
| post - pre op | -8.627<sup>b</sup> | -8.646<sup>b</sup> | -8.349<sup>b</sup> | -7.780<sup>c</sup> | -7.986<sup>c</sup> | -8.172<sup>c</sup> |
| Asymp. Sig. | .000   | .000   | .000   | .000   | .000   | .000   |

Furthermore we assessed whether there were significant asymmetry comparing left and right eye before and after the surgery. According to the results of the normality test for all points measured before and after operation by left and right eyes, non-parametric test was
used in the further analysis. Descriptive statistics of all TPS points before and after the operation by left and right eye is shown in Table 3.

|                     | Mean | Std. Deviation |
|---------------------|------|----------------|
|                     |      |                |
| **Measurement of TPS and BFS in three points for left and right eyes (n=50)** |      |                |
| **TPS-P1 pre op**   |      |                |
| D                   | 1.100| 1.3553         |
| L                   | 1.060| 1.3118         |
| **TPS-P2 pre op**   |      |                |
| D                   | .730 | 1.0653         |
| L                   | .870 | 1.1375         |
| **TPS-P3 pre op**   |      |                |
| D                   | .90  | 1.329          |
| L                   | .88  | 1.118          |
| **BFS-P1 pre op**   |      |                |
| D                   | 16.560| 2.7174        |
| L                   | 16.990| 2.8544        |
| **BFS-P2 pre op**   |      |                |
| D                   | 18.14| 2.983          |
| L                   | 18.40| 2.955          |
| **BFS-P3 pre op**   |      |                |
| D                   | 20.40| 3.301          |
| L                   | 20.66| 3.179          |
| **TPS-P1 post**     |      |                |
| D                   | 3.780| .9592          |
| L                   | 3.860| .9094          |
| **TPS-P2 post**     |      |                |
| D                   | 3.490| .9340          |
Results of testing statistical difference in points between left and right eyes before and after operation are given in Tables 4 and 5. According to the results there was no difference between left and right eyes both before and after the operation.

**Table 4**

|                  | TPS-P1 | TPS-P2 | TPS-P3 | BFS-P1 | BFS-P2 | BFS-P3 |
|------------------|--------|--------|--------|--------|--------|--------|
| Mann-Whitney U   | 1227.5 | 1176.5 | 1212.5 | 1148.5 | 1174.5 | 1176   |
| Asymp.Sig. (2-tailed) | 0.867  | 0.565  | 0.77   | 0.48   | 0.6    | 0.601  |
### Table 5

**Difference between left and right upper eyelid after operation**

|          | TPS-P1 post | TPS-P2 post | TPS-P3 post | BFS-P1 post | BFS-P2 post | BFS-P3 post |
|----------|-------------|-------------|-------------|-------------|-------------|-------------|
| Mann-Whitney U | 1172        | 1183        | 1174        | 1048.5      | 1110.5      | 1182.5      |
| Asymp.Sig. | 0.571       | 0.631       | 0.583       | 0.156       | 0.331       | 0.638       |

(2-tailed)

Besides objective measurements presented in Table 4 and 5 patients were also asked about their perception of upper eyelid asymmetry before and after surgery. Their answers are presented in Figure 2 and 3.

![Diagram](image)

**Fig. 2- Patients’ perception of upper eyelid asymmetry before surgery**
Fig. 3.- Patients’ perception of achieved improvement in eyelid asymmetry after surgery

Mean values of difference before and after operation in all points in different age groups are listed in Table 6.

| Age  | TPS-P1(mm) | TPS-P2(mm) | TPS-P3(mm) | BFS-P1(mm) | BFS-P2(mm) | BFS-P3(mm) |
|------|------------|------------|------------|------------|------------|------------|
| 33-45| 2.5000     | 2.5313     | 2.3438     | -1.8281    | -2.2188    | -2.5625    |
| 45-55| 2.5543     | 2.5543     | 2.4022     | -1.9674    | -2.4130    | -2.5543    |
| > 55 | 3.4773     | 3.3636     | 2.7955     | -1.3864    | -1.4545    | -2.5000    |

There is statistically significant difference in operation success between 3 age categories in TPS-P1 (chi square= 13.089, df=2, p=0.001) and TPS-P2 (chi square= 8.386, df=2, p=0.015).

Major complains considering upper eyelids before and after surgery are presented in Figure 4 and 5.
Fig. 4- Preoperative complains in patient seeking upper blepharoplasty

Fig. 5- Postoperative changes in symptoms that patient had before upper blepharoplasty

Results of survey presenting patients and surgeons satisfaction with overall result of blepharoplasty are presented in Figure 6. There are no unsatisfied patients or surgeon.
There is strong positive and statistically significant correlation between patients’ and surgeons’ satisfaction ($r= 0.704, p=0.002$), and also between patients’ satisfaction and age of the patient ($r= 0.704, p=0.002$).

We have calculated the absolute differences between pre and post measurement in TPS in all points. Then we calculated the mean value of these differences for each patient. With this quantity we wanted to measure the objective achievement and to compare it with subjective satisfaction of the patients.

There is positive and statistically significant correlation between patients’ subjective satisfaction and objective operation results ($r= 0.498, p=0.000$). Similarly, there is positive and statistically significant correlation between surgeons subjective satisfaction and objective operation results ($r= 0.600, p=0.000$).

**Discussion**

As every face ages differently and some periorbital anatomical features can differ from patient to patient there is no universal surgical solution for eyelid correction. Every plastic surgeon during professional carrier changes technique in many ways influenced by new anatomical studies or new appealing techniques in order to find something that works well in his hands. After many publications there is still lack of consensus on the way we treat muscle in blepharoplasty; should we resect the orbicular muscle or not, if so how
much muscle should be resected, is it necessary to suture the muscle, how should we suture the skin etc. \(^4,5\)

We don’t believe in wide resection of orbicular muscle and radical excision of fat pads in every patient as preservation of muscle and some amount of fat pads should give fullness to eyelid end youthful appearance. „Hollow eyes“ are one of the stigmas of blepharoplasty and sigh of radical fat resection. These days with better understanding of aging process and after detailed analyzes of volume changes in aging face we are more oriented to volume preservation and restoration, than resection and forced tightening as it was done previously. If there is obvious redundant muscle, we resect just a small strip of muscle in order to avoid muscle fold formation. Similar practice is found in many other studies in literature. \(^6,7,8,9,10\) If necessary, as part of primary or secondary blepharoplasty, restoring fullness of upper eyelid can be accomplished by different adjuvant techniques such as fat grafting, medial fat pad transposition, imbrication of orbicular muscle, hyaluronic acid injections etc. We have to keep in mind that incidence of complications (lagophthalmos, sluggish eyelid closer, dry eye syndrome) as presented by Kiang and authors is expected to be lower in muscle sparing techniques. \(^11\) Of course, not all studies agree with this finding. Before accusing muscle resection for higher rate of complications we have to classify patients in same risk level groups considering nicotine consumption, exposition to UV rays, diabetes and other factors that are expected to influence rate of complications besides surgical technique. Saalabian AA and authors demonstrated on a group of 387 patients that extent of tissue resection had no statistically significant effect on patients satisfaction with final result of upper eyelid surgery. \(^12\)

On the other hand, some authors are in favor of wide muscle resection as they consider skin and muscle as a single unit. According to them redundancy in skin reflects redundancy in muscle also. \(^13,14,15\)

When arguing about aesthetic achievements that are related to muscle resection we have to keep in mind influence of muscle resection to brow position as all these components are closely connected. Widgerow AD and authors advocate that the resection of orbicular muscle is supposed to allow the frontal muscle advantage over antagonistic orbicular muscle and thus produce elevation of eyebrow. \(^16\) This hypothesis gives new prospective to importance of muscle resection in rejuvenations of periorbital region.
However authors didn’t give us any objective measurements of pre and postoperative results so the real value of this for sure interesting point can’t be assessed.

The upper eyelid crease is formed by union of skin dermal component, deep aponeurosis of the orbicularis oculi muscle, the aponeurosis of the palpebral levator muscle, and the septum at the level of the upper tarsus. That’s why we choose to close the wound by continuous suture that involves skin and fascial layer of orbicularis oculi muscle together in order to promote scar formation that would better define the crease. Even when we do not resect the muscle we make the same suture that attaches skin edges to underlining muscle. Different authors use different techniques, but in my hands this option gives good results as this study confirmed.

Measuring of TPS and BFS are usually used to compare two different techniques or to evaluate outcome of surgery. Figuieredo and authors used it to evaluate brassière sutures as adjuvant procedure during upper eyelid surgery.\textsuperscript{17}

In this study all patients had statistically significant improvement after surgery and this improvement was verified by change in TPS and BFS (Table 1 and 2). This improvement was greatest in older population (Table 6). Aesthetically significant difference in operation success was measured for TPS-P1 (chi square= 13.089, df= 2, p=0.001) and TPS-P2 (chi square= 8.386, df=2, p=0.015) for older than 55 (Table 6). We expected to get such a result as in older population skin excess is more pronounced so change in appearance and benefit from surgery is greatest. Those patients were also most satisfied with result. Strong positive correlation between patients’ satisfaction and age of the patient (r= 0.704, p=0.002) was noticed after questionnaire analyzes. Besides objective measurement and more evident change after surgery in older population these patients are traditionally more objective and realistic in expectations. They approach surgery with „real“ problem, have many complains that are pronounced so they feel significant relief after correction of eyelids. For them skin excess is not just aesthetical problem, but also often impairs their everyday functioning and diminishes quality of life.

We also wanted to evaluate if we managed to correct asymmetries in eyelids with surgery. However results of testing statistical difference in all points between left and right eyes before the operation didn’t show any significant difference so we couldn’t expect to be able to measure improvement later on (Table 4 and 5). This correlate with results of
questionnaire where 58% of patient didn’t perceive eyelid asymmetry and 24% noticed insignificant asymmetry before the operation (Figure 2). Most of those who noticed asymmetry had from moderate to significant improvement after the surgery (Figure 3).

Considering preoperative complaints, most often patient complained about sensation of fallen eyelids, increased eyelid weight and narrowing of visual field (Figure 4). Those symptoms were marked as “significantly improved” or “absent” after surgery (Figure 5). In our study, as in most studies in literature, upper blepharoplasty had high rate of patient satisfaction. This satisfaction also correlates with surgeons’ satisfaction of final outcome (Figure 6).

As there is positive and statistically significant correlation between patients’ subjective satisfaction and objective operation results (r= 0.498, p=0.000) our measurement proved to be reliable and simple tool for estimation of final result. One more interesting role of objective measurements in eyelid surgery is implementation of measurement criteria that could allow health insurance companies to limit falsification of medical necessity for upper blepharoplasty which if often seen in practice. Thus it would be easy to separate patients that has clearly just aesthetic problem from those that are entitled to health insurance coverage as they have some functional disability or important visual field narrowing caused by change in upper eyelids.

**Conclusion**

Objective measurements (TPF and BFS), as before/after photos, can be a useful mean in approaching the patient after eyelid surgery, when we argue about achieved results. We are not seeking for standardizes single solution for periorbital rejuvenation and we do not try to reach some imaginary goal, but rather look on this as a constant journey of improving ourselves as a surgeons in order to be able to offer more and to have satisfied patient in the end.

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