


# Improvements in the perception of facial attractiveness following surgical aesthetic treatment; study based on online before and after photos

Mateusz Przylipiak MSc<sup>1</sup> | Jerzy Przylipiak MD<sup>1</sup> | Robert Terlikowski MD<sup>2</sup> | Emilia Lubowicka MSc<sup>3</sup> | Lech Chrostek MD, PhD<sup>4</sup> | Andrzej Przylipiak MD, PhD<sup>3</sup> 

<sup>1</sup>Medical Practice, Bialystok, Poland

<sup>2</sup>Department of Rehabilitation, Medical University of Bialystok, Bialystok, Poland

<sup>3</sup>Department of Aesthetic Medicine, Medical University of Bialystok, Bialystok, Poland

<sup>4</sup>Department of Biochemical Diagnostics, Medical University of Bialystok, Bialystok, Poland

## Correspondence

Andrzej Przylipiak, Department of Aesthetic Medicine, Medical University of Bialystok, Bialystok, Poland.

Email: andrzej.przylipiak@umb.edu.pl

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## Summary

**Background:** Aesthetic surgery procedures such as lip augmentation, eyelid correction, face-lifting, or Botox treatment for lines and wrinkles are an important part of cosmetic surgery.

**Objectives:** The aim of the study was to estimate improvement in appearance following plastic surgery using modern collective intelligence methods of validation.

**Methods:** A total of 108 photographs showing 54 patients prior to and following cosmetic surgery were downloaded from Internet web presentations of several unnamed plastic surgeons. The same number of photographs depicted each of the four investigated areas of treatment—26 lip enhancement, 26 blepharoplasty, 26 face-lift, 26 botulinum toxin injection. Attractiveness of depicted individuals was assessed by 167 observers. Each photograph was judged separately.

**Results:** Blepharoplasty produced the most remarkable improvement in attractiveness amounting to 32.79 (SD ± 26.35). Improvement following Botox treatment stood at 30.29 (SD ± 24.55), whereas face-lifting produces improvement of 28.70 (SD ± 22.76). Improvement following lip augmentation was estimated at 12.70 (SD ± 29.8). Highest Spearman's rank correlation coefficient was obtained for face-lift and Botox (0.24 and 0.22, respectively).

**Conclusions:** Blepharoplasty, face-lifting, and Botox deliver a significant improvement in facial attractiveness. Additionally, face-lifting and Botox are distinguished by a high level of reproducibility. Our results indicate that lip augmentation is a treatment with a statistically significant, but less marked improvement in attractiveness.

## KEYWORDS

attractiveness, blepharoplastic, Botox, face, face-lift, lips augmentation

## 1 | INTRODUCTION

The aim of aesthetic treatment was to enhance the attractiveness of an individual's face or body. Assessment of the achieved outcome is predominantly a subjective judgment of a physician and a patient and is based on mutual agreement. The results obtained by plastic surgeons are subject

to the evaluation of patients and people surrounding them. In general, plastic surgeons receive positive feedback from their patients following the treatment. Despite its importance, there are rather few instruments allowing for the objective measurement of the achieved outcomes.<sup>1</sup>

Studies investigating the effects of aesthetic surgery published to date have been based on satisfaction questionnaires completed

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by patients.<sup>2,3</sup> Nevertheless, there are very few statistical evaluation tools enabling one to make research findings regarding the success or failure of aesthetic surgery objective.<sup>4</sup>

Nowadays, high accessibility of information on the Internet enables interested individuals to search for “before” and “after” pictorial results of plastic surgery. Aesthetic surgeons demonstrate on their websites the outcomes of procedures performed by them, which the authors of the present study assume are the most successful outcomes intended to entice potential clients. The aim of the study was to evaluate the “before” and “after” results publicized by several unnamed plastic surgeons. We wanted to discover objective opinions of unbiased and untrained respondents about a postsurgery improvement in the attractiveness of patients’ appearance. Result reproducibility was of particular interest to us. The same photographs as those available to potential patients were utilized in the study.

We considered surgical procedures which belong to the regular repertoire of plastic surgeons such as blepharoplasty, face-lifting, lip enhancement, and Botox treatment for wrinkles.

Our aim was to classify treatments which deliver a noticeable improvement and to find areas in aesthetic medicine with lower reproducibility, which either need to be addressed by surgeons more adequately or need an innovative algorithm of a course of treatment.

We intended to obtain results by using methods of collective intelligence. Collective intelligence judgment is an acknowledged instrument which enables one to determine prevailing views on several areas of interest.<sup>5</sup>

## 2 | METHODS

A total of 108 photographs depicting 54 “before” and “after” patients were downloaded from Internet web presentations of several unnamed plastic surgeons or aesthetic dermatologists. Similarly to regular Internet users, we did not know whether the pictures were unedited or improved by individuals presenting them. The same number of photographs depicted each of the four investigated areas of treatment—26 lip enhancement, 26 blepharoplasty, 26 face-lift, and 26 botulinum toxin injection. The attractiveness of the presented patients was assessed by 167 observers (88 female and 79 male). Each photograph was judged separately although the “before” and “after” pairs of photographs were presented simultaneously. The rating method previously described by Axellson et al, which proved appropriate for measuring facial attractiveness, was used in the study.<sup>6</sup> The photographs were presented to untrained observers for a fixed period of 7 seconds. The mean age of subjects was 28 years (range 20–53). The respondents rated each photograph by drawing a line on a pointless scale representing 0–100 arbitrary units (AU). The respondents rated facial attractiveness using 0 AU as very unattractive and 100 AU as very attractive. The IBM SPSS 20.0 Statistics Genericom (IBM Corporation, Armonk, NY) program was applied.  $P < 0.05$  and  $P > 0.01$  were acknowledged as statistically significant. The Local Ethics Committee

approved of the ethical and legal admissibility of the study with the number R-I-002/507/2014.

## 3 | RESULTS

Mean value of improvement after all treatments combined was 26.11 (SD  $\pm$  25.86) expressed in AU (Table 2).

A procedure which most dramatically improves an individual's appearance is eyelid correction surgery, which was confirmed by the results of our study. The mean value of improvement achieved as a result of blepharoplasty was statistically significant and amounted to 32.79 (SD  $\pm$  26.35) AU. This is the best result revealed in the current study. Spearman's rank correlation coefficient (SC) was 0.08, which means that result reproducibility is fairly low (Table 1). The second place was taken by treatment with botulinum toxin with 30.25 (SD  $\pm$  24.55) AU. The result was statistically significant and demonstrated very high result reproducibility amounting to 0.22 SC. Face-lifting also produced a remarkable, statistically significant improvement of 28.70 (SD  $\pm$  22.76) AU and took third place. The best value of SC was obtained for a face-lift with 0.24 SC. The worst “before” and “after” improvement was achieved by lip augmentation with 12.70 (SD  $\pm$  29.8) AU, with 0.16 SC. This value, although very low, was statistically significant. The highest values of SC are for face-lift and Botox procedures, which indicate the best reproducibility for these treatments.

Dispersion diagrams (Figure 1A–D) showing the dependence between the rating prior to and that following the treatment are to be interpreted as follows: if we draw a line between the lower left-hand angle and the upper right-hand angle, every mark over the line are patients who showed an improvement in appearance after the procedure, every mark below the line are patients whose appearance deteriorated after the treatment, on the line are patients in whose appearance no change was observed by study participants.

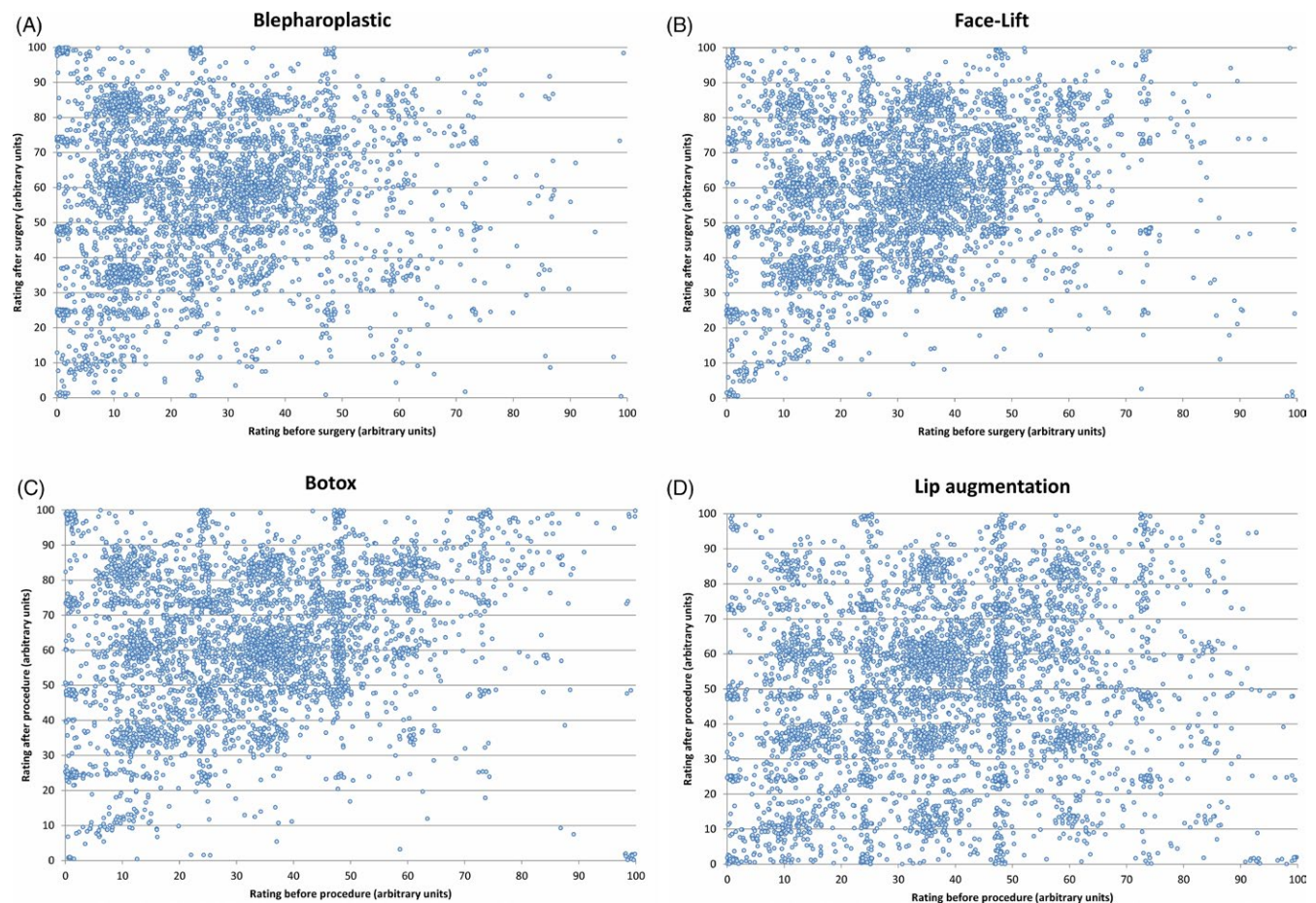
The dispersion diagram for eyelid correction shows a clear concentration of results in the upper left-hand section of Figure 1A, which documents a substantial improvement in the patient's appearance. Similarly, positive results condensed in the upper left-hand section of Figure 1B indicate an improvement in the patient's appearance following a Botox injection. Figure 1C represents the distribution of results after a face-lift, with distinct aggregation in the upper left-hand section of the diagram. In Figure 1D, the results of lip augmentation are also concentrated in the upper left-hand section,

**TABLE 1** Spearman's rank correlation coefficient between the ratings before procedure vs after procedure

Type of procedure	<i>r</i>	<i>P</i>
Blepharoplasty	0.08	0.000
Face-lift	0.24	0.000
Botox	0.22	0.000
Lip augmentation	0.16	0.000

**TABLE 2** Mean improvement before vs after several treatments: blepharoplasty, face-lift, Botox, and lip augmentation

Type of procedure	Difference in rating of attractiveness						
	Mean	Standard deviation	Minimum	Quartile			Maximum
				Lower	Median	Upper	
Blepharoplasty	32.79	26.35	-100.00	17.39	30.43	50.00	100.00
Face-lift	28.70	22.76	-100.00	15.22	26.09	43.48	100.00
Botox	30.25	24.55	-100.00	17.39	26.09	47.83	100.00
Lip augmentation	12.70	29.80	-100.00	-2.17	15.22	28.26	100.00

**FIGURE 1** Dispersion diagrams showing dependence between rating before and rating after the treatment. Improvement of patients look was observed by 167 untrained raters, who appraised four types of procedures: blepharoplasty, face-lift, Botox, and lip augmentation

although a number of them are placed in the lower right-hand section of the diagram. This indicates less homogeneous results, which are not as good as those produced by other procedures.

## 4 | DISCUSSION

Treating healthy individuals, which means applying invasive treatment without any medical indications, is a specific feature of the work of aesthetic surgeons. The job requires motivation, manual dexterity, and expertise in obtaining good aesthetic results. The aim

of the study was to examine treatment outcomes in relation to improvements achieved and in relation to result reproducibility.

The most marked improvement was achieved thanks to blepharoplasty. This highlights the importance of the periocular region in facial aesthetics. Unfortunately, treatment result reproducibility was the lowest in the study due to the lowest Spearman's coefficient rank correlation. This signifies result unpredictability and indicates that a favorable outcome depends on the surgeon's skill and expertise. The outcomes can be very diverse—ranging from excellent to substandard. Our study revealed that an improvement in appearance achieved after lip augmentation was the least satisfactory among all

the procedures examined in the study. Spearman's coefficient was average, which indicates average result reproducibility. The surgeon must apply all his/her expertise in order to achieve a satisfactory outcome. The respondents in our study frequently perceived the results of the procedure as disappointing. Face-lifting and Botox injections produce a remarkable improvement in facial attractiveness and offer high result reproducibility since the dispersion of effects was not substantial. This means that face-lifting and Botox treatment are the most standardized procedures.

The present study demonstrates convincingly that the patient's appearance improves statistically significantly after all the procedures examined in this study. Best results were achieved following blepharoplasty as well as after botulinum toxin treatment. Similarly, face-lifting produced improvements in appearance perceived as desirable by the respondents. The results show that all the investigated procedures bring noticeable improvements in the patient's appearance. It is significant that improvements are easily detectable by unbiased, untrained individuals. The least satisfactory results were achieved in the case of lip augmentation. It is difficult to say whether the respondents' expectations were too high or if it is connected with difficulty in performing the procedure flawlessly. It is most probable that lip augmentation is a treatment laden with high, subjective expectations, and a highly subjective evaluation. One needs to remember that the canon of beauty in this area is inhomogeneous and that criticism of observers in this regard can be severe. In general, lip augmentation is one of the most difficult areas of aesthetic medicine since the final result depends on the "starting point," which varies considerably among individuals. Additionally, the treatment should be performed fairly conservatively in order for a satisfactory result to be achieved. However, the choice of procedure depends on patient expectations expressed prior to the treatment. Those expectations are sometimes inconsistent with the aesthetic standards of lip augmentation, and therefore, good patient education in this regard is necessary. It is not only plastic surgery or aesthetic dermatology procedures that increase facial attractiveness but also orthognathic maxillofacial surgery performed where medically indicated that improves facial attractiveness.<sup>7</sup> Orthodontic treatment also results in enhanced facial appearance.<sup>8,9</sup> All these treatments require methods of exact evaluation utilizing questionnaires or goniometric measurements.<sup>9-11</sup>

Other authors have performed research similar to ours<sup>4</sup> and found a statistically insignificant increase in facial attractiveness and marked rejuvenation of approximately 3.1 years following a face-lift, neck lift, or blepharoplasty.

The authors of the study are aware of the fact that the photographs forming the basis of the evaluation were preselected by surgeons who presumably presented the best of their results; however, the aim of the study was to find treatments which deliver dubious results although they are presented by surgeons as exemplary. As we can see, even such excellent, select cases represent a wide spectrum of quality. The study indicates that the most appreciated areas of aesthetic surgeons' activity are

blepharoplasty, Botox treatment, and face-lifting. The effects of blepharoplasty are usually spectacular, and therefore, the authors expected the excellent outcomes of the procedure to be confirmed in the study. The area around the eye displays signs of aging at a very young age, and therefore, a great number of people are interested in this treatment. Botox treatment also produces outstanding results. Our study revealed very good result reproducibility of Botox treatment. It is clear why Botox is so popular—it produces a satisfactory and reproducible result at a low cost and with no recovery time. Face-lifting took a respectable, third place among surgical procedures aimed at improving appearance, with an excellent first place in regard to reproducibility. However, it is a very expensive treatment which requires a long recovery.

Our work is the first study to compare several aesthetic surgery procedures in regard to a postsurgery improvement in appearance and result reproducibility.

## 5 | CONCLUSIONS

Blepharoplasty, face-lifting, and Botox treatment deliver a significant improvement in facial attractiveness. Face-lifting and Botox are additionally distinguished by a high level of reproducibility. Our results indicate that lip augmentation is a treatment with a significant, but less marked improvement in attractiveness.

## ORCID

Andrzej Przylipek  <http://orcid.org/0000-0001-5554-4628>

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