

Preoperative computer imaging before augmentation rhinoplasty

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Abstract. – OBJECTIVE: In the present study, we investigated the efficacy of morphing technology *via* Adobe PhotoShop program and its “liquefy” effect in patients planned to undergo augmentation rhinoplasty.

PATIENTS AND METHODS: The retrospective data for 100 consecutive augmentation rhinoplasty cases (64 females and 36 males) were enrolled in our study. Preoperative computer imaging (PCI) steps, a stepwise systematic guide for image editing, including (1) augmenting the dorsum, (2) lengthening the nose, (3) adjusting the tip projection, (4) perfection of the nasal dorsum and (5) exaggerating the tip projection and/or the dorsal augmentation were applied to the patients. After performing the PCI before augmentation rhinoplasty, the patients were allowed to see the options for the final appearance of their noses. Therefore, PCI helped them to decide on their operations.

RESULTS: After applying CS-PCI before augmentation rhinoplasty, 71 patients (71%) accepted Step-4, and 19 (19%) accepted Step-3. Furthermore, six patients (6%) requested additional changes during their operational planning. In 95% of the cases, the authors achieved the results agreed upon based on the preoperative simulation.

CONCLUSIONS: By PCI involving five steps for augmentation rhinoplasty, the patients were allowed to see the options for the final appearance of their noses. Therefore, PCI helped them to decide on their operations. With the help of morphing technology (2D), it is possible to increase interpersonal communication effectively.

Key Words:

Preoperative Computer Imaging (PCI), Augmentation rhinoplasty, Final appearance, Interpersonal communication.

Introduction

Morphing technology can be a valuable tool for helping patients understand the potential outcomes of rhinoplasty surgery and visualize the changes that can be made to the nose. However, patients must have realistic expectations about the procedure and understand that the results may vary from the images produced by the morphing programs¹.

Rhinoplasty is a surgical procedure that involves reshaping the bones and cartilage of the nose to improve its appearance besides function. The procedure results can vary depending on the patient's anatomy, the surgeon's education and skills, and the specific techniques used during the surgery.

Effective pre-op consultations for rhinoplasty need open lines of communication between the physician and the patient. These discussions have benefited from computer imaging over the last three decades¹⁻⁷. Recent technology advancements and the limitations of a 2D medium (such as the inability to address face depth and nasal shape, leading to data loss⁸⁻¹⁰) have hastened the switch from 2D to 3D models in a computer simulation. The accessibility of 3D printing has also allowed the creation of patient-specific preoperative models for use in planning, rehearsal, and patient consultation¹¹⁻¹³.

Cosmetic surgery is conducted to improve patients' psychological and social quality of life (QoL) and aesthetic enjoyment¹⁴. Therefore, it is in the surgeon's best interest to comprehend the patient's expectations, discuss the advantages and disadvantages of the procedure¹⁵, and use the appropriate patient-reported outcome measure (PROM)¹⁶. Xiao et al¹⁴ reported PROM's

objective, questions, and interpretation to assist physicians and researchers in selecting the most appropriate PROM for measuring QoL following functional or cosmetic rhinoplasty¹⁴.

In the present study, we investigated the efficacy of morphing technology *via* the Adobe PhotoShop program and its “liquify” effect in patients planned to undergo augmentation rhinoplasty.

Patients and Methods

This study is conducted in the Otolaryngology Department of Eskişehir Osmangazi University according to the rules outlined in the Declaration of Helsinki. Ethics committee approval was taken from Bilecik Şeyh Edebali University, Non-Invasive Clinical Research Ethics Committee (Date: 23.02.2023, Number: 5). There is no need to take informed consent as because the data were evaluated retrospectively.

Subjects

The retrospective data for 100 consecutive augmentation rhinoplasty cases applied to the Otolaryngology Department of Eskişehir Osmangazi University were enrolled in our study. There were 64 females (64%) and 36 males (36%). The mean ages of the patients were 25.76 ± 6.06 (Ranged from 18 to 44).

Exclusion Criteria

The study did not include rhinoplasty patients who required procedures other than augmentation, sinonasal polyps, sinonasal tumors, and patients with diagnosed psychiatric diseases and neurological disorders.

Preoperative Computer Imaging (PCI)

This stepwise systematic guide, designated as PCI, was developed to improve the planning for the reduction of rhinoplasty and to allow the patients to observe the steps of the procedure. A stepwise systematic guide for image editing (performed by C.C. Cingi) was developed for Adobe PhotoShop 2023 (licensed to Anadolu University) (Adobe, San Jose, CA, USA) using only the “liquify” effect.

The PCI involves the following steps for augmentation rhinoplasty:

A stepwise systematic guide for image editing was developed for Adobe PhotoShop using only the “liquify” effect (Figures 1-2).

1. Augmenting the dorsum
2. Lengthening the nose
3. Adjusting the tip projection
4. Perfection of the nasal dorsum
5. Exaggerating the tip projection and/or the dorsal augmentation

Five steps were performed without discussing the procedure with the patient and looking directly at the monitor to limit the preparation period.

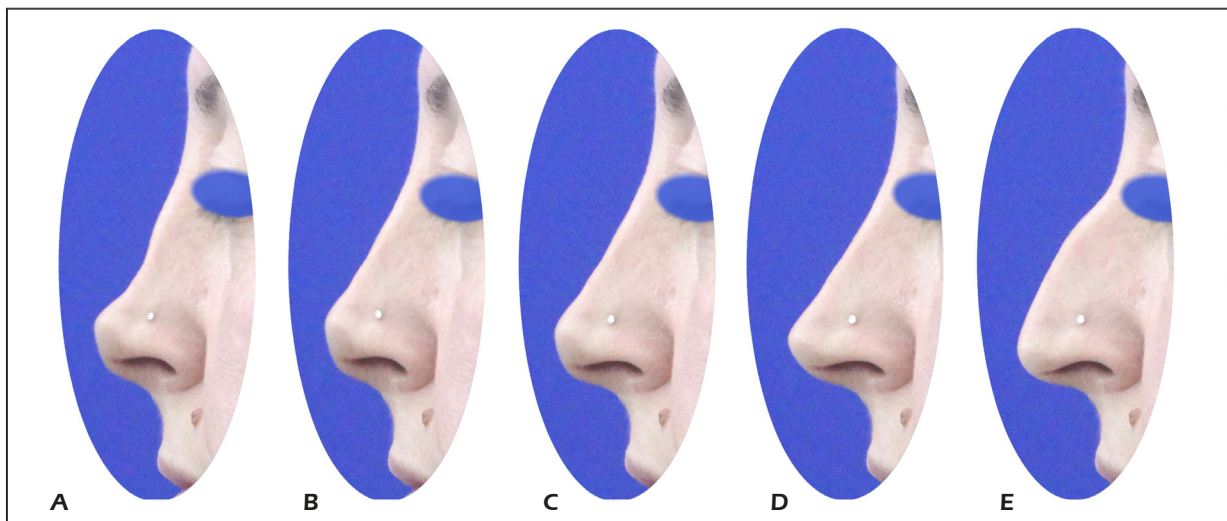


Figure 1. Preoperative computer imaging steps for augmentation rhinoplasty (Female patient). **A**, Augmenting the dorsum. **B**, Lengthening the nose. **C**, Adjusting the tip projection. **D**, Perfection of the nasal dorsum. **E**, Exaggerating the tip projection and/or the dorsal augmentation.

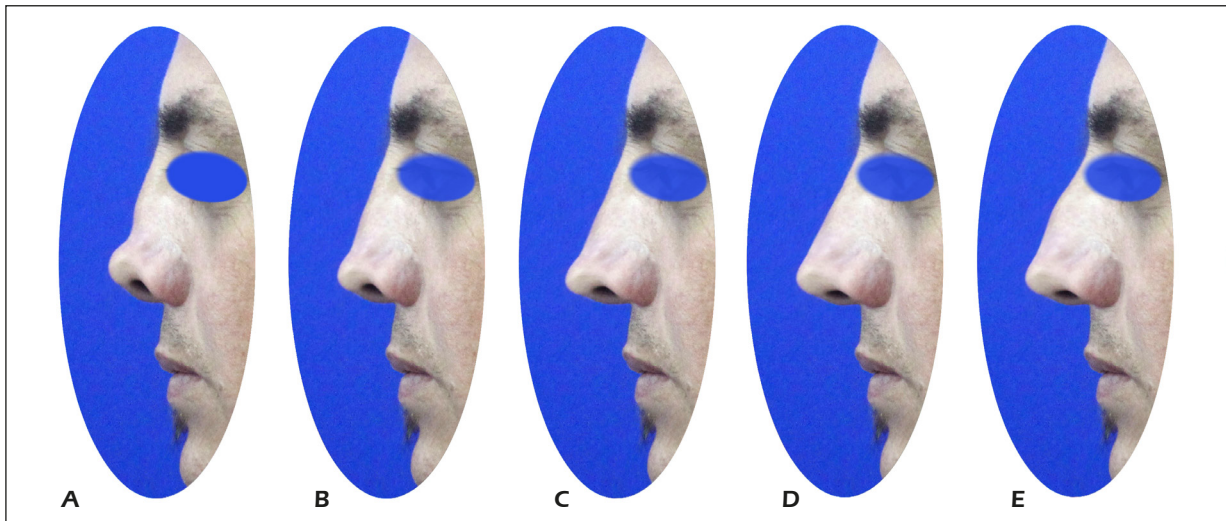


Figure 2. Preoperative computer imaging steps for augmentation rhinoplasty (Male patient). **A**, Augmenting the dorsum. **B**, Lengthening the nose. **C**, Adjusting the tip projection. **D**, Perfection of the nasal dorsum. **E**, Exaggerating the tip projection and/or the dorsal augmentation.

- Augmenting the dorsum: The saddle at the nose's bridge is patients' most common source of worry. Hence, the initial step is to demonstrate the patient's outcome of a dorsal augmentation alone.
- Lengthening the nose: When the dorsum is increased, it typically makes the nose seem too small in comparison. The nasolabial angle and nasal length should be modified in the second stage.
- Modifying the tip projection: The projection of the tip is the following variable to weak. Depending on the nose's pathology, the tip projection may need to be adjusted upwards or downwards.
- Perfection of the nasal dorsum: At this stage, the dorsum is fine-tuned after having been straightened initially. After adjusting the tip projection, the height of the radix, the dorsal line, or the curvature is modified.
- Having an overly elongated tip or enlarged dorsum.

Ultimately, this procedure guides the patient toward the fourth or third phase. Patients often choose out of having the tip projected, and the dorsal hump exaggerated after seeing this outcome. The conversation is completed at this time.

Methods

After performing the PCI before augmentation rhinoplasty, the patients were allowed to see the

options for the final appearance of their noses. Therefore, PCI helped them to decide on their operations.

Statistical Analysis

The data collected in this study were analyzed using the SPSS for Windows 16.0 software (SPSS Inc., Chicago, IL, USA). Descriptive statistics (Mean, standard deviation, minimum, maximum, and defining the quartiles) were applied. A p -value < 0.05 was considered statistically significant.

Results

One hundred consecutive augmentation rhinoplasty cases were enrolled in our study. They were 64 (64%) females and 36 (36%) males. After performing the steps for preoperative computer imaging (CS-PCI), the patients were allowed to see the options for the final appearance of their noses.

After applying CS-PCI before augmentation rhinoplasty, 71 patients (71%) accepted Step-4 (Step-4 perfection of the nasal dorsum: at this stage, the dorsum is fine-tuned after having been straightened initially. After adjusting the tip projection, the height of the radix, the dorsal line, or the curvature is modified), and 19 (19%) accepted Step-3 (Step-3 modifying the tip projection: the projection of the tip is the following variable to

weak. Depending on the nose's pathology, the tip projection may need to be adjusted upwards or downwards).

Furthermore, six patients (6%) requested additional changes during their operational planning.

In 95% of the cases, the authors achieved the results agreed upon based on the preoperative simulation.

Discussion

Clearly defining the surgical objectives by the patient and the surgeon is crucial to a successful operation. Most of the conversation between the surgeon and patient focuses on moderating expectations. As long as surgeons themselves perform the morphing, modern technology makes it simple to predict the outcome of a rhinoplasty treatment¹⁷.

In the current study, 75% of patients accepted Step 4 following PCI application prior to augmentation rhinoplasty, while 19% accepted Step 3. Additionally, six patients (8%) sought additional adjustments throughout the planning phase of their procedure. In 95% of cases, the authors achieved the preoperative simulation-based agreed-upon outcomes.

In Lekakis et al¹ study, 172 consecutive patients requesting rhinoplasty were included. After completing a questionnaire in response to a 2D simulation, patients experienced 3D morphing. 61% of respondents were satisfied with 2D morphing, according to their findings. Ninety-five percent of the same sample said the 3D simulation was superior to 2D. In addition, 84% of patients wanting revision rhinoplasty admitted that 3D computer simulation assisted them in comprehending the goals of surgery, compared to 61% of patients in the primary group. In addition, a more significant proportion of patients initially dissatisfied with their 2D simulation (67%) were reassured to undertake surgery following the 3D simulation compared to those who were first delighted with their 2D simulation (48%). A more significant proportion of women (63%) than men (42%) appeared to be reassured by 3D imagery. However, the two surgeons found 3D simulations beneficial for 66% and 74% of all patients.

Morphing has been used in plastic surgery to show the patient a potential outcome of an operation, such as what the face might look like after rhinoplasty. The two most crucial factors for cosmetic surgery are the patient's pre-surgery

awareness and motivation to undergo the procedure. Awareness is achieved during the preliminary visits, and it is the surgeon's responsibility to inform the patient about the surgery's risks, benefits, and probable consequences, but most importantly, the realistic outcomes that may be expected so that the patient has reasonable expectations. Utilizing morphing at the initial consultation can harm the patient's motivation for surgery and awareness of the potential outcome¹⁸.

In Lekakis et al¹⁹ study, 334 consecutive patients seeking rhinoplasty received "two-dimensional computer imaging" and responded to "a 14-question survey regarding their opinion on morphing". Patients were classified as surgery candidates based on the presence or absence of "patient/physician consensus" regarding the anticipated outcomes during simulation. Accepted candidates were scheduled for rhinoplasty and classified into three groups: those who underwent surgery, those who postponed their operation (static), and those who opted to forego the procedure. Their survey results were compared across various patient categories. Forty-four patients (13.2%) were denied rhinoplasty because consensus could not be reached during morphing. Among the 290 patients who were accepted for rhinoplasty, 178 (53.3%) underwent the procedure, 74 (22.1%) postponed it, and 38 (11.4%) canceled it.

Kosowski et al¹⁶ noted that no measures are valid, reliable, and responsive for measuring "patient-reported outcomes" following surgery and nonsurgical face rejuvenation. There is a need for "a patient-reported outcome" measure that represents facial cosmetic surgery patients' perspectives and satisfies established health measuring standards.

Interactions within the medical system are complex, occurring where positive and negative impacts coexist and constantly swap places. Communication in medicine has many forms and may be seen in many settings. However, that is only as important as that between patient and doctor, providing much of the data needed to diagnose. Combining spoken and written language with nonverbal cues like gestures, mimicry, posture, movement, and appearance, as well as para-verbal cues like body language, is how we generate communication between people by voice attributes accompanying the word, such as "intonation, the inflection of voice, tone, rhythm, and verbal flow"²⁰.

While talking with a patient, it is essential to consider the patient's current state, degree of knowledge, and potential for improvement. Gaining the communication skills essential to forming genuine specialized therapeutic alliances requires not only in-depth medical knowledge to diagnose and treat disease but also the ability to gather information from the patient, the empathy to respond to the patient's feelings and concerns, and the persistence to establish and maintain a therapeutic relationship as a concrete offer of information and medical education²¹.

Interpersonal communication is essential in many aspects of life, including personal relationships, professional settings, and social interactions. It is a crucial skill that can help build trust, resolve conflicts, and foster meaningful connections. Patients must discuss their goals and expectations with their surgeons during consultation. The surgeon can help the patient understand the potential benefits and limitations of the procedure and help the patient set realistic outcome expectations²⁰.

In addition to discussing these issues with the surgeon, it is also vital for patients to follow any pre-surgery instructions provided by the surgeon or medical staff. This may include avoiding certain medications or supplements, quitting smoking, and preparing for recovery. By following these instructions, patients can help to ensure a successful outcome and a smooth recovery from the procedure.

Conclusions

By PCI involving five steps for augmentation rhinoplasty²², the patients were allowed to see the options for the final appearance of their noses. Therefore, PCI helped them to decide on their operations. With the help of morphing technology (2D), it is possible to increase interpersonal communication effectively.

Conflict of Interest

The Authors declare that they have no conflict of interests.

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No funding was obtained from any companies or organizations for this paper.

Ethics Approval

Ethics committee approval was taken from Bilecik Şeyh Edebali University, Non-Invasive Clinical Research Ethics Committee (Date: 23.02.2023, Number: 5).

Informed Consent

There was no need to take informed consent because the data were evaluated retrospectively.

Authors' Contribution

Can Cemal Cingi: Planning, designing, literature survey, data collection. Nuray Bayar Muluk: Planning, designing, literature survey, statistical analysis, writing, active intellectual support. Cemal Cingi: Planning, designing, literature survey, data collection, English editing.

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