Assessing the Expectations of Patients Demanding Rhinoplasty on Profile Photographs using Proportional Measurements and Simulation Programs

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Abstract

Objective: The aim of this study was to define the desired profile measurements in patients who demand rhinoplasty and to assess the needs of extra profile surgeries in these patients.

Material and Methods: Overall, 100 patients (60 women, 40 men) demanding rhinoplasty between January and December 2013 were included in this study. Standard profile photos were taken. Rhinoplasty and extra profile surgeries were simulated in those photos with both patient and surgeon decisions. These simulated photos were assumed as the desired profile view. In those photos, some angles or measurements were calculated to understand the desired proportions on the profile view. Then, these desired proportions were compared with the universal ideal proportions to understand the needs of extra profile surgeries in those patients.

Results: It has been found that 43% of women and 27.5% of men would benefit from fat injections to the forehead. Sagittal lowering of the nasion was necessary in 25% of both men and women. Respectively in women and men, demands in; nasolabial angle increase were 85% and 75%, projection increase according to Goode ratio were 35% and 32%, according to Baum ratio, 80 and 75%. Lower chins vertical height was longer than the nose in 18% and 17%, nose was longer than the lower chin in 17% and 7.5% in women and men respectively. Lower 2/3rds of the chin was longer than normal in 21% of the patients in both women and men. In two different proportions, the chin was found to be retruded in 23%–36% and 30%–35% and protruded in 23%–26% and 25%–30% in women and men, respectively.

Conclusion: Personal demands may vary from the universal ideals. Therefore, pre-surgical simulations become necessary to assess the extra surgery needs in patients demanding rhinoplasty. These simulations may help the surgeon to personalize the surgery according to the patients demand, and patient satisfaction may increase as a result this approach.

Keywords: Rhinoplasty, photoshop, profile, chin, genoplasty, fat injection

INTRODUCTION

Patients who are not content with their facial profiles mostly complain of their nose appearing too large in proportion to their facial features in photographs showing their faces in profile. However, a smooth nose line alone does not suffice for an ideal profile.¹,² Together with the nose, the forehead, lips, and chin gain importance in an evaluation of the facial profile. Many patients nevertheless consult with an expectation of rhinoplasty, and, in the presence of additional problems in the remaining facial regions, it can be impossible to achieve an ideal profile regardless of the successful outcome of the rhinoplasty.¹,³ A preoperative analysis of the patient's side profile is greatly important in eliminating such issues.

Even if no diagnostic tests are used for this purpose, photo editing programs can be employed in test screening. These programs enable various types of modifications of the soft tissue and thereby enable a simulation of the estimated outcome. Apart from their comforting influence on the patient, these simulations are beneficial for the surgeon. The surgeon has the opportunity to rehearse essential maneuvers such as angle modifications and length adjustments of the nose. Simulations performed together with the

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Angle Measurements

a. Nasolabial angle (NLA): The angle that a line drawn perpendicular to the Frankfort plane through the subnasale makes with the columella. Normal values vary from 93.5 to 98.5 degrees in males and from 95 to 100 degrees in females.

b. Curve angle: The angle formed by a line connecting the nasion, the highest or the lowest point of the nose arch, and the tip superior.

c. Lip–chin–neck angle (LCNA): The angle formed by a line drawn between the pogonion and the contour of the lower lip, and the contour between the mentum and the base of the submental. Normal values vary from 100 to 120 degrees.

d. Legan’s angle (LA): The angle formed by the intersection of the lines from the glabella to the subnasale, and from the pogonion to the subnasale. A good-looking facial profile anticipates this angle to be between −9 and −17 degrees in females and between −7 and −15 degrees in males.

e. Nasomental angle: The angle formed by the intersection of the lines drawn from the nasion to the tip superior, and from the tip superior to the pogonion. Normal values vary from 120 to 130 degrees.

f. Interior angle of the forehead: The angle that the lowest or the highest point of the forehead arch on the glabella makes with the upper and lower planes of the forehead. In females, the ideal aesthetic perception anticipates this angle to be slightly convex. In males, however, a flat or minimally concave forehead can be evaluated as normal because of the orbital protrusions in the glabella area (−1, −2 degrees).

g. Nasofrontal angle: The angle formed by a line drawn from the nasion to the glabella intersecting with a line drawn from the nasion to the superior tip. Ideal universal values are from 115 to 130 degrees.

Ratios

a. Baum ratio: First, a line is drawn from the radix to the subnasale to calculate the nasal base length. Then, a line is drawn at 90 degrees to this line from the inferior nasal tip to find the measurement of nose projection. The Baum ratio is calculated by dividing the length of the nasal base by the length of the nose projection. The normal value is 2.8/1.

b. Goode ratio: The distance from the alar line to the inferior nasal tip divided by the distance from the nasion to the inferior nasal tip. Normal values vary from 0.55 to 0.60.

c. Nasal dorsum/nasal base length ratio: The distance between the nasion and the tip inferior divided by the distance between the nasion and the subnasale.

d. Mid-face/lowe face ratio: The length from the glabella to the subnasale divided by the length from the subnasale to the mentum. The normal value is 1.

e. Upper lip/lower chin ratio: The ratio between the distance from the subnasale to the stomion and the distance from the subnasale to the mentum. The normal ratio is 1/3.
Indices
a. **Nasion index:** The length of a perpendicular line drawn from the nasal base to the most prominent point of the nasion divided by the vertical intercanthal distance.
b. **Supratip index:** The length of a perpendicular line drawn from the alar wings to the supratip break divided by the vertical intercanthal distance.

Assessment of Patient Expectations
The facial profile views desired by the patients were simulated together by the patient and physician. Following the rhinoplasty simulation, where the physician deemed necessary, additional simulations were performed in the forehead and chin regions. These simulations were recorded only whenever the patient found the latter to be better than the simulation of the rhinoplasty. While 40 patients (24 females and 16 males) found the results achieved in the rhinoplasty-only simulation to be sufficient, minor modifications were simulated on the forehead and chin areas of the remaining 60 patients, who agreed that the modifications “looked better.” Photographs obtained from the simulations that were performed for the 100 patients were accepted as conclusive, and the images were analyzed. The values obtained from this analysis were accepted as the desired facial profile data for the patients who had applied for rhinoplasty. These values are summarized in Table I.

**Anthropometric Measurements**

**Female patients**
The total number of patients was 60 and the median age was 27.4 (ranging from 18 to 49). These values are summarized in Table II.

**Angle Measurements**
a. **NLA:** The mean angle was found to be 91.1 degrees (ranging from 67 to 113 degrees). The desired angle values were found to vary from 102 to 114 degrees. Accordingly, while no modification of NLA was necessary in 9 patients, augmentation of NLA was simulated in 51 patients.
b. **Curve angle:** The mean value was found to be 190.0 (±4.7) degrees (ranging from 184 to 202 degrees), and our desired values were found to vary from 165.9 to 172.1 degrees. Accordingly, our female patients desired not a flat but a concave nasal dorsum.
c. **LCNA:** The mean value was found to be 103.1 (±9.4) degrees (ranging from 83 to 130 degrees). Compared to the desired values (varying from 99.3 to 105.7 degrees), these values were found to be less than 99.3 degrees in 14 patients, greater than 105.7 degrees in 22 patients, and within the limits of the reference values in 24 patients.
d. **LA:** The mean LA value was found to be −11.9 (±5.3) degrees (ranging from +5 to −23 degrees). Our desired LA values varied from −9.6 to −13.9 degrees. Accordingly, the chin structure presented a greater value than desired in 16 patients; the value was within the desired limits in 23 patients, and was smaller in 21 patients.
e. **Nasomental angle:** The mean value was found to be 127.5 (±5.5) degrees (ranging from 116 to 134 degrees). Our desired post-simulation values varied from 124.7 to 131.8 degrees. Accordingly, the nasomental angles were lower than the reference value in 14 patients, greater than the reference value in 16 patients, and within the range in 30 patients.

**Table I. Overall values**

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasolabial angle</td>
<td>91.1±10°</td>
<td>89.7±8.8°</td>
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<tr>
<td>Curve angle</td>
<td>190.1±4.7°</td>
<td>192.8±4.5°</td>
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<tr>
<td>Lip–chin–neck angle</td>
<td>103.1±9.4°</td>
<td>105.7±9.5°</td>
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<td>Facial contour angle</td>
<td>−11.9±5.3°</td>
<td>−12.5±4.1°</td>
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<td>Nasomental angle</td>
<td>127.5±5.5°</td>
<td>130±5.5°</td>
</tr>
<tr>
<td>Interior angle of the forehead</td>
<td>0.1±4.2°</td>
<td>−2.1±4.2°</td>
</tr>
<tr>
<td>Nasofrontal angle</td>
<td>152.5±7.9°</td>
<td>153±7.2°</td>
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<tr>
<td>Ratios</td>
<td></td>
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<tr>
<td>Mid-face/lower face</td>
<td>0.97±0.06</td>
<td>0.97±0.06</td>
</tr>
<tr>
<td>Upper lip/lower face</td>
<td>0.33±0.06</td>
<td>0.33±0.06</td>
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<tr>
<td>Nasal dorsum/base</td>
<td>0.96±0.06</td>
<td>0.95±0.05</td>
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<tr>
<td>Goode ratio</td>
<td>0.56±0.05</td>
<td>0.56±0.05</td>
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<tr>
<td>Baum ratio</td>
<td>2.73±0.21</td>
<td>2.80±0.21</td>
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<tr>
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<tr>
<td>Nasion index</td>
<td>1.00±0.2</td>
<td>1.16±0.3</td>
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<tr>
<td>Supratip index</td>
<td>1.05±0.05</td>
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**Table II. Desired values**

<table>
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<th>Measurements</th>
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<th>Male</th>
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</thead>
<tbody>
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<td>Angles</td>
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<td></td>
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<tr>
<td>Nasolabial angle</td>
<td>108.5±5.9°</td>
<td>104.2±5.1°</td>
</tr>
<tr>
<td>Curve angle</td>
<td>169±3.1°</td>
<td>172±3.1°</td>
</tr>
<tr>
<td>Lip–chin–neck angle</td>
<td>102.5±3.2°</td>
<td>104.4±3.3°</td>
</tr>
<tr>
<td>Legan's angle</td>
<td>−11.7±2.1°</td>
<td>−12.6±2.0°</td>
</tr>
<tr>
<td>Nasomental angle</td>
<td>129.5±3.5°</td>
<td>128±3.3°</td>
</tr>
<tr>
<td>Interior angle of the forehead</td>
<td>1.57±2.2°</td>
<td>−0.9±1.6°</td>
</tr>
<tr>
<td>Nasofrontal angle</td>
<td>144.8±4.7°</td>
<td>144.1±4.6°</td>
</tr>
<tr>
<td>Ratios</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-face/lower face</td>
<td>0.99±0.05</td>
<td>1.00±0.05</td>
</tr>
<tr>
<td>Upper lip/lower face</td>
<td>0.33±0.03</td>
<td>0.33±0.03</td>
</tr>
<tr>
<td>Nasal dorsum/base</td>
<td>0.87±0.03</td>
<td>0.87±0.03</td>
</tr>
<tr>
<td>Goode ratio</td>
<td>0.63±0.03</td>
<td>0.62±0.04</td>
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<tr>
<td>Baum ratio</td>
<td>2.73±0.15</td>
<td>2.71±0.15</td>
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<tr>
<td>Indices</td>
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<td></td>
</tr>
<tr>
<td>Nasion index</td>
<td>0.91±0.22</td>
<td>1.08±0.22</td>
</tr>
<tr>
<td>Supratip index</td>
<td>0.96±0.03</td>
<td>0.97±0.03</td>
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</table>
f. **Interior angle of the forehead:** The mean value was found to be 0.1 (±4.2) degrees (ranging from −5 to 8). Our desired interior forehead angle values varied from −0.6 to 3.77 degrees. While the interior angle of the forehead was found to be convex in only 22 of the female patients, this angle was measured to be flat in 13 patients. In 25 female patients, a concave forehead angle, which is found to be undesirable in women, was observed on the glabella.

g. **Nasofrontal angle:** The mean value was found to be 152.5 (±7.9) degrees (ranging from 130 to 161 degrees). Universal values are from 123 to 137 degrees. Our study, the desired nasofrontal angle values varied from 140.1 to 149.5. Accordingly, the nasofrontal angle was found to be smaller than 140 degrees in 3 patients, to be larger than 149.5 degrees in 43 patients, and within the range of the reference value in 14 patients.

### Ratios in Female Patients

a. **Mid-face/lower face ratio:** Mean value was found 0.97±0.06 (ranging from 0.88 to 1.13). The study’s reference value was found to vary from 0.94 to 1.04. Accordingly, this value was found to be less than 0.94 in 11 patients, greater than 1.04 in 10 patients, and within these values in 39 patients.

b. **Upper lip/lower face ratio:** The mean value was found to be 0.33 (±0.06) (ranging from 0.23 to 0.46). The universal reference value is 1/3. Our desired values varied from 0.30 to 0.36. Accordingly, while this value was found to be less than 0.30 in 13 patients, it was found to be greater than 0.36 in 12 patients.

c. **Nasal dorsum/nasal base ratio:** The mean value was measured to be 0.96 (±0.06) (ranging from 0.87 to 1.11). The universal reference value is 5/6. Our desired values varied from 0.84 to 0.91. Accordingly, while 21 patients were found to be within the limits of the reference value, 39 patients had a value greater than 0.91.

d. **Goode ratio:** The mean value was found to be 0.56 (±0.05) (ranging from 0.49 to 0.68). The universal reference values vary from 0.55 to 0.66. Our desired values varied from 0.60 to 0.66. Accordingly, 48 patients had a Goode ratio of less than 0.60; the ratios of 2 patients were greater than desired, while the ratios of 10 patients were within the desired limits.

e. **Baum ratio:** The mean value was found to be 2.73 (±0.21) (ranging from 2.24 to 3.00). The universal reference value is given as 2.8. Our desired Baum ratios were found to vary from 2.59 to 2.89. Accordingly, 14 patients had a Baum ratio of less than 2.58, and 2 patients had a ratio of greater than 2.89, while the ratios of 25 patients fell within the normal limits.

### Indices in Female Patients

a. **Nasion index:** The mean nasion index was found to be 1.00±0.2 (ranging from 0.71 to 1.48). The desired study measurements varied from 0.69 to 1.13. Accordingly, while the nasion index was within the normal limits in 45 patients, it was greater than 1.13 in 15 patients.

b. **Supratip index:** The mean supratip index was found to be 1.05±0.05 (ranging from 0.94 to 1.18). The reference values of the study varied from 0.93 to 0.99. Accordingly, while the supratip index was found to be within the normal limits in 8 patients, it was found to be greater than the normal limit in 52 patients.

### Indices in Male Patients

*The total number of patients was 40 and the median age was 26.3 (ranging from 18 to 42). The values are summarized in Table II.*

a. **NLA:** The mean angle was found to be 89.7 (±8.8) degrees (ranging from 64 to 116 degrees). A comparison of the actual measurements with the desired data showed that no NLA modifications were required in 6 patients, an increase in NLA was required in 30 patients, and a decrease was required in 4 patients.

b. **Curve angle:** The mean value was found to be 192.8 degrees (ranging from 185 to 202), and our desired values were found to vary from 169 to 175 degrees. Accordingly, our male patients desired not a flat but a slightly concave nasal dorsum. In our study, a need for reduction of the nasal dorsum was observed in all patients.

c. **LCNA:** The mean value was found to be 105.7 (±9.5) degrees (ranging from 89 to 129 degrees). Desired values in the simulated measurements varied from 101.1 to 107.1 degrees. Accordingly, this value was found to be less than 101 degrees in 10 patients, greater than 107.3 degrees in 11 patients, and within the desired limits in 19 patients.

d. **LA:** The mean value was found to be −12.5 (±4.1) degrees (ranging from −24 to −3 degrees). The desired values in the simulated measurements varied from −10.6 to −14.6 degrees. Accordingly, while the number of patients with a larger negative value than −14.6 degrees was 14, and that with a larger positive value than −9 degrees was 12, the number of patients measuring within the mean limits was 14.

e. **Nasomental angle:** The mean value was found to be 130 (±5.5) degrees (ranging from 121 to 141 degrees). The universal values vary from 123 to 137 degrees. Our simulated values varied from 124.7 to 131.8. Accordingly, the nasomental angle was smaller than the simulated value in 12 patients, within the limits in 12 patients, and greater than the reference values in 16 patients.

f. **Interior angle of the forehead:** The mean value was found to be −2.1 (±4.2) degrees (ranging from −5 to 8). Our desired study values varied from −2.5 to 0.7 degrees. While the vectoral value of the forehead was found to vary from −2.5 to 0.7 degrees in 24 patients, this was found to be a more negative value than −2 degrees in 11 patients and a more positive value than 0.7 degrees in 5 patients.

g. **Nasofrontal angle:** The mean value was found to be 153 (±7.2) degrees (ranging from 130 to 175 degrees). The universal values are from 127 to 141 degrees. With the exception of 4 patients, this value was found to be equal to or greater than 141 degrees in all patients. Our simulated study values varied from 140.7 to 147.7 degrees. Accordingly, while the nasofrontal angle was found to be smaller than 140.7 degrees in 4 patients and greater than 147.7 degrees in 31 patients, it was found to be within the desired range in only 5 patients.
Ratios in Male Patients

a. **Mid-face/lower face ratio:** The mean value was found to be 0.97±0.06 (ranging from 0.88 to 1.10). The universal value is 1. The simulated desired values varied from 0.95 to 1.05. Accordingly, this value was found to be less than 0.95 in 17 patients, greater than 1.05 in 3 patients, and within this range in 20 patients.

b. **Upper lip/lower face ratio:** The mean value was found to be 0.33 (±0.06) (ranging from 0.23 to 0.5). The universal value is 0.33. Our desired values were found to vary from 0.30 to 0.36, with values less than 0.30 in 7 patients, greater than 0.36 in 7 patients, and within the desired limits in 26 patients.

c. **Nasal dorsum/nasal base ratio:** The mean value was found to be 0.95 (±0.05) (ranging from 0.87 to 1.06). The universal reference value is 5/6. Our simulated measurement values varied from 0.84 to 0.90. Accordingly, while 9 patients were found to fall within the desired range, 31 patients had a value greater than 0.90.

d. **Goode ratio:** The mean value was found to be 0.56 (±0.05) (ranging from 0.46 to 0.66). The universal reference values vary from 0.55 to 0.66. Our simulated values varied from 0.58 to 0.66. Accordingly, 31 patients had a Goode ratio of less than 0.58, and 9 patients were within the normal limits.

e. **Baum ratio:** The mean value was found to be 2.80 (±0.21) (ranging from 2.40 to 3.20). The universal reference value is given as 2.8. Our desired values varied from 2.56 to 2.86. Accordingly, 3 patients had a Baum ratio of less than 2.56, 13 patients had a ratio of greater than 2.86, and this ratio was found to fall within the desired limits in 24 patients.

Indices in Male Patients

a. **Nasion index:** The mean nasion index was found to be 1.16±0.03 (ranging from 0.97 to 1.57), and the simulated values varied from 0.86 to 1.30. Accordingly, while the nasion index was within the desired limits in 22 patients, it was less than 0.86 in 8 patients and greater than 1.30 in 10 patients.

b. **Supratip index:** The mean supratip index was found to be 1.05±0.05 (ranging from 0.94 to 1.16). The desired supratip index values varied from 0.94 to 1.00 in the simulations. Accordingly, while the supratip index was found to be within the normal limits in 5 patients, it was found to be above the normal limits in 35 patients.

**Interpretation of Results**

In our study, an evaluation of the profile measurements from the cranial to the caudal side demonstrated that women anticipated a slightly convex forehead, while men anticipated a forehead that is either flat or concave at 1 or 2 degrees immediately above the brows. The patients’ anticipations of an angulation on the forehead are consistent with the universally ideal values. With respect to anthropometric measurements, 25 of the 60 female patients (42%) were observed to have a concave internal angle on the forehead. Among the male patients, 11 (22.5%) were observed to have a concavity of less than −2.5 degrees on their forehead. Fat injections into the forehead may be suitable for these patients.

In our study, our ideal nasofrontal angle values were observed to be higher than the universal values. This angle involves three areas, namely the glabella, height of the nasion, and nasal angulation. Structure-wise, the Turkish race is known to have a higher nasofrontal angle. In a 2008 article, Malkoc et al. reported the mean nasofrontal angle value to be 148 degrees in women and 146 degrees in men. These angles were found to have similar values in our study. Here, the depressed position of the glabella on the sagittal plane or the prominent position of the nasion on the sagittal plane can constitute another important aspect. In rhinoplasty, the nasion region is the most challenging area for adjusting position and height. Attempting to achieve universal values in this region therefore seems neither possible nor essential. In our study, 43 female and 31 male patients had a nasofrontal angle greater than the desired value indicated in the simulations.

Our simulated measurement values for the nose differ from the universal values in several aspects. In our simulations, the nasal tip region of the side profile was observed to be slightly more projected and elevated than those of the universal reference values. This gives rise to a greater than average NLA and Goode ratio, as well as a less than average Baum ratio. This can be explained by the fact that patients who apply for rhinoplasty with aesthetic concerns tend to have slightly higher than normal expectations. Leong and White conducted a similar study on the variations of Caucasian noses. According to the results of this study, the Baum ratios of patients who applied with aesthetic concerns were found to be lower than the normal values, and this led to an anticipation of greater projection. The results of this study further indicate the anticipated nasofrontal angle to be larger than the universal values.

In individual preoperative anthropometric examinations, a need to increase NLA was identified in 88% of the female patients and in 75% of the male patients. In the remaining patients, no increase was found to be necessary in the nasolabial angle; however, a need to decrease the angle was identified in 2 female and 4 male patients. Regarding the Goode and Baum ratios, a need for increased projection was identified in 80% and 35% of the female patients and in 77% and 32% of the male patients, respectively. Preoperative examination of the nasal dorsum length revealed that the nasal dorsum was longer than the nasal base in 65% of the female patients, in 75% of the male patients, and needed to be shortened. This can be easily corrected by rotating the tip.

The curve had a concave angulation in the simulated images of both female and male patients. This was an expected outcome in our female patients; however, male patients anticipated a flatter nasal dorsum. From this, it follows that male patients anticipated a flatter nose at a slightly concave nasal dorsum angle, albeit not to the degree anticipated by female patients.

The length ratios of the mid-face and the lower chin, the nasal dorsum and the nasal base, and the upper lip and the chin were found to match the universal values. On the other hand, the lower chin was observed to be longer than the nose.
length in 18% and 17% of female and male patients, respectively, and the nose was observed to be longer than the lower chin in 17% and 7.5%. These patients should be evaluated regarding a modification in their nose and chin lengths. An examination of the upper lip and chin length ratios showed that 2/3 of the lower portion of the chin was either long or short respectively in 21% of the female patients, and in 17.5% of the male patients. Patients that present lower than normal ratios should be evaluated for vertical maxillary deficiency, and patients with higher length ratios should be evaluated for mandibular hyperplasia.

The nasomaxillary angle was found to be smaller than normal in 23% and 30% of female and male patients, respectively, and larger than normal in 26% and 30%. Patients who present with a larger angle should be evaluated for low nasal projection or mandibular hyperplasia, and those who present with a smaller angle should be evaluated for high nasal projection or mandibular hypoplasia.

LA was found to be negative below the normal value in 23% and 35%, and to be positive above the normal value in 26% and 30% of the female and male patients, each respectively. Patients who present with a relatively positive angle value should be evaluated for the prominence of the glabella on the sagittal plane or for mandibular hyperplasia, and those who present with a relatively negative angle value should be evaluated for the depression of the glabella or for mandibular hypoplasia.

LCNA was found below the normal value in 23% and 25%, and above the normal value in 36% and 27% of the female and male patients, each respectively. Patients who present with a larger angle should be evaluated for sagging tissue under the chin or for mandibular hypoplasia, and those who present with a smaller angle should be evaluated for mandibular hyperplasia. In the study, an intervention was suggested to 5 female and 5 male patients for sagging tissue under the chin, and platysmaplasty through submental incision was applied together with fat excision on 1 female patient.

The supratip index, which indicates the overall tip-defining points of patients, was seen to be lower than the normal values in 87% of the female and male patients; thus, an increase in their tip definitions was required.

Occlusion defects were identified in 3 patients (Angle class III malocclusion in 2 patients, and Angle class II malocclusion in 1 patient), who were referred to the orthodontics clinic after the rhinoplasty surgery. One patient was deemed to have a sequela of craniostenosis in regard to the angulation observed on the forehead. It was explained to the patient that a frontal advancement procedure could be performed together with the neurosurgery department; however, the patient did not consent. Regarding the chin tip, fat injection was proposed to 20 patients (12 females and 8 males), and mentoplasty using Medpor™ implants was proposed to 4 patients (all female). Of these patients, 2 accepted the fat injection procedure, and 2 accepted the placement of a Medpor™ implant. Genioplasty was proposed to 2 female and 3 male patients for correcting mandibular vertical excess and to 5 female and 2 male patients for moving the chin tip backward; however, none of the patients consented.

**DISCUSSION**

Patients who are not content with their facial profiles most frequently tend to request rhinoplasty surgery. In some patients, however, rhinoplasty itself does not suffice for achieving an ideal facial profile. In recent years, a number of articles have been published about areas other than rhinoplasty where surgical intervention can be performed to achieve an ideal profile. In 2010, Ahmed et al. studied the rate at which patients who apply for rhinoplasty would benefit from a chin tip augmentation. Based on the measurements they performed according to a range of criteria, the researchers reported the microgenia rate to range from 17% to 62% in male patients and from 42% to 81% in female patients. In a 2013 article, Bertossi et al. reported that they performed combined rhinoplasty and genioplasty on 90 patients between 2002 and 2004 and that they achieved more harmonic outcomes compared with the outcomes achieved by rhinoplasty alone. In an article published in 2012, Işık and Şahin reported combined rhinoplasty with fat injection into the forehead; all patients were satisfied with the outcome. In 2013, Daniel et al. published a series comprising 24 cases in which they combined rhinoplasty with an intervention on the shape of the eyebrows. In this series, they reported that they performed endoscopic intervention on the muscle groups impacting the medial brow to better define the nasion; they also reported that they performed further intervention in the chin region in 12% of the cases.

As demonstrated in these studies, combining rhinoplasty with additional surgical procedures in selected patients can have favorable effects on the appearance of the facial profile. The issue to consider here is the criteria by which the patients will be evaluated. In their 2010 article, questioning the necessity of a chin augmentation together with rhinoplasty, Ahmed et al. have led us to question the extent to which universal values hold true in evaluation, given that the microgenia rate was found to range from 40% to 80%, especially in females. When this rate was assessed based on our simulation values, it was found to be about 25%.

Given the extensive use of visual and print media today, individuals can desire to resemble personalities they admire, and these personalities may come from different populations. This outcome is gradually creating a racially unvaried concept of beauty.

Anthropometric measurements can nonetheless reveal great differences among races. It therefore seems more reasonable that the anthropometric measurements related to the specific race of the patient be used in angle and pro-
portions measurements. A major aspect here is whether or not the anticipations can be met of patients who present in the hope of aesthetical corrections of their common racial features.

Therefore, in our study, apart from anthropometric measurements, photographic simulations were performed in the presence of each patient, and subjective facial profiles were created based on the mutual decisions of the patient and physician. As would be expected, the simulated profiles matched the universally ideal values in some areas and differed in others. Therefore, when creating the simulations, it will be more suitable to consider the socially ideal criteria rather than the universal.

In the simulations performed in our study, the modifications made for nasal projection and the nasofrontal angle were found to exceed the universal values. It thus becomes important to consider these criteria in facial profile reconstruction procedures performed on members of Turkish society.

Whether or not additional surgeries can be proposed to patients who apply in anticipation of rhinoplasty is a matter of debate apart from the question as to the possible adverse impact that the simulation can have on the patient’s expectations, or the question of whether it is ethical. Here, the main issue is the purpose of the simulations. When such simulations are performed as part of a marketing strategy and yield results that go beyond what can be performed by the surgeon, this will lead to unhappy patients after the surgery. The best approach to avoiding such unfavorable outcomes is for the simulations to be performed directly by an experienced surgeon who will also perform the surgery, and to simulate surgically achievable results. These simulations can facilitate an understanding between the patient and the surgeon and further allow the surgeon to rehearse the outcomes of possible procedures. Moreover, these simulations will aid the understanding of whether or not the patient would benefit from additional interventions apart from rhinoplasty.

CONCLUSION

Personal expectations do not always correspond to universal or racial approximations. Simulations performed before surgery can therefore clearly demonstrate any surgical needs and assist in the personalization of the treatment plan. Patient expectations can thereby be extensively understood, and maximal surgical benefits can be offered.

Ethics Committee Approval: Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki “Ethical Principles for Medical Research Involving Human Subjects”, (amended in October 2013).

Informed Consent: Written informed consent was obtained from patients who participated in this study.

Peer-review: Externally peer-reviewed.


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REFERENCES

1. Isik S, Sahin I. Contour restoration of the forehead by lipofilling: our experience. Aesthetic Plast Surg 2012; 36: 761-6. [CrossRef]