COSMETIC

Outcomes Article

Benefits of a Short, Practical Questionnaire to Measure Subjective Perception of Nasal Appearance after Aesthetic Rhinoplasty

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Background: The authors tested a short, practically designed questionnaire to assess changes in subjective perception of nasal appearance in patients before and after aesthetic rhinoplasty.
Methods: A prospective cohort study was conducted in a group of 121 patients who desired aesthetic rhinoplasty and were operated on by one surgeon. The questionnaire contained five questions (E1-E5) based on a five-point Likert scale and a visual analogue scale (range, 0 to 10). Two questions were designed as trick questions to help the surgeon screen for signs of body dysmorphic disorder.
Results: All patients rated the appearance of their nose as improved after surgery. The visual analogue scale revealed a Gaussian curve of normal distribution (range, 0.5 to 10) around a significant improvement (mean, 4.36 points, p = 0.018). Also, question E1, question E2, and the sum of questions E1 through E5 showed a statistically significant improvement after surgery ($p = 1.74 \times 10^{-36}$, $p = 4.29 \times 10^{-33}$, and $p = 9.23 \times 10^{-31}$, respectively). The authors found a linear relationship between preoperative score on the trick questions and postoperative increase in visual analogue scale score. Test-retest reliability could be investigated in 74 of 121 patients (61 percent) and showed a positive correlation between postoperative (1 year after surgery) and repostoperative response (2 to 4 years after surgery).
Conclusions: The authors concluded that a surgeon performing aesthetic rhinoplasty can benefit from using this questionnaire. It is simple, takes no more than 2 minutes to complete, and provides helpful subjective information regarding patients' preoperative nasal appearance and postoperative surgical outcome. (*Plast. Reconstr. Surg.* 132: 913e, 2013.)
CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

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THERAPEUTIC

The standardization of outcome assessment in aesthetic surgery would be extremely advantageous because it would allow the comparison of different techniques, quantification of positive effects, and identification of patients unlikely to benefit from surgery. Traditional assessments of surgical success have already examined end points such as mortality, morbidity, and physiologic function. These concepts are not applicable to aesthetic surgery. The nature of

aesthetic surgery, the creation of beauty, is subjective and eludes clear definition.

Despite this obstacle, many assessments of the various dimensions of aesthetic surgery outcome have previously been published. In 2003, Ching and colleagues[1] conducted a comprehensive review of aesthetic surgery outcome instruments. They identified body image and quality-of-life measures to be of the greatest value in determining aesthetic surgery outcomes. Reviewing the instruments that were available at that moment, Ching et al. selected several questionnaires as potential candidates for further study. Unfortunately, they did not elaborate on body image

assessment instruments that focused specifically on aesthetic rhinoplasty. Only the Facial Appearance Sorting Test was mentioned as being potentially useful, as it was found to display good validity and reliability for rhinoplasty while it also seemed sensitive to change.[2] However, the study in which it was used dates back to 1988.

In an effort to improve outcome assessment measurement in aesthetic rhinoplasty, a more recent study started to use the Glasgow Benefit Inventory. The inventory is a validated postintervention questionnaire with 18 questions based on a five-point Likert scale; it is specifically designed for head and neck surgical procedures.[3] In a study from 2010, Chauhan et al.[4] used the Glasgow Benefit Inventory to measure outcome in 30 adolescent aesthetic rhinoplasty candidates. They could demonstrate positive changes in behavior and interpersonal relations after surgery.[4,5] Although tested and validated, the inventory contains 18 questions, which makes even this comparatively short test considerably time consuming during anamnesis and requires lengthy analysis afterward.

Our objective for this study was to design a test that was so simple a patient could complete the questionnaire within 2 minutes. This short duration would enable the surgeon to instantly profit from the gathered information during anamnesis before and after rhinoplasty. We subsequently designed a short questionnaire on the basis of a previously validated questionnaire in an earlier study by Alsarraf and colleagues.[6] The questionnaire contained a visual analogue scale and five simple questions to evaluate subjective body image and quality of life in relation to nasal appearance in our patient population.[6] In this article, we describe the results of our data after statistical analysis and define how we think a surgeon could benefit from the questionnaire in the rhinoplasty decision-making process.

PATIENTS AND METHODS

In this study, we included 121 patients who underwent aesthetic rhinoplasty between 2007 and 2009. The only inclusion criterion was that patients paid for the surgery themselves, indicating that the reason for surgery was mainly aesthetic. All rhinoplasties were performed by the first author (P.J.F.M.L.). Patients were seen preoperatively and postoperatively at the outpatient department of the Bergman Clinic and the Diakonessen Hospital in The Netherlands. During the first consultation, patients were asked preoperatively to complete a short questionnaire (Table 1).

The first part of the questionnaire consisted of five questions (E1 through E5) interviewing

Table 1. The Utrecht Questionnaire for Outcome Assessment in Aesthetic Rhinoplasty

I give the following score to the way I like the appearance of my nose:

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I--------I--------I--------I--------I--------I--------I--------I--------I--------I--------I
0        1        2        3        4        5        6        7        8        9        10
very ugly                                                                        very nice
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E1. Are you concerned about the appearance of your nose?

Not at all	A little	Moderate	Much or often	Very much or often
1	2	3	4	5
☐	☐	☐	☐	☐

E2. Does this concern bother you often?

Not at all	A little	Moderate	Much or often	Very much or often
1	2	3	4	5
☐	☐	☐	☐	☐

E3. Does this concern affect your daily life (e.g., your work)?

Not at all	A little	Moderate	Much or often	Very much or often
1	2	3	4	5
☐	☐	☐	☐	☐

E4. Does this concern affect your relationships with others?

Not at all	A little	Moderate	Much or often	Very much or often
1	2	3	4	5
☐	☐	☐	☐	☐

E5. Do you feel stressed by the appearance of your nose?

Not at all	A little	Moderate	Much or often	Very much or often
1	2	3	4	5
☐	☐	☐	☐	☐

Fig. 1. Postoperative improvement on the visual analogue scale (*VAS-E*). Improvement on scale revealed a Gaussian curve of normal distribution around a mean improvement of 4.36 points ($p = 0.018$).

the patient about body image and quality of life in relation to nasal appearance. Each of the five questions was scored on a five-point Likert scale (1, not at all; 5, very much/often), so that in total a minimum of five points and a maximum of 25 points could be gathered. The third and fourth questions (E3 and E4) were considered trick questions that were included with the idea that they might hint at a disturbance in body perception or body dysmorphic disorder.

The second part of the questionnaire consisted of a visual analogue scale on which patients could rate the appearance of their nose on a 10-point scale (0, very ugly; 10, very nice).

Table 2. Comparison of Preoperative and 1-Year Postoperative Scores*

	Preoperative Score	Postoperative Score	p
Questions E1 through E5 (minimal score 1, maximal score 5)			
E1	3.364	1.562	1.74×10^{-36}
E2	3.231	1.463	4.29×10^{-33}
E3	2.331	1.141	3.88×10^{-20}
E4	2.083	1.182	3.06×10^{-16}
E5	2.388	1.165	1.70×10^{-21}
Sum, E1 through E5 (maximal score 25)	13.397	6.512	9.23×10^{-31}
Visual analogue scale score	3.611	7.981	2.12×10^{-46}

*The p value belongs to the null hypothesis that there is no improvement after surgery; if $p < 0.01$, this hypothesis was rejected. Paired t test analysis includes all 121 patients.

To assess the changes in subjective perception of nasal appearance after surgery, an identical questionnaire was completed by these patients in the postoperative period not sooner than 6 months but not later than 1 year after surgery. Two to 4 years after the operation, patients were asked by mail to fill in the same questionnaire (repostoperative data). To assess reliability, validity, and internal consistency of our questionnaire, we statistically analyzed preoperative, postoperative, and repostoperative questionnaire data.

We evaluated test-retest reliability by computing for each question the Pearson correlation coefficient between the postoperative (1 year after surgery) and the repostoperative response (2 to 4 years after surgery). We used a t test to evaluate these correlation coefficients. The internal consistency of the questionnaire was measured with Cronbach's alpha. The validity of this short questionnaire was assessed by measuring the responsiveness to change. Therefore, we computed a paired t test by comparing preoperative and postoperative responses with preoperative and repostoperative responses.

RESULTS

We included 121 patients who underwent rhinoplasty for aesthetic reasons. The average age of our patient population was 34 years (range, 17 to 66 years). The male-to-female ratio was 1:5.4 (19:102).
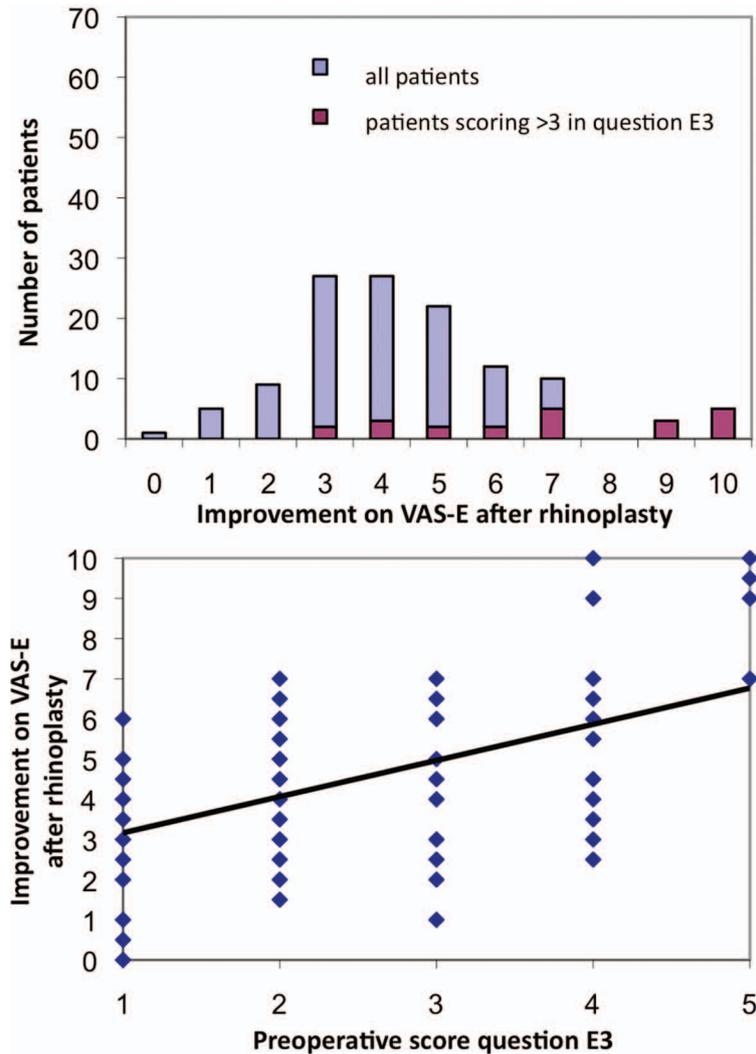
Fig. 2. Regarding trick question E3, a linear relation was found between the preoperative rating for the individual question and the level of improvement on the visual analogue scale (*VAS-E*) after rhinoplasty. If a patient scored high on question E3, the postoperative improvement on the scale was likely to be on the right side of the spectrum.

No patients received a negative score on the visual analogue scale; all patients regarded the appearance of their nose as improved 6 months to 1 year after surgery (range, 0.5 to 10). Analysis of the improvement in the visual analogue scale score(Fig. 1) revealed a Gaussian curve of normal distribution around a mean improvement of 4.36 points ($p = 0.018$). The majority of the investigated population (88.4 percent) regarded the appearance of their nose as improved between two and eight points.

Table 2 lists the average scores for the five questions (E1 through E5) that were used to evaluate body image and quality of life before and 6 months to 1 year after rhinoplasty. The p value relates to the null hypothesis that there was no improvement after surgery; if $p < 0.01$, this hypothesis was rejected. The score of all individual questions as well as the sum of the questions dropped significantly after surgery, indicating a change in subjective perception of nasal appearance. Regarding trick questions E3 and E4, a linear relation was found between the preoperative rating and the level of improvement on the visual analogue scale after surgery ($rE3 = 0.525$, $rE4 = 0.530$). If a patient scored high on questions E3 and E4, then the postoperative improvement on the visual analogue scale was likely to be on the right side of the spectrum of the Gaussian curve (*purple* in Figs. 2 and 3).
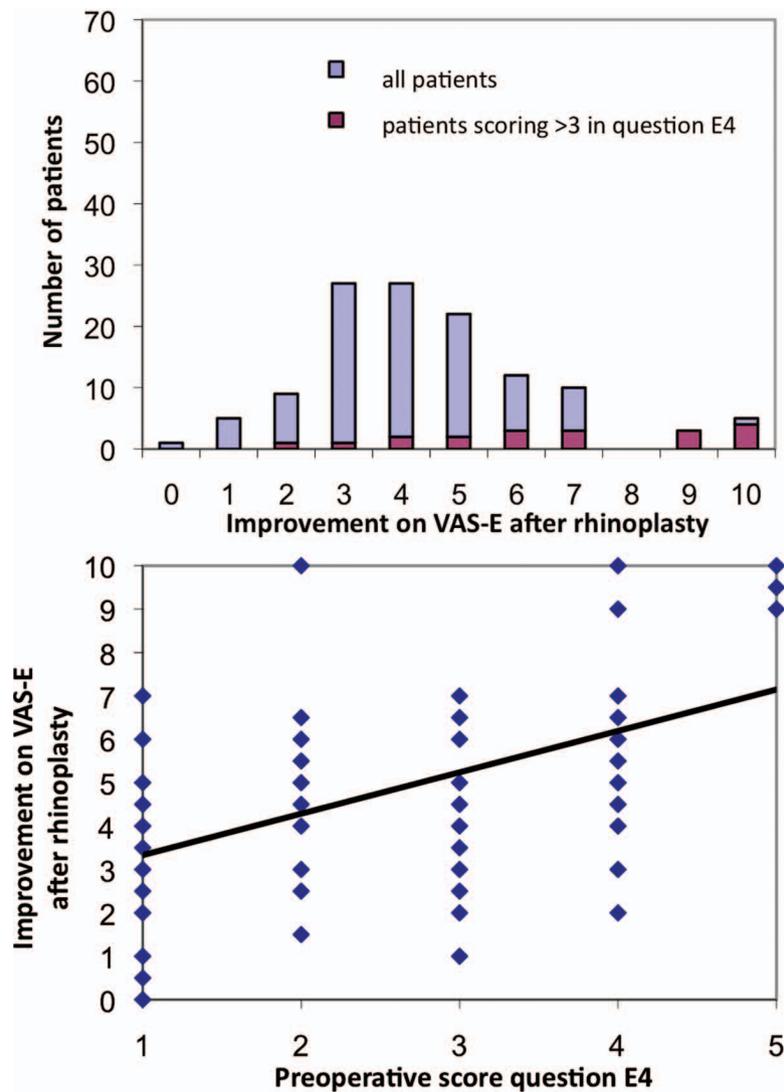
Fig. 3. Regarding trick question E4, a linear relation was found between the preoperative rating for the individual question and the level of improvement on the visual analogue scale (*VAS-E*) after rhinoplasty. If a patient scored high on question E4, the postoperative improvement on the scale was likely to be on the right side of the spectrum.

Table 3. Comparison of Postoperative and Repostoperative Scores*

	Pearson Correlation Coefficient	p
Questions E1 through E5 (minimal score 1, maximal score 5)		
E1	0.185	0.0577
E2	0.317	2.99×10^{-3}
E3	0.248	0.0164
E4	0.205	0.0401
E5	0.188	0.0541
Sum, E1 through E5 (maximal score 25)	0.295	5.31×10^{-3}
Visual analogue scale score	0.577	3.69×10^{-8}

*The p value belongs to the null hypothesis that the answers given by the patients 6 months to 1 year after the surgery and the answers given by the same patients 2 to 4 years after the surgery are not correlated; if $p < 0.1$, this hypothesis was rejected.

Test–retest reliability (i.e., the overall consistency of the measurement) could be investigated in 74 (61 percent) of 121 patients and showed a positive correlation between the postoperative (1 year after surgery) and the repostoperative response (2 to 4 years after surgery). Table 3 shows the Pearson correlation coefficient between the postoperative and repostoperative responses for each question. The t test evaluation of these correlation coefficients showed significance for all individual questions and the sum of the questions ($p < 0.1$).

Also the internal consistency of the questionnaire appeared adequate. A Cronbach's alpha value of 0.8 or higher corresponds to good internal consistency (i.e., the consistency of results across items). Our questionnaire holds this property throughout the preoperative, postoperative,

Table 4. Comparison of Preoperative, Postoperative, and Repostoperative Scores*

	p Value Preoperative versus Postoperative	p Value Preoperative versus Repostoperative
Questions E1 through E5 (minimal score 1, maximal score 5)		
E1	1.39×10^{-23}	8.64×10^{-16}
E2	2.25×10^{-21}	9.14×10^{-18}
E3	2.17×10^{-13}	6.29×10^{-12}
E4	3.29×10^{-11}	2.20×10^{-10}
E5	4.16×10^{-15}	3.02×10^{-11}
Sum, E1 through E5 (maximal score 25)	7.36×10^{-20}	4.03×10^{-16}
Visual analogue scale	6.25×10^{-29}	3.25×10^{-23}

*The p value belongs to the null hypothesis that there is no improvement in response between preoperative and postoperative and between preoperative and repostoperative; if $p < 0.01$, this hypothesis was rejected. Paired t test analysis includes those 74 out of 121 patients who provided a repostoperative response.

and repostoperative responses. We found alpha values to be 0.857 for preoperative responses, 0.837 for postoperative responses, and 0.846 for repostoperative responses.

The validity of the questionnaire (i.e., the degree to which it measures what it is supposed to measure) was assessed by measuring the responsiveness to change. A paired t test was used to compare preoperative and postoperative responses and preoperative and repostoperative responses. The results can be found in Table 4. We observed a significant improvement in response for all individual questions and the sum of the questions ($p < 0.01$) in the postoperative and repostoperative phase as compared with the preoperative situation.

DISCUSSION

Our research concerns the evaluation of a short and practical questionnaire on a group of 121 patients undergoing aesthetic rhinoplasty. In all cases, rhinoplasty was paid for by the patients themselves, rather than by an insurance company. Table 1 shows the content of the questionnaire, which in general took the patient not more than 2 minutes to complete. Patients were operated by one surgeon (P.J.F.M.L.).

The significant improvement in questions E1, E2, and E5 in Table 2 indicated that, after surgery, rhinoplasty patients were less concerned about the appearance of their nose (E1, 1.74×10^{-36}), that in addition this concern bothered them less (E2, $p = 4.29 \times 10^{-33}$), and that they felt less stressed by the appearance of their nose (E5, $p = 1.70 \times 10^{-21}$). Also the sum of questions E1 through E5 showed a significant lowering ($p = 9.23 \times 10^{-31}$). Together, this strongly suggests a postoperative improvement in subjective perception of nasal appearance and quality of life in the investigated rhinoplasty population.

The level of subjective improvement on the visual analogue scale ("How do you like the appearance of your nose?") confirmed this. The mean postoperative improvement on the visual analogue scale was 4.36 points on a scale between 0 (very ugly) and 10 (very nice), and this improvement was statistically significant ($p = 0.018$). Interestingly, Figure 1 shows that the distribution of improvement on the visual analogue scale had the appearance of a bell curve, also called a Gaussian curve, of normal distribution of chance. In other words, after analyzing our particular patient group, we can cautiously state that on a 10-point scale, any new rhinoplasty patient coming into
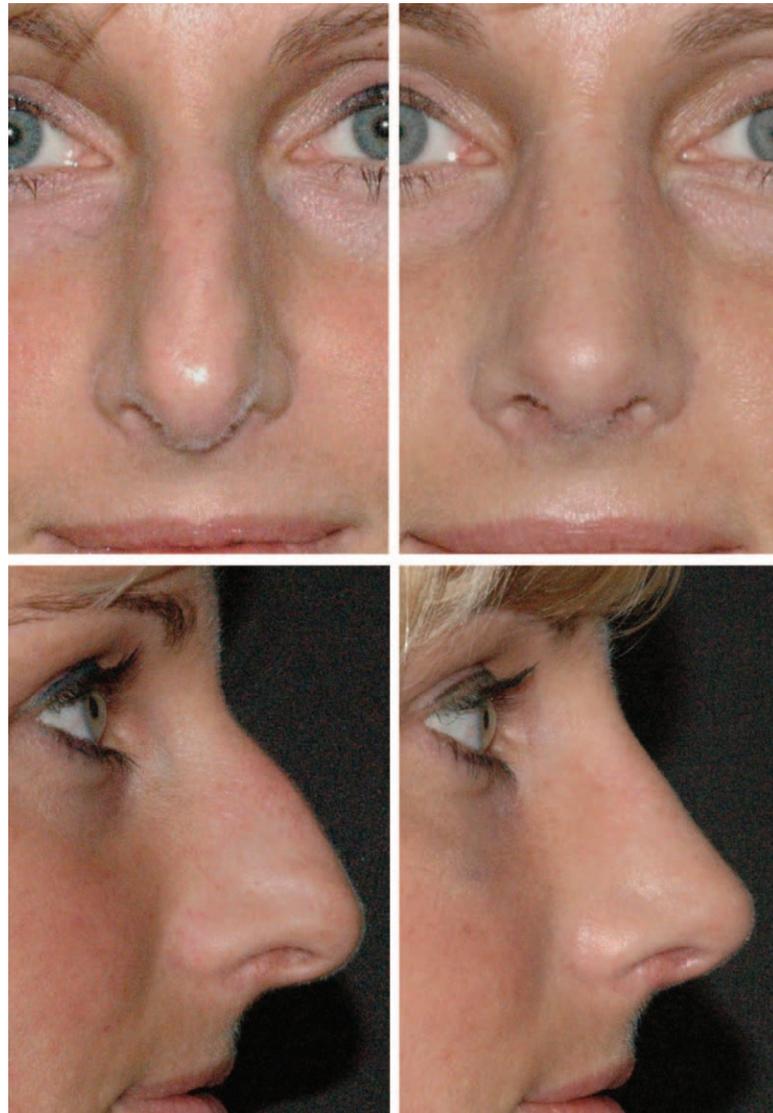
Fig. 4. Preoperative (*left*) and postoperative (*right*) views of a patient just left of the middle of the spectrum on the Gaussian curve shown in Figure 1. The improvement in visual analogue scale score was 4 (5 preoperative and 9 postoperative). The preoperative and postoperative scores for the individual questions were as follows: E1: 2–1; E2: 2–1; E3: 1–1; E4: 1–1; E5: 1–1; sum, E1 through E5: 7–5.

our office has a relatively high chance of a postoperative improvement of somewhere between three and six points. Hence, using as simple a tool as a visual analogue scale, analysis of a group of patients operated on can give a surgeon awareness of performance in the specific rhinoplasty population he or she is working in and that is of value to both the surgeon and the patient. Using a *t* test, after breaking up the visual analogue scale into five segments of two points, we also tested the hypothesis of a predictable postoperative improvement of two and subsequently four points in our population and found $p < 0.00001$ and p < 0.028, respectively, indicating a low chance of statistical error when using these statements. This could potentially refute the one-step theory of Gaylon McCollough (monstrosity-deformity-average-good-great), which proclaims that the postoperative result in rhinoplasty most likely is to move only one step up when using such a scale.

In our investigated population, patients who scored extreme postoperative improvements on the visual analogue scale also had high preoperative scores on trick questions E3 and E4 (*purple* in Figs. 2 and 3). This relationship appeared linear ($rE3 = 0.525$, $rE4 = 0.530$) and indicates a possible

Fig. 5. Preoperative (*left*) and postoperative (*right*) frontal views of a thick-skinned patient on the far left side of the spectrum on the Gaussian curve shown in Figure 1. The improvement in visual analogue scale score was 0.5 (6 preoperative and 6.5 postoperative). The preoperative and postoperative scores for the individual questions were as follows: E1: 2–3; E2: 2–3; E3: 1–1; E4: 1–1; E5: 1–2; sum, E1 through E5: 7–10.

relationship between "hysterical extreme improvement" on the visual analogue scale and extreme high scores in these two questions. Recent studies by Alavi et al. and Picavet et al. have revealed a high prevalence of moderate to severe body dysmorphic disorder symptoms in the aesthetic rhinoplasty population.[7–9] Our present data cannot prove that body dysmorphic disorder patients score high preoperatively for questions E3 ("Does this concern affect you daily life, e.g., your work?") and E4 ("Does this concern affect your relationship with others?"), but one could assume a correlation exists. In our practice, extreme scores on questions E3 and E4 automatically lead to a thorough anamnesis to evaluate whether the postoperative expectations regarding the rhinoplasty are realistic in that specific patient. However, in our investigated population, those patients who scored on the extreme right side in the Gaussian curve of Figure 1 were not suffering from an imagined or slight defect (as you would expect in body dysmorphic disorder). Moreover, we have seen body dysmorphic disorder and borderline patients in our office but believe we could identify them preoperatively and avoid surgery, due to an efficient preoperative selection procedure combining gut feeling, warning signs, and high scores on questions E3 and E4 with a consultation to a specialized psychiatrist. Thus, high scores on questions

E3 and E4 in combination with the surgeon's feeling that "something is not right" have in some cases resulted in a diagnosis of body dysmorphic disorder or borderline personality disorder by the consulted psychiatrist, who consequently advised us not to operate on these patients. To put this in perspective, it should be noted that in today's cosmetic rhinoplasty population, many individuals seek subtle yet precise alterations in the contour of an already attractive nose, but they do not lack insight and their motives are both rational and legitimate, albeit exacting (e.g., models, actors, and others in public life). These unique patients must be differentiated from those suffering from borderline or narcissistic personality disorders, who might also place undue emphasis on a fairly slight cosmetic deformity and in whom surgery might also be contraindicated. Hence, the highly discriminating but legitimate patients will be difficult to differentiate from patients with body dysmorphic disorder or various personality disorders using this questionnaire.

Thus, the questionnaire we used in this study most certainly has its limitations. The fact that it takes the patient only 2 minutes to complete the form automatically affects the quantity and therefore possibly the quality of the cumulative data. However, Alsarraf and colleagues showed excellent reliability, consistency, and validity scores in a
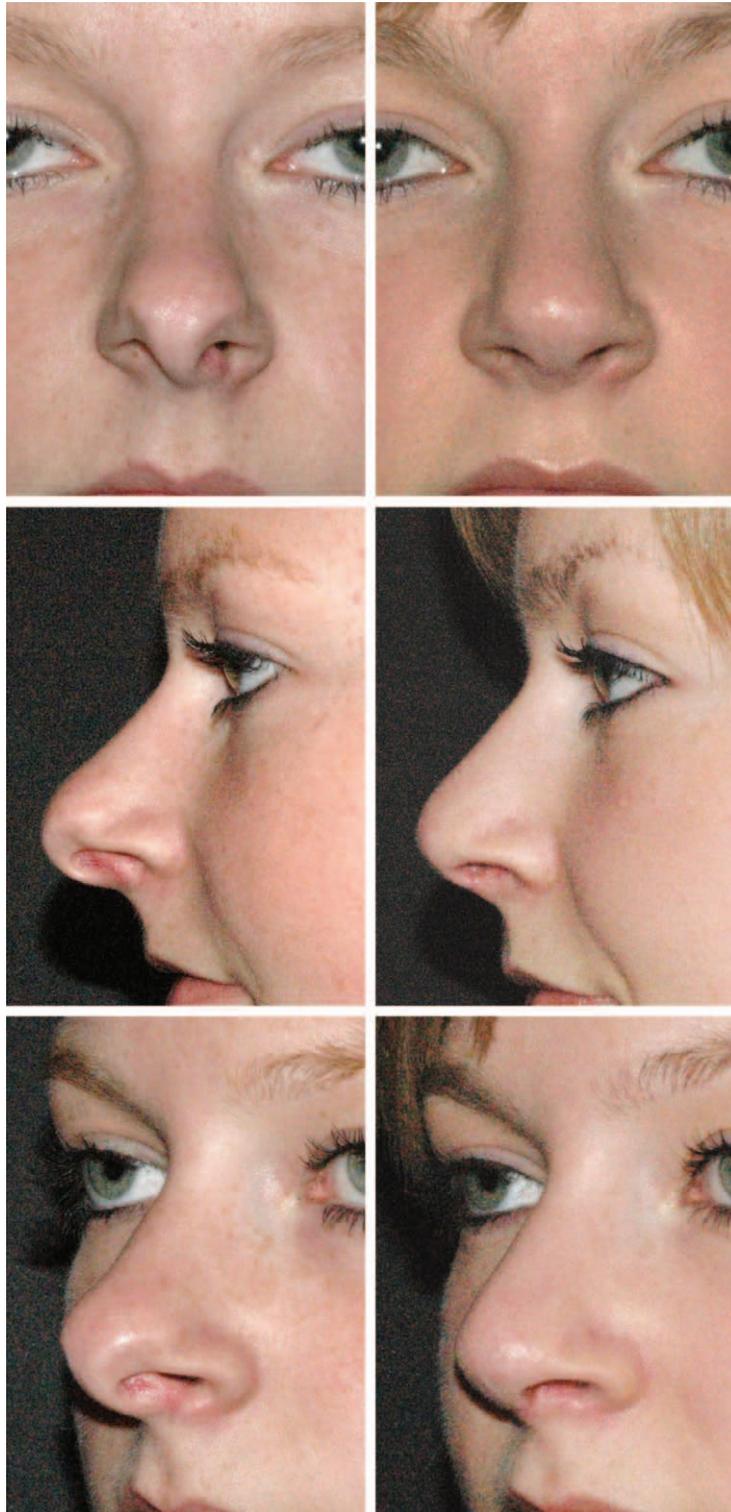
Fig. 6. Example of a patient on the far right side of the spectrum on the Gaussian curve shown in Figure 1. Preoperative (*left*) and postoperative (*right*) views are shown. The improvement in the visual analogue scale score was 10 (0 preoperative and 10 postoperative). The patient also showed a high score on trick questions E3 and E4. Anamnesis revealed realistic expectations regarding the postoperative result. The preoperative and postoperative scores on the questions were as

Fig. 7. Preoperative (*left*) and postoperative (*right*) views are shown of a patient on the far right side of the spectrum on the Gaussian curve shown in Figure 1. The improvement in the visual analogue scale score was 9.5 (0.5 preoperative and 10 postoperative). Note the difference in the preoperative score compared with that of the patient shown in Figure 5. The current patient also had a high score on trick questions E3 and E4. The malformation in the middle third of the nose resulted in major problems in body image perception. Anamnesis revealed a history of multiple consultations with a psychologist. The preoperative and postoperative scores on the questions were as follows: E1: 5–2; E2: 5–1; E3: 5–1; E4: 5–1; E5: 5–1; sum, E1 through E5: 25–6.

study using a short list of almost similar questions.[6] Other, more comprehensive aesthetic rhinoplasty outcome instruments have also proven their value in other well-documented studies.[10–14] In terms of feasibility, validity, reliability, and sensitivity to changes, Ching et al.[1] selected the Multidimensional Body-State Relations Questionnaire, a psychological assessment of body image, as the best potential candidate for further study. The Derriford Scale, an instrument that assesses appearance-related quality of life, was also selected.[15–17]

We decided that these comprehensive aesthetic surgery outcome instruments were not applicable in our situation. In our busy practice, we simply lack time and the staff to help patients to complete long lists of questions and analyze the data afterward. Lengthy questionnaires also cannot be used "on the spot" during anamnesis and directly help the surgeon in terms of decision making or patient education. We have shown in this study that, although short and simple, this questionnaire has proved itself reliable and valid and therefore altogether a good instrument for specific, practical use in a rhinoplasty population.

In sum, on the basis of an earlier validated questionnaire from Alsarraf and colleagues,[6] we designed a short, practical questionnaire that can be used in every office setting and focuses specifically on aesthetic rhinoplasty. Because it takes the patient less than 2 minutes to complete the questionnaire, the surgeon gains instant information during anamnesis. This information can subsequently be used during the anamnesis for decision making and patient education (Figs. 4 through 7).

Preoperatively, the questionnaire informs the surgeon on body image and quality of life in relation to nasal appearance. A high score on the two trick questions might be indicative of body dysmorphic disorder and might be a helpful caveat when combined with the surgeon's intuition. Postoperatively, the questionnaire measures outcome after rhinoplasty in the individual patient, which, for example, can be helpful in deciding whether small additional corrections are needed or can be avoided (Fig. 6). Furthermore, when analyzing a group of patients who have been operated on and who completed

Fig. 6. (*Continued*) follows: E1: 5–1; E2: 5–1; E3: 4–1; E4: 4–1; E5: 5–1; sum, E1 through E5: 23–5. Because the subjective improvement in the questionnaire was high, additional correction of the columella double break was abandoned.

the questionnaire, it can give both the surgeon and the patient an idea of what can be accomplished given a certain rhinoplasty population.

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PATIENT CONSENT

Patients provided written consent for the use of their images.

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