

# Influence of the Subjective Body Image on the Outcome of Functional Rhinoplasty

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**Abstract** Improvement of nasal breathing is considered to be the major aspect of functional rhinoplasty (fRPL). Nevertheless, simultaneous aesthetic modifications can be required to achieve sufficient functional enhancement. Thus, the aim of this study was to assess the influence of the subjective perception of the nasal appearance on the outcome of fRPL. Patients undergoing fRPL were asked to complete the German version of the Utrecht Questionnaire for Outcome Assessment in Aesthetic Rhinoplasty (D-OAR) preoperatively, 1, 3 and 12 months after surgery. The patients' satisfaction with the procedure's result was determined using a five-point Likert scale 1, 3 and 12 months after rhinoplasty. In total, 87 patients (42 males and 45 females) with a median age of 25 years undergoing fRPL were included in this study. Compared to males, females showed diminished VAS scores ( $4.03 \pm 2.02$  vs  $2.71 \pm 1.96$ ,  $p = 0.006$ ) and higher D-OAR scores during preoperative outpatient consultation ( $13.34 \pm 5.00$  vs  $16.07 \pm 5.62$ ,  $p = 0.020$ ). An increase in the VAS score and a decrease in the D-OAR score were observed independent of gender post-operatively. Significant correlations between the patients' satisfaction and the D-OAR score at each time point of assessment were demonstrated, whereas no significant correlation between the post-operative

patients' satisfaction and the initial D-OAR score could be identified. These results demonstrate the importance of body image and the subjective perception of the nasal appearance in particular in patients undergoing fRPL which should be taken into consideration of surgeons preoperatively.

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**Keywords** Questionnaire · Quality of life · Rhinoplasty · Functional rhinoplasty · Outcome · Body image

## Introduction

Functional rhinoplasty (fRPL) requires a multidimensional approach. For the purpose of functional optimization, a simultaneous correction of the outer nose can be necessary. Especially in cases with crooked or tension noses, nasal obstruction can be improved just by modification of the nasal appearance [1, 2]. Functional demands and aesthetic ideas may be contradictory: while nasal obstruction profits from extending nasal dimensions, the patient's aesthetic sense will favour a nose individually tailored to the facial features. Hence, finding the perfect balance between functional and a sufficient aesthetic result is the challenging factor of fRPL. Furthermore, the patient's evaluation of the aesthetic result depends on subjective satisfaction with nasal appearance and might differ from the surgeon's opinion [3]. In cosmetic surgery, the patient's expectations concerning the aesthetic outcome play a pivotal role and should be taken into consideration by the surgeon

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preoperatively [4]. The subjective perception of the nasal appearance determines a considerable part of the perceived personal body image, and body image dissatisfaction was described to be the strongest motivator for patients to undergo plastic surgery [5]. Notably, enhanced quality of life was observed in patients after facial plastic surgery and cosmetic surgery as well as rhinoplasty have the potential to increase self-esteem and self-confidence in patients with disturbances of body image perception [6–9]. Although functional aspects were assumed to be the strongest predictor to obtain fRPL, it is important to reveal concomitant expectations concerning nasal appearance enhancement to avoid post-operative dissatisfaction with the outcome. However, the influence of aesthetic expectations and body image in particular on the outcome of functional rhinoplasty has not been elucidated so far. Questionnaires represent important instruments in assessment of quality of life and are also helpful tools to measure outcomes due to an intervention, especially concerning plastic surgery and rhinoplasty [10, 11]. The “Utrecht Questionnaire for Outcome Assessment in Aesthetic Rhinoplasty” (OAR) was developed by Lohuis et al. to measure the subjective perception of nasal appearance and its influence on quality of life and was conceived for assessment of outcome in aesthetic rhinoplasty [12]. For an appropriate use in German patients, we developed and validated a reliable version of the OAR in German language (D-OAR) [13].

The aim of the present study was to determine the influence of the body image on the outcome of functional rhinoplasty using the D-OAR.

## Materials and Methods

### Patients and Data Acquisition

Patients undergoing functional rhinoplasty between March 2015 and December 2016 were included in this study. Reimbursement of the costs by health insurance was obligatory for study enrolment confirming the functional aspect and necessity of the rhinoplasty. Procedures performed solely for aesthetic improvement, especially those paid by the patients, were excluded as well as isolated septoplasty or septorhinoplasties with concomitant sinus surgery. The patients were asked to complete a questionnaire during outpatient consultation preoperatively, 4 weeks, 3 and 12 months after surgery. This study has been conducted in full accordance with ethical principles, including the World Medical Association Declaration of Helsinki (version 2002) and the additional requirements, and has been approved by the institutional ethics committee. Written informed consent was obtained from all subjects.

## Questionnaire

The validated German version of the OAR (D-OAR) was used for assessment [13]. The OAR consists of two elements. The first part is a visual analogue scale (VAS) to assess the subjective perception of nasal appearance with a range from 0 (very ugly) to 10 (very nice). The second part consists of five questions concerning quality of life and body image in dependence on nasal appearance and can be answered using a five-point Likert scale (1: “not at all” up to 5: “very much often”). A maximum score of 25 points and a minimum score of 5 points can be determined by summation. High score values indicate a high perceived influence of the nasal appearance on body image and quality of life. Two questions (E3 and E4) were considered trick questions to detect disorders in body image perception [12].

Furthermore, the patients were asked to express their subjective satisfaction with the procedure’s result in general using a five-point Likert scale from 0 (not satisfied) up to 4 (totally satisfied) during post-operative outpatient consultation.

## Statistical Analysis

Statistical evaluation was performed with IBM® SPSS® Statistics 24. Parameters were characterized by median, mean values  $\pm$  standard deviation (SD) and data distribution. Correlations (Spearman’s correlation coefficient =  $r_{sp}$ ) were considered to be low ( $0.2 < r_{sp} \leq 0.5$ ), good ( $0.5 < r_{sp} \leq 0.8$ ) or excellent ( $0.8 < r_{sp} \leq 1.0$ ). Depending on distribution of the data, a paired *t* test or Wilcoxon rank sum test was used to compare differences between two linked variables, whereas student’s *t* test or Mann–Whitney *U* test was carried out for independent variables. Results with  $p \leq 0.05$  were considered to be statistically significant.

## Results

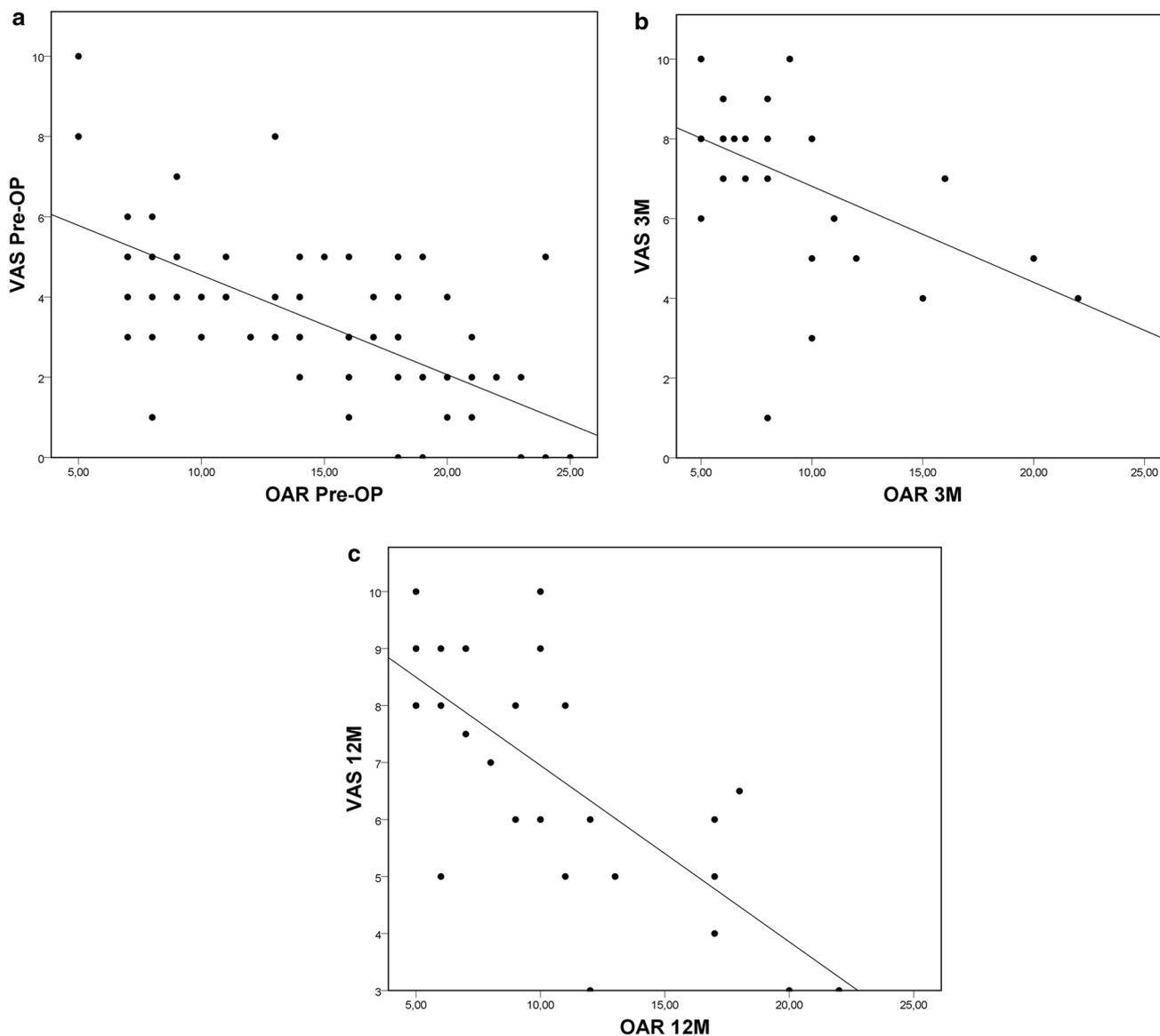
### Patients

Completed questionnaires of 87 patients undergoing fRPL were available for data analysis. Seven patients (6 males and 1 female) required solely a functional improvement, whereas 80 patients (36 males and 44 female) demanded both a functional and aesthetic modification. With 42 male patients with a median age of 25 years (range from 16 to 57 years) and 45 female patients with a median age of 26 years (17–61 years), the male-to-female ratio was 0.93:1.

## Preoperative Assessment

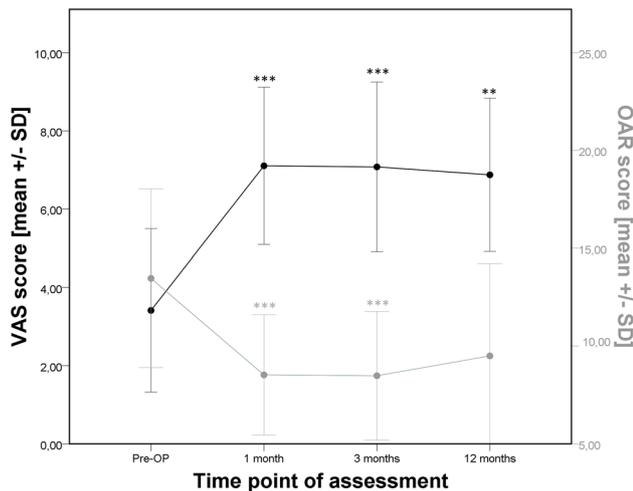
Females showed a diminished VAS score compared to males during preoperative outpatient consultation ( $2.71 \pm 1.96$  vs  $4.03 \pm 2.02$ ,  $p = 0.006$ ). Stratified by age, no differences in the initial VAS assessment between the younger and the older patients could be observed ( $\leq 25$  years:  $3.11 \pm 1.80$  vs  $> 25$  years:  $3.83 \pm 2.27$ ,  $p = 0.130$ ). Differences due to gender were also detectable in the preoperative D-OAR scores: females showed higher D-OAR scores compared to males ( $16.07 \pm 5.62$  vs  $13.34 \pm 5.00$ ,  $p = 0.020$ ). Analysis of the trick questions revealed no difference between male

and female patients ( $4.27 \pm 2.27$  vs  $5.09 \pm 2.75$ ,  $p = 0.137$ ). Although results were not significant, a slightly increased D-OAR score could be observed in young males ( $\leq 25$ :  $14.54 \pm 4.26$ ) compared to older males ( $> 25$ :  $11.65 \pm 5.59$ ,  $p = 0.067$ ). Furthermore, patients who required just functional improvement of their nose had significantly lower D-OAR scores compared to patients demanding functional and aesthetic modifications ( $9.67 \pm 5.05$  vs  $15.15 \pm 5.34$ ,  $p = 0.017$ ). A highly significant correlation between the VAS score and the D-OAR score could be determined ( $r_{sp} = -0.660$ ,  $p < 0.001$ ) (Fig. 1a).



**Fig. 1** Correlations of the visual analogue scale (VAS) score with the score of the Utrecht Questionnaire for Outcome Assessment in Aesthetic Rhinoplasty (OAR). Lower VAS scores are associated with

higher OAR scores preoperatively [Pre-OP, (a)], 3 months [3M, (b)] and 12 months [12 M, (c)] after the procedure



**Fig. 2** Visual analogue scale (VAS) score (black) and score of the Utrecht Questionnaire for Outcome Assessment in Aesthetic Rhinoplasty (OAR) (grey) at the different time points of assessment. Points and bars indicate the mean  $\pm$  standard deviation (SD). Compared to the initial assessment, a significant increase in the VAS score is accompanied with a significant decrease in the OAR score after procedure. (\*\*\* $p < 0.001$ , \*\* $p < 0.01$ )

### One-Month Assessment

A significant increase in the VAS score was observed 1 month after the procedure compared to the initial score ( $7.00 \pm 2.06$  vs  $3.41 \pm 2.11$ ,  $p < 0.001$ ), and no differences between the genders could be identified anymore (males:  $6.89 \pm 2.38$ , females:  $7.32 \pm 1.60$ ,  $p = 0.526$ ). Moreover, the mean D-OAR score decreased significantly from  $15.20 \pm 5.12$  to  $10.07 \pm 4.74$  ( $p < 0.001$ ) (Fig. 2).

### Three-Month Assessment

Differences between 3-month post-operative and preoperative assessments supported the previous results of the significant post-operative improvement with a mean D-OAR score of  $8.96 \pm 4.31$  ( $p < 0.001$ ) and a mean VAS

score of  $7.09 \pm 2.15$  ( $p < 0.001$ ). Corresponding to the preoperative assessment, patients with higher OAR scores were more dissatisfied with their subjective perception of nasal appearance (lower VAS scores) ( $r_{sp} = -0.604$ ,  $p < 0.001$ ) (Fig. 1b).

### One-Year Assessment

The improvement of the VAS compared to initial rating was stable over the time with a mean VAS score of  $6.81 \pm 1.96$  ( $p = 0.002$ ). But with a mean D-OAR score of  $11.00 \pm 5.25$ , no significant difference to initial assessment could be observed anymore ( $p = 0.086$ ). Furthermore, a negative correlation of VAS score and D-OAR score could be observed 1 year after surgery ( $r_{sp} = -0.693$ ,  $p < 0.001$ ) (Fig. 1c).

Notably, no correlation of VAS score improvement 1, 3 and 12 months after the procedure and the initial sum score of the questions E3 and E4 could be observed ( $r_{sp} = 0.093$ ,  $r_{sp} = 0.124$ ,  $r_{sp} = 0.118$ , respectively,  $p \geq 0.05$ ).

### Patient Subjective Satisfaction

In total, the patients were satisfied with the result 3 months and 12 months after surgery ( $3.23 \pm 0.80$ ,  $3.00 \pm 0.93$ , respectively). Neither gender nor age had an influence on these results (data not shown). The subjective satisfaction with the procedure's result correlates significantly with the D-OAR score at the time point of assessment, whereas no correlation between initial D-OAR and post-operative satisfaction could be observed (Table 1). Patients were stratified by the median sum of the trick questions E3 and E4 to determine the influence of these questions on post-operative subjective satisfaction. No differences of the subjective satisfaction with the procedure's result between the stratified groups could be detected 1 month ( $3.46 \pm 0.72$  vs  $3.30 \pm 0.82$ ,  $p = 0.498$ ), 3 months ( $3.21 \pm 0.88$  vs  $3.27 \pm 0.70$ ,  $p = 0.830$ ) or 12 months ( $3.00 \pm 1.00$  vs  $3.00 \pm 1.00$ ,  $p = 1.000$ ) after surgery.

**Table 1** Correlations of the Utrecht Questionnaire for Outcome Assessment in Aesthetic Rhinoplasty (OAR) sum score with patient subjective satisfaction 1, 3 and 12 months after procedure

	Patient subjective satisfaction 1 month	Patient subjective satisfaction 3 months	Patient subjective satisfaction 12 months
OAR score preoperatively	0.143	0.022	0.567
OAR score 1 month	– 0.564***		
OAR score 3 months		– 0.494**	
OAR score 12 months			– 0.756*

Values are Spearman's correlation coefficients ( $r_{sp}$ )

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

## Discussion

In this prospective study, we were able to demonstrate an improvement of the subjective perception of the nasal appearance and the associated quality of life indicating the body image as an important domain of patient's satisfaction in fRPL.

Amodeo et al. reviewed and emphasized the critical connection between the psyche and the nose and corroborated the necessity to reveal psychological motivation in patients undergoing aesthetic rhinoplasty [14]. Surgical modifications of the nasal appearance will have an influence on body image due to a special importance of the nose for the facial harmony and as a critical factor for body image disturbances [6, 15]. Because of both functional and aesthetic alterations, it is important to take both factors into consideration in patients undergoing functional rhinoplasty. The visual analogue scale is a well-established global assessment to capture both aesthetic and functional aspects of the nose from the patients' perspective and is often criticized for reliability and validity issues [16]. However, in this study the VAS, as a component of the D-OAR, represented a helpful tool to determine the subjective perception of the nasal appearance in fRPL patients during outpatient consultation. With a median age of 25 years (mean 28.6 years) and a male-to-female ratio of 0.93:1, the population of this study was younger than Lohuis' patient population (average age: 34 years, male/female = 1:5.4) and more balanced with respect to gender, which might be due to the predominant functional aspect of the patient's motivation to undergo rhinoplasty [12].

Good correlations between the VAS and the D-OAR assessment at every time point confirm the construct validity of the D-OAR which was already shown and confirm the body image being an important aspect in fRPL [13]. Trick questions revealed no differences in patients' satisfaction with the outcome. These questions were implemented by Lohuis to identify disturbances of body image. Body dysmorphic disorder represents a severe form of body image disturbance and is characterized by a preoccupation with perceived defects in appearance causing distress or impairments [17]. It is common routine of our clinical practice that in cases with symptoms suspicious of body dysmorphic disorder surgery is denied. Furthermore, in contrast to Lohuis et al. in this study cohort no influence between the trick questions and the improvement on the VAS could be observed. These findings indicate the psychological differences between patients obtaining solely aesthetic and patients undergoing functional rhinoplasty. A detailed prospective study comparing these cohorts would be necessary to confirm these results. Perceptual distortion and dissatisfaction with the perceived body image in

general are more frequent in females than in males [18–20]. In congruence with these findings, higher initial D-OAR scores in females compared to males were observed in this study and point out a sex-specific difference concerning the subjective perception of nasal appearance. Therefore, a higher influence of the body image on the motivation to undergo fRPL in females is assumable. However, in contrast to recent findings no differences of the satisfaction level could be observed between males and females [21].

Notably the decrease in the D-OAR score after surgery indicates an improvement in psychological well-being after functional rhinoplasty as well as adjustment with the new aesthetic appearance over time, as the preoperative negative impact on quality of life is no longer memorized, which is in accordance with findings for cosmetic surgery in general [22]. Although persistent high post-operative D-OAR scores are associated with an increased level of dissatisfaction, preoperatively assessed D-OAR scores allow no estimations concerning the individual expected outcome. The body image plays a pivotal role also in functional rhinoplasty, but in contrast to aesthetic surgery the impact of the body image on the outcome of the procedure is diminished in fRPL. The study was intended to assess the influence of the body image on the outcome of functional rhinoplasty. Further studies will have to prove whether the patient's subjective perception is realistic and whether the body image is influenced by functional improvement. The preoperative gender difference indicated by our data supports significant differences in the type of complaints leading to the patient's decision to receive rhinoplasty.

## Conclusion

This study demonstrates the importance of the body image and the subjective perception of the nasal appearance in particular on the outcome of functional rhinoplasty which should be taken into consideration of surgeons preoperatively. The OAR is a helpful and brief tool to assess the perceived influence of the nasal appearance on quality of life in functional rhinoplasty patients.

## Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical Approval** All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments comparable ethical standards. The study was approved by the institutional ethics committee. This

article does not contain any studies with animals performed by any of the authors.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

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