Original Research

Quality of Life after Rhinoplasty—A Prospective Study

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Abstract

As our previous studies have shown, cosmetic surgery has a positive correlation with postoperative well-being. The aim of this study was to prospectively examine the postoperative changes in quality of life (QoL) after a rhinoplasty. Thirty-four patients who underwent septorhinoplasty performed by a single surgeon from July 2015 to October 2018 reported in indication-specific self-developed and different validated questionnaires (FLZM or Fragen zur Lebenszufriedenheit Module, Freiburg Personality Inventor, Rosenberg self-esteem scale, Functional Rhinoplasty Outcome Inventory 17 [FROI-17], and Glasgow Benefit Inventory [GBI]) on the status of their QoL preoperatively (T0) and 6 months' follow-up (T1). Our goal was to assess the difference in psyche and self-esteem and to get objective insights into the effect of the operation. Significant improvements in QoL in terms of general module, health, and appearance were noted. The general part of the FLZM showed increasing T1 values in the sum scores ($p = 0.005$). With regard to the item "health," T1 was better than the norm data ($p = 0.003$). The statistically significant improvement for the item nose appearance ($p < 0.0001$) after operation and T1 versus reference data ($p < 0.010$) should be highlighted. The subjective patient ratings showed statistically significant T1 improvements for all items of the FROI-17: overall nose ($p < 0.0001$), nasal function ($p = 0.001$), general/further symptoms ($p = 0.006$), and confidence increased by aesthetic changes ($p < 0.0001$). Furthermore, the GBI score shows an improved QoL after rhinoplasty ($p < 0.0001$). Based on the assessment of a variety of disease- and nondisease-specific validated questionnaires, numerous improvements in the QoL of the patients were observed. Therefore, we support septorhinoplasty as a meaningful procedure regarding QoL improvement. The level of evidence is Level II prospective cohort study.

Keywords

► rhinoplasty
► nose
► quality of life
► aesthetic surgery
► patient satisfaction

Nasal reconstruction is originated in India and goes back to Sushruta, commonly dated sixth century.[1] Since then, patients are seeking rhinoplasty for various reasons: for health reasons such as breathing difficulties through the nose or corrective damage after injury or often for psychological reasons with the desire to alter the physical appearance. The nose has an impact on a person's appearance and perception by others. Physiognomics claim to identify a person's character on shape and size of the nose. In his study, Tamir[2] derived certain characteristics from the appearance of the nose. The nose is one of the first things we notice and remember about the other person.

Cleopatra's legendary, straight, and characterful nose is no longer the ideal of beauty for women. According to the advertising industry, female noses should be small and cute.[3] Beauty is subjective and beauty ideals change over time, but beautiful people have always had advantages in many areas of life. Beauty correlates with happiness through increased economic advantage and earning potential, popularity, trustworthiness, and confidence. All this contributes to the notion that "beauty is power."[4]

Quality of Life (QoL) is becoming more and more important and is a criterion for the success of medical treatment. Although a number of remarkable research results in various areas of ENT were published early on, QoL research in facial plastic surgery only gained importance later.[5] The subjective evaluation of satisfaction[6] and concerns about the correct recording and interpretation of the psychological data might have been the reason.[7] Our working group has been researching on the QoL after plastic, aesthetic, and reconstructive surgery for almost 20 years. We see QoL as a prospective therapeutic goal and are always concerned with the question of how the surgical intervention has affected the QoL of our patients.

Methods

In cooperation with our internal psychological department, we developed a questionnaire to obtain more detailed information about the patient's subjective parameters. In addition, well-known standardized questionnaires were added[8–12] in order to evaluate the QoL as a multidimensional construct. The questionnaires were answered by each patient preoperatively (T0) and after 6 months' follow-up (T1), and the calculated data were compared either with a national norm population[9,10,12] and/or with internal data from earlier studies.[8,13,14] A total of 34 patients who underwent septorhinoplasty performed by the same surgeon from July 2015 to October 2018 were included in this prospective study. Patients with reconstruction and tightening with an implant, implant change as well as revision surgery were excluded from the start.

The self-developed indication-specific questionnaire relates to socio-demographic information, satisfaction with the operation result, social and economic consequences of the intervention and complications. Patients were requested to fulfill the questionnaires while they were placed in the waiting room. It took round about 15 minutes to answer the prepared questionnaire package.

The FLZM ("Fragen zur Lebenszufriedenheit Module"; "Questions for Life Satisfaction Modules") was used to identify the change of satisfaction with the own appearance after rhinoplasty. The Life Satisfaction Modules[8] is a standardized and widely used instrument in German-speaking countries for determining the respondent's subjective QoL by individually weighting the three modules: general satisfaction, satisfaction with health, and satisfaction with appearance (body image). The results of the FLZM were compared with reference data.[8]

The Freiburg Personality Inventor (FPI-R),[9] a German multidimensional personality test, is used to gain additional insight into the patient's personality. For the purpose of our study, we used the 14-points life satisfaction questionnaire (emotional inventory) on behaviors, habits, and preferences with answer options "agree" and "disagree." Our results were compared with the German norm data ($n = 3740$) and categorized in four classes of emotional stability: "extremely well-balanced emotional stability" ($1 - 2$ points), "very well-balanced emotional stability" ($3–5$ points), "balanced emotional stability" ($6 - 7$ points), and "unbalanced emotional stability" (>8 points).

The Rosenberg self-esteem scale (RSES)[15] was first used by Rosenberg in 1965 and is the most widely used instrument for measuring self-esteem in social science research. In order to ensure a spontaneous answer, the questionnaire consists of a mixture of five "positive" and five "negative" statements. These 10 statements on a four-point scale rage from "strongly agree" to "strongly disagree." The calculated mean self-esteem score was compared to the score of a German control group with 782 participants (mean 31.73). A score above 30, on a scale from 10 to 40 indicates a high self-esteem of our patients.[12]

The Functional Rhinoplasty Outcome Inventory 17 (FROI-17) is used to assess the QoL specifically before and after rhinoplasty. It consists of 17 items for three subpoints (nasal symptoms, general symptoms, and self-confidence), with answer options from 0 (no problem) to 5 (as bad as it can be). The total score and the subscore were transformed to a scale from 0 to 100 by dividing the sum of the raw scores of the items by the sum of spans of the ranges and multiplying by 100.[10]

The Glasgow Benefit Inventory (GBI) is a validated post-intervention survey on satisfaction of the patients with the operation (here rhinoplasty). It includes questions on various health-related aspects of QoL, with answers to choose from a five-point Likert-Scale. The GBI score ranges from -100 (maximal deterioration) through 0 (no change) to $+100$ (maximal improvement).[11] It offers patients a five-point classification for assessing their subjective QoL. The values -100 to -50 reflect a "high deterioration," -50 to 0 a "slight deterioration," 0 "no change," 0 to 50 a "slight improvement," and 50 to 100 a "significant improvement." The results of the GBI were compared with 0 (one-sample t-test), to get an impression of patient's postoperative benefit. In addition, we compared the results with a reference data ($n = 90$) from one of our earlier studies.[14]

SPSS Statistics 17.0 (SPSS Inc., Chicago, IL) performing the Welch's t-test (unpaired) and the one-tailed t-test, was used for all statistical analyses. An overall statistical significance level was set at $p < 0.05$. Microsoft Excel 2016 (Microsoft Cooperation, Redmont, AL) was used for graphics and tables.

Table 1 FLZM—weighted satisfaction for the module "General Satisfaction"[8]

	Study group T0			Study group T1			Norm data			*p* (*t*-test)		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	T0 vs. T1	T0 vs. norm	T1 vs. norm
Friends	7.35	5.17	34	8.79	5.87	34	8.08	6.33	2536	0.131	0.503	0.516
Hobbies	5.12	5.66	34	6.88	6.47	34	6.31	6.36	2531	0.117	0.278	0.604
Health	**9.91**	**7.49**	**34**	**11.97**	**5.98**	**34**	**8.06**	**7.51**	**2541**	**0.085**	**0.154**	**0.003**[a]
Income	7.00	6.25	34	8.26	5.83	34	6.49	7.27	2537	0.088	0.684	0.158
Work	6.38	5.55	34	6.50	5.38	34	5.45	7.30	2462	0.900	0.463	0.407
Living conditions	8.26	6.28	34	8.56	6.01	34	8.33	6.40	2533	0.787	0.950	0.835
Family life	8.24	6.56	34	9.00	7.33	34	9.84	6.94	2519	0.438	0.182	0.484
Partner relationship	7.24	9.29	34	9.06	8.21	34	7.90	7.69	2509	0.112	0.620	0.383
Sum score	**59.50**	**30.94**	**34**	**69.03**	**27.83**	**34**	**60.49**	**37.13**	**2534**	**0.005**[a]	**0.877**	**0.182**

Abbreviation: SD, standard deviation.
Note: Statistical comparison of T0, T1, and normative data.
[a]Significant statistical differences at $p < 0.05$.

Results

Out of 45 patients, 11 patients dropped out of the study: one patient due to cancelled surgery, seven patients did not complete the questionnaires, and three patients due to revision. Our final study group $n = 34$ consisted of 29 (85.3%) women and five (14.7%) men, the mean age was 29.79 with an age range from 17 to 53 years. Open septo-rhinoplasty was performed in 28 (82%) patients and closed septorhinoplasty in six (18%) patients. The reasons for the operation were functional and aesthetic limitations in all 34 patients.

In comparison of T0 versus T1, the FLZM sum-score "general satisfaction" showed a statistically significant improvement ($p = 0.005$) (►**Table 1**). In the "health" module, the items "freedom from pain" ($p = 0.038$) and "independence from help" ($p = 0.016$) (►**Table 2**) showed significant improvements compared to T0 versus T1. Furthermore, there was an improvement with regard to the items "nose" ($p < 0.0001$), "mouth"

($p = 0.049$), bottom ($p = 0.045$), and feet ($p = 0.014$) (►**Tables 3** and **4**) to be determined. In the "body image" module, the sum-score ($p = 0.038$) (►**Table 4**) should be emphasized.

In the area of health status, statistically significant improvements in T1 compared to the norm were found ($p = 0.003$) (►**Table 1**). The FLZM health part showed statistically significant improvements in "independence from help" ($p < 0.0001$) compared to norm data, but it should be noted that a significant improvement was already found in comparison to T0 versus norm data ($p = 0.039$). With regard to the item "freedom from pain," the T1 group showed significantly better values ($p = 0.023$) compared to norm such as "mobility" ($p = 0.002$) (►**Table 2**). Compared to one of our earlier studies,[14] our patients had a scientifically poorer attitude toward their own nose preoperatively, T0 versus T0 reference study ($p < 0.0001$). Postoperatively the score was significantly better than the T1 reference study ($p = 0.010$) (►**Table 4**).

Table 2 FLZM—weighted satisfaction for the module "Health"[8]

	Study group T0			Study group T1			Norm data			*p* (*t*-test)		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	T0 vs. T1	T0 vs. norm[a]	T1 vs. norm[a]
Fitness	6.97	5.87	34	7.79	5.81	34	8.09	7.01	2220	0.405	0.354	0.804
Ability to relax	6.24	6.15	34	5.94	6.14	34	7.40	6.50	2214	0.792	0.302	0.194
Energy	8.38	6.93	34	7.82	5.65	34	9.14	6.53	2215	0.602	0.501	0.241
Mobility	**11.29**	**6.25**	**34**	**12.88**	**6.09**	**34**	**9.07**	**6.96**	**2210**	**0.221**	**0.065**	**0.002**[a]
Vision/Hearing	11.38	7.03	34	11.18	7.93	34	11.03	7.03	2217	0.828	0.773	0.910
Freedom from anxiety	7.45	6.23	33	8.06	6.44	33	8.10	6.71	2204	0.553	0.580	0.973
Freedom from pain	**9.82**	**7.45**	**33**	**12.03**	**5.40**	**33**	**9.10**	**7.39**	**2217**	**0.038**[a]	**0.577**	**0.023**[a]
Independence from help	**14.88**	**5.87**	**33**	**16.76**	**4.44**	**33**	**12.45**	**6.72**	**2215**	**0.016**[a]	**0.039**[a]	**<0.0001**[a]
Sum score	75.79	34.65	33	82.30	33.11	33	74.39	41.54	2218	0.225	0.847	0.276

Abbreviation: SD, standard deviation.
Note: Statistical comparison of T0, T1, and normative data.
[a]Significant statistical differences at $p < 0.05$.

Table 3 FLZM—weighted satisfaction for the module "body Image."[15] Statistical comparison of T0 and T1

	N	Study group T0		Study group T1		p (t-test)
		Mean	SD	Mean	SD	T0 vs. T1
Hair	34	6.85	6.35	6.68	6.41	0.848
Ears	34	7.29	5.95	9.21	5.69	0.094
Eyes	34	11.91	6.62	12.21	6.47	0.820
Mouth	**34**	**6.44**	**7.27**	**8.59**	**7.14**	**0.049[a]**
Teeth	34	10.00	8.17	9.35	7.79	0.580
Facial hair	34	7.74	6.62	8.76	7.13	0.449
Chin/neck	34	5.26	6.81	6.82	6.01	0.114
Shoulders	34	6.97	6.22	6.88	6.33	0.930
Breasts/bosom	34	7.53	5.93	7.65	6.11	0.895
Abdomen	34	6.76	7.18	7.32	6.29	0.622
Waist	34	6.97	7.00	7.97	6.63	0.339
Hips	34	4.74	6.91	5.15	6.17	0.712
Penis/vagina	34	7.35	6.42	9.03	6.61	0.053
Bottom	**34**	**4.32**	**6.20**	**6.50**	**6.00**	**0.045[a]**
Thighs	34	3.79	6.01	4.79	6.00	0.268
Feet	**34**	**4.09**	**5.57**	**6.18**	**5.86**	**0.014[a]**
Hands	34	7.65	6.81	8.50	6.13	0.274
Skin	34	5.50	9.58	5.62	9.11	0.939
Body hair	34	6.59	8.55	6.79	7.83	0.872
Size	34	7.74	6.53	7.97	6.30	0.803
Weight	34	7.88	7.13	7.91	6.84	0.980

Abbreviation: SD, standard deviation.
[a]Significant statistical differences at $p < 0.05$.

Table 4 FLZ^M—weighted satisfaction for parameters "nose" and "sum score" of the module "body image" and comparison with reference data[14]

		Nose	Sum score
	N	34	34
Study Group T0	Mean	−2.79	140.49
	SD	9.27	93.04
Study Group T1	Mean	10.29	170.44
	SD	7	93.52
p (t-test)	T0 vs. T1	**<0.0001[a]**	**0.038[a]**
Reference nose RT0[14]	Mean	6.88	121.04
	SD	7.03	81.42
	N	130	130
Reference nose RT1[14]	Mean	7.27	144.13
	SD	5.98	86.49
	N	130	130
p (t-test)	T0 vs. T0 Reference	**<0.0001[a]**	0.230
	T1 vs. RT1 Reference	**0.010[a]**	0.120

Abbreviation: SD, standard deviation.
[a]Significant statistical differences at $p < 0.05$.

Table 5 FPI-R—Freiburg personality inventory[9]

	Mean	SD	N	p (t-test)
Study group T0	4.50	1.85	34	
Study group T1	4.24	1.71	34	
Norm data	5.78	3.68	3740	
T0 vs. T1				0.318
T0 vs. norm				0.043[a]
T1 vs. norm				0.015[a]

Abbreviation: SD, standard deviation.
Note: Statistical comparison of T0, T1, and normative data.
[a]Significant statistical differences at $p < 0.05$.

Table 6 RSES—Rosenberg self-esteem scale[13]

	Mean	SD	N	p (t-test)
Study group T0	33.24	4.87	34	
Study group T1	33.59	4.81	34	
Norm data	31.73	4.71	782	
T0 vs. T1				0.591
T0 vs. norm				0.068
T1 vs. norm				0.025[a]

Abbreviation: SD, standard deviation.
Note: Statistical comparison of T0, T1, and normative data.
[a]Significant statistical differences at $p < 0.05$.

The FPI-R showed that our patients were emotionally statistically significantly more stable than the norm even before the operation ($p = 0.043$).[9] The emotional strengths increased even more after the operation, T1 versus norm ($p = 0.015$) (►**Table 5**).

Similar to emotional strength, the results of the RSES with a score above 30 show a high general self-esteem with almost the same results T0 and T1. The patients already had a not statistically significantly better self-esteem T0 than the average German population, T1 was statistically significantly better ($p = 0.025$) (►**Table 6**).

All FROI-17 subjective patient ratings showed statistically significant postoperative improvements. T0 versus T1 scores: overall score ($p < 0.0001$), nasal function ($p = 0.001$), general symptoms ($p = 0.006$), and self-confidence increased through aesthetic changes ($p < 0.0001$) (►**Table 7**).

Table 8 GBI—Glasgow benefit inventory[12]

	Mean	SD	N	p (t-test)
Study group GBI (T1) total score	21.90	16.64	34	
Reference data[16] total score	17.19	19.26	90	
T1 vs. 0				**<0.0001**[a]
T1 vs. reference data[15]				0.1831

Abbreviation: SD, standard deviation.
Note: Statistical comparison of T0 vs. 0 and T1 vs. reference data.
[a]Significant statistical differences at $p < 0.05$

The total score of the GBI shows a clear benefit from the surgery ($p < 0.0001$). Compared to reference data (►**Table 8**) from one of our earlier studies,[14] no significant difference is given ($p = 0.1831$).

Discussion

With 85.3% female and 14.7% male patients, this study corresponds to numerous other studies that show that women make up the majority of rhinoplasty patients.[14,16] It can be assumed women are more receptive to advertising and what they see online.

According to the 2019 American Academy of Facial Plastic and Reconstructive Surgery (AAFPRS) survey, 72% of AAFPRS members reported that patients seeking plastic surgery want to look better on their selfies—a 15% increase from 2018! Social media is having an increasing impact on facial plastic surgery.[17] Nasal surgery is one of the procedures that is increasingly requested due to the influence of social media and photo sharing. Sorice et al[18] showed that it has often become a competition among cosmetic surgery patients to post "before and after" surgery photos on Facebook, Instagram, and YouTube.

Chinski et al[19] conclude that rhinoplasty has a positive and statistically significant influence on the beauty of the face. Consistent with this, our patients showed a statistically significant perception of nose T0 versus T1 ($p < 0.0001$) regarding FLZ "body-image" (►**Table 4**).

The positively influenced overall "body-image" is reflected in the significantly better sum score ($p = 0.038$). In addition, other body parts such as the mouth ($p = 0.049$), the bottom

Table 7 FROI-17—functional rhinoplasty outcome inventory[11]

		Study group T0		Study group T1		p (t-test)
	N	Mean	SD	Mean	SD	T0 vs. T1
Overall score	34	31.76	22.47	16.21	11.06	<0.0001[a]
Nasal function	34	26.22	24.36	13.36	10.75	0.001[a]
General symptoms	34	32.77	25.47	19.75	16.26	0.006[a]
Self-confidence	34	47.65	24.99	13.82	17.41	<0.0001[a]

Abbreviation: SD, standard deviation.
Note: Statistical comparison of T0 and T1.
[a]Significant statistical differences at $p < 0.05$.

($p = 0.045$), and the feet ($p = 0.014$) were perceived more positively. Although the results of other parts of the body are not directly related to rhinoplasty, they show that successful nasal surgery has positive effects on attitude and sensation of the body and on the way, people perceive their physical appearance (►**Table 3**).

Cole et al[20] found that the extent of the health improvements with rhinoplasty compared to other plastic procedures (mammaplasty and tummy tuck) is lower. This can be explained by a large number of aesthetic and nonhealth interventions. Despite the predominantly aesthetic reason for the operation, our patients showed highly significant health improvements. With regard to the item freedom from pain ($p = 0.038$) and independence from help ($p = 0.016$), a direct postoperative improvement was found (T0 vs. T1). The patients reached T1 statistically significant results compared to norm in freedom from pain ($p = 0.023$), mobility ($p = 0.002$), and independence from help ($p < 0.0001$) (►**Table 2**). Here it seems that a new body feeling has positive influence on different areas of life. However, according to Stewart et al,[21] patients with predominantly functional problems, like our participants are often satisfied with the result of a nose job if the respiratory function is improved.

Our patients already showed T0 to be statistically significantly more emotionally stable ($p = 0.043$) than the norm, which was exacerbated by operation T1 ($p = 0.015$) (►**Table 5**). A postoperative effect was not found 6-month after the operation. A longer follow-up time may be needed to address this issue.

With regard to self-esteem, our results are in agreement with Moss and Harris,[22] who evaluated long-term results of cosmetic interventions and showed that aesthetic surgery can statistically improve self-esteem, depression, and anxiety, with only a slight improvement in self-esteem after 6 months. We also found a minimal and nonsignificant improvement 6 months post-surgery, but statistically significant T1 results compared to the norm population ($p = 0.025$) (►**Table 6**). Studies comparing patients with cosmetic rhinoplasty with functional patients showed that aesthetic patients had lower self-esteem and body image,[23,24] but higher improvement of QoL, while when both, aesthetic and functional reasons combined were the reason for surgery, the level of benefit is the highest.[25] We conclude that emotional stability is positively linked to self-esteem. This hypothesis is supported by studies that show a connection of emotional stability with happiness[26,27] and self-esteem with happiness.[27,28]

We excluded three patients who underwent revision because of the prolonged treatment. At the time point of T1, the result was not comparable to the other participants. The reoperation rate was three out of 44 patients (6.8%) and is lower than the reported value of 9.8% in the work of Neaman et al.[29] The treatment of only one, experienced and board-certified surgeon could be the reason for this low re-operation rate.

Our results of the subjective patient evaluation also underline the positive influence of the operation on the patient's well-being. The ratings showed statistically significant postoperative improvements in all items of the FROI

(overall nose, nasal function, general/further symptoms like sleep disorders and confidence improvement by aesthetic changes) (►**Table 7**). The results underline the clear and sustained positive influence of the operation on the patient's outcome.

A benefit of rhinoplasty is also shown in the total GBI score ($p < 0.0001$) (►**Table 8**). This finding is inline by a study by Alsarraf[30] who reported the improvement in the health status of 88% of the patients in their study on 26 patients.

In summary, it can be said that regardless of motivation or demand,[31] almost all patients benefit from rhinoplasty. In his study, Murrell[32] demonstrated a statistically significant correlation between the subjective and objective improvements after rhinoplasty. In aesthetic surgery, however, patients need to be realistic about the limitations and outcomes that can be expected in order to gain emotional benefits. Unrealistic expectations regarding postoperative changes in life[33] or an extremely positive self-assessment that is not perceived by the environment can lead to dissatisfaction. However, with our results, we can recommend rhinoplasty as a successful procedure.

One of the strengths of the current study is the prospective design and the number of validated disease- and nondisease-specific questionnaires. To the best of our knowledge, there is currently no such detailed research in the area of QoL after rhinoplasty. The literature offers a variety of questionnaires focusing on generic- and disease specific- QoL,[34] but many of them have not been validated. To not oversize the questionnaire package, other useful questionnaires like SCHNOS[35] or Face-Q[36] were not considered for data collection.

We used our special-chosen questionnaire package with good experiences on our numerous researches regarding QoL after plastic, aesthetic, and reconstructive surgery for almost 20 years.

Due to the large number of validated questionnaires evaluated, we consider this prospective study to be unique. Another strength of our study is that all interventions were performed by a single surgeon, which ensured a homogeneous procedure and asthenic perception. Nevertheless, this could also be negative as only one surgeon's opinion for and against a surgery can influence the outcome.

Conclusion

In cosmetic surgery, the aesthetic result is the main factor in patient satisfaction. This prospective study shows that rhinoplasty in various areas such as health, body awareness, and perception of the nose can significantly improve QoL. Rhinoplasty can also benefit patients who already have high self-esteem and greater emotional stability than the general norm before the operation. With our results surgeons can consider different parts of QoL in counseling patients regarding rhinoplasty.

Therefore, we can conclude that these benefits can outweigh the operative-risks of rhinoplasty. Reflecting these clear and sustained positive results, we can advise rhinoplasty as a meaningful procedure regarding QoL improvement.

Conflict of Interest
None declared.

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