

Patient-reported Aesthetic Satisfaction following Facial Skin Cancer Surgery Using the FACE-Q Skin Cancer Module

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Background: Over 5 million basal and squamous cell skin cancers are diagnosed each year. Seventy to 80% of these cancers occur in the head and neck region, for which surgical excision is the standard treatment. As patient satisfaction and quality of life are among the most important outcomes in plastic and reconstructive surgery, understanding patient perception of aesthetic postoperative outcome is critical. The objective of this study was to assess aesthetic satisfaction following facial skin cancer surgery using the FACE-Q Skin Cancer Module in the context of sociodemographic and clinical factors.

Methods: This is a single-center, cross-sectional study in a tertiary care cancer setting of patients who underwent facial skin cancer surgery from March 1, 2016, to March 31, 2018. Patients completed the FACE-Q Skin Cancer Satisfaction with Facial Appearance and Appraisal of Scar scales postoperatively, between May 21, 2018, and October 1, 2018.

Results: Patients completed the Satisfaction with Facial Appearance (n = 405) and Appraisal of Scar scales (n = 408) postoperatively (response rate 39%). Lower postoperative facial appearance and scar satisfaction scores were associated with female gender, younger age (<65 years), surgery location on the lip or nose, repair by flap or graft, and greater defect size. Linear regression models established that younger age, female gender, nose location, and flap repair were independently predictive of lower aesthetic satisfaction.

Conclusions: Sociodemographic factors, central facial location, and repair type strongly contribute to aesthetic satisfaction following facial skin cancer surgery. This patient-reported data may guide counseling regarding postoperative aesthetic outcome and inform patient expectations. (*Plast Reconstr Surg Glob Open* 2019;7:e2423; doi: 10.1097/GOX.0000000000002423; Published online 30 September 2019.)

BACKGROUND

Over 5 million basal and squamous cell skin cancers are diagnosed in the United States each year.^{1,2} Seventy to 80% of these cancers occur in the head and neck region, for which surgical excision is the standard of treatment.³ Diagnosis and treatment can be stressful for patients and families, affecting psychosocial well-being, social

interactions, and other aspects of health-related quality of life.^{4,5} In addition, treatment of facial skin cancers can result in scars or physical disfigurement, which are particularly distressing.⁶ Patients are concerned about changes in their facial appearance following reconstruction and desire meaningful data to help them better understand expected outcomes.^{4,5,7} As patient satisfaction and quality of life are among the most important outcomes in plastic and reconstructive surgery,^{5,8} understanding patient perceptions of aesthetic postoperative outcomes is critical.^{9–11}

Patient-reported outcome measures (PROMs) are questionnaires developed with direct input from patients.

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Received for publication May 7, 2019; accepted July 2, 2019.

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DOI: 10.1097/GOX.0000000000002423

Disclosure: This research was funded, in part, by NIH/NCI Cancer Center Support Grant P30 CA008748. The funder had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication. The FACE-Q Skin Cancer Module is owned by Memorial Sloan-Kettering Cancer Center.

PROMs are generally considered to be the best method for quantifying a patient's clinical experience¹² and have been linked to improved symptom management and enhanced quality of life in head and neck oncology patients.¹³ Prior systematic reviews of PROMs for facial skin cancer showed that reconstructive and aesthetic outcomes of facial skin cancer are poorly addressed.^{14,15} The FACE-Q Skin Cancer Module was developed to assess patient-reported outcomes for surgical treatment of facial skin cancer including postresection aesthetic and health-related quality of life outcomes. It consists of 5 independently functioning scales including overall facial satisfaction (Satisfaction with Facial Appearance) and scar bother (Appraisal of Scars).¹⁶⁻¹⁹

Our goal is to assess patient satisfaction with facial appearance and surgical scar following skin cancer surgery in the context of sociodemographic and clinical factors. Identifying factors that impact postoperative satisfaction from the patient's perspective allows physicians to optimize patient satisfaction and identify patients at risk for aesthetic dissatisfaction.

METHODS

Study Design and Data Collection

Institutional review board approval was obtained from Memorial Sloan Kettering Cancer Center. A single-center, cross-sectional study design was used. All patients ≥ 21 years of age who underwent facial skin cancer surgery between March 1, 2016, and March 31, 2018, were identified. Patients were excluded if they could not speak or read English. The study questionnaire was emailed or mailed to patients based on their preference. Patients completed the questionnaires between May 21, 2018, and October 1, 2018. To optimize response, questionnaires were delivered up to 2 additional times and a final reminder phone call was made for any patient who did not return a completed questionnaire. Study data were collected and managed using Research Electronic Data Capture (REDCap), a secure, web-based application that supports data capture for research studies.

Participant electronic medical records were reviewed for age, gender, marital status, history of anxiety and/or depression, facial skin surgery history, skin cancer type, postoperative defect size, repair type, and repair size. Skin cancers included in this study were basal cell carcinoma, squamous cell carcinoma (including in situ), and melanoma (invasive and in situ). Locations on the face were categorized as forehead/eyebrow, temple, eyelid, cheek, nose, lip, chin, and ear. Repair types were second intention healing, primary closure, flap (advancement, rotation, transposition, interpolated and paramedian forehead flap), and graft (including skin substitutes).

Questionnaire

For this study, the FACE-Q Skin Cancer Module scales addressing appearance were used: Satisfaction with Facial Appearance and Appraisal of Scar. Each scale consists of 8–10 questions that address concerns that a skin cancer pa-

tient may have, such as satisfaction with different aspects of their face (ie, shape and contour) and how bothered they are by certain aspects of their scar (ie, color and length). Responses were rated on a Likert-type scale, summed, and transformed on a 0–100 scale. Higher values represented greater satisfaction with facial appearance and postsurgical scar (ie, the scar is less bothersome).

Statistical Analysis

Data were analyzed by demographic variables, skin cancer type, anatomic surgical location, repair type, defect size, repair size, and time interval between surgery and survey completion. There were 2 primary dependent variables in the analysis: (1) satisfaction with facial appearance, and (2) satisfaction with scar. These variables were continuously scaled with a potential range from 0 to 100. Descriptive statistics were used to assess the distribution of patient and surgical characteristics. Student's *t* tests were used to assess the differences in the 2 dependent variables by patient and surgical characteristics. Variables found to be significant on univariate analysis were included into separate linear regression models to explore associations between satisfaction with facial appearance and satisfaction with scar with patient and surgical characteristics. To help visualize the relationship between the dependent variables and age, marginal-predicted values were estimated from the regression models and plotted. All analyses were performed with Stata v.14.2, Stata Corporation, College Station, Tex.

RESULTS

The survey was administered by e-mail to 1,049 patients ≥ 21 years old who underwent facial skin cancer surgery between March 1, 2016, and March 31, 2018. Of these patients, 73 (6.7%) patients requested a mailed copy of the survey. A total of 408 patients completed the Satisfaction with Facial Appearance scale, and 405 patients completed the Appraisal of Scar scale (38.9% and 38.6% response rates, respectively) between May 21, 2018, and October 1, 2018. Fifty-two patients (5.0%) declined study participation, and 589 patients (56.1%) did not respond to e-mail or telephone communication.

The cohort of patients who completed the Satisfaction with Facial Appearance scale was 49.8% female ($n = 203$) with an average age of 65.6 ± 12.0 years. The cohort of patients who completed the Appraisal of Scar scale was 49.6% female ($n = 197$) with an average age of 65.3 ± 11.9 years. The demographic information of the participants can be found in [Table 1](#). Age and sex of the study participants were similar to those of nonresponders (average age was 65.1 ± 13.8 years and 44.8% were female). The average times between surgery and survey completion for Satisfaction with Facial Appearance and Appraisal of Scar scales were 58.7 ± 34.5 weeks and 59.1 ± 34.4 weeks, respectively.

The overall mean scores for postoperative facial and scar satisfaction were 74.4 and 81.7, respectively. Patients reported lowest facial and scar satisfaction at < 6 months postoperatively, and scores improved over time ([Table 1](#)). Female gender, younger age (< 65 years), unmarried status,

Table 1. Comparison of Postoperative FACE-Q Skin Cancer Scores, by Demographic and Clinical Factors

| Variable | Coding | n | Satisfaction with Facial Appearance | | n | Appraisal of Scar | |
|--|---------------------|-----|-------------------------------------|--------|-----|-------------------|--------|
| | | | Mean Score (SD) | P | | Mean Score (SD) | P |
| Gender | Male (all) | 205 | 79.1 (22.5) | <0.001 | 208 | 86.9 (19.6) | <0.001 |
| | Female (all) | 203 | 69.7 (23.0) | | 197 | 77.1 (25.9) | |
| Age (years) | <65 | 172 | 70.9 (22.7) | 0.001 | 173 | 77.2 (26.2) | <0.001 |
| | ≥65 | 236 | 76.9 (23.3) | | 232 | 85.7 (20.3) | |
| Marital status | Married | 341 | 75.5 (22.6) | 0.04 | 342 | 82.6 (22.5) | 0.34 |
| | Not married | 67 | 68.9 (25.8) | | 63 | 79.5 (27.8) | |
| History of anxiety and/or depression | No | 350 | 75.6 (22.7) | 0.008 | 352 | 82.8 (23.0) | 0.15 |
| | Yes | 58 | 66.9 (24.8) | | 53 | 77.8 (25.3) | |
| Number of facial skin cancer surgeries within the past 2 years | 1 surgery | 321 | 75.3 (23.0) | 0.12 | 317 | 83.5 (23.0) | 0.02 |
| | 2+ surgeries | 87 | 71.0 (23.8) | | 88 | 77.1 (24.2) | |
| History of nonskin cancer facial surgeries | No | 259 | 75.9 (22.6) | 0.09 | 257 | 83.0 (22.1) | 0.30 |
| | Yes | 145 | 71.5 (24.1) | | 143 | 80.4 (25.8) | |
| Wound healing type | Second intention | 33 | 73.9 (23.3) | 0.025 | 34 | 82.4 (21.8) | 0.004 |
| | Primary closure | 223 | 77.2 (22.0) | | 220 | 85.7 (21.1) | |
| | Flap | 110 | 69.0 (24.8) | | 109 | 77.1 (26.0) | |
| | Graft | 42 | 74.3 (23.6) | | 42 | 76.0 (26.0) | |
| Location of surgery | Forehead/eyebrow | 62 | 77.4 (19.9) | 0.774 | 62 | 84.4 (19.8) | 0.020 |
| | Temple | 33 | 73.6 (22.4) | | 33 | 84.5 (24.0) | |
| | Eyelid | 22 | 74.7 (29.0) | | 21 | 90.5 (14.3) | |
| | Check | 113 | 73.3 (28.0) | | 111 | 84.0 (24.8) | |
| | Nose | 105 | 72.6 (19.9) | | 105 | 75.0 (23.8) | |
| | Lip | 24 | 71.4 (21.0) | | 23 | 79.2 (25.3) | |
| | Chin | 15 | 78.1 (21.8) | | 16 | 82.8 (25.2) | |
| | Ear | 34 | 79.0 (20.5) | | 34 | 88.0 (21.9) | |
| Postoperative period | <6 months | 88 | 70.8 (23.4) | 0.198 | 89 | 74.8 (27.3) | 0.006 |
| | 6 months to <1 year | 95 | 73.1 (22.6) | | 96 | 84.2 (21.6) | |
| | ≥1 year | 225 | 76.0 (23.4) | | 220 | 83.9 (22.3) | |

Table 2. Relationship between Size of Surgical Defect/Repair with Patient Satisfaction with Appearance and Patient Satisfaction with Surgical Scar

| Variable | Satisfaction with Facial Appearance | | | Appraisal of Scar | | |
|----------------------------|-------------------------------------|------------------------|------|-------------------|------------------------|------|
| | n | Coefficient (95% CI) | P | n | Coefficient (95% CI) | P |
| Largest diameter of defect | 381 | -0.21 (-0.40 to -0.02) | 0.03 | 378 | -0.16 (-0.34 to 0.03) | 0.09 |
| Largest diameter of repair | 253 | -0.04 (-0.19 to 0.10) | 0.55 | 249 | -0.006 (-0.16 to 0.14) | 0.93 |

and history of anxiety and/or depression were significantly associated with lower postoperative facial satisfaction. Female gender, younger age (<65 years), and history of ≥2 facial skin cancer surgeries in the past 2 years were significantly associated with lower postoperative scar satisfaction scores (ie, more scar bother).

Of anatomic sites, ear and eyelid were associated with the highest overall facial and scar satisfaction scores, whereas lip and nose were associated with the lowest scores (Table 1). For patients who underwent surgery on the nose, mean facial (67.4) and scar (68.0) satisfaction scores were lowest <6 months following surgery, and improved over time (74.2 and 79.1 ≥1 year following surgery). Those who underwent surgery on the nasal tip reported the lowest mean scar satisfaction (62.9), compared with other nasal locations such as the ala, bridge, dorsum, and sidewall (range 72.3–86.2). For the lip location, the mean facial satisfaction score (67.7) was lowest <6 months following surgery and improved over time (74.8 ≥1 year following surgery).

Among repair types, primary closure was associated with the overall highest mean facial and scar satisfaction scores and flap and graft repairs were associated with overall lowest postoperative mean facial and scar satisfac-

tion scores (Table 1). There were no differences in the scores based on the anatomic location of the graft donor site. For patients who underwent flap repair, mean facial (62.8) and scar (71.9) satisfaction scores were lowest <6 months following surgery and improved over time [70.5 (facial) and 78.8 (scar) ≥1 year following surgery]. Those who underwent paramedian forehead flap reported the lowest mean facial satisfaction score (61.4) compared with other flap types (range 66.6–73.1). Larger defect size was also predictive of decreased aesthetic satisfaction, whereas no association was seen with repair size (Table 2).

Linear regression models established that female gender and repair by flap were independently predictive of lower satisfaction with facial appearance (Table 3). Younger age, female gender, surgery on the nose, and repair by flap were independently predictive of lower scar appraisal. Marginal-predicted values of facial aesthetic and scar satisfaction scores demonstrated a direct relationship with patient age (Figs. 1, 2).

DISCUSSION

Our study shows that anatomic location, repair type, and patient factors influence a patient's aesthetic satis-

Table 3. Results from Linear Regression Models with Satisfaction and Scar as the Dependent Variables and Age, Gender, History of Anxiety and/or Depression, Nose Location, and Repair by Flap as the Independent Variables

| Variables | Coefficient | t Value | Standard Error | P | 95% CI | |
|--|-------------|---------|----------------|--------|--------|-------|
| | | | | | Lower | Upper |
| Satisfaction with facial appearance | | | | | | |
| Age | 0.19 | 0.1 | 1.96 | 0.051 | 0 | 0.38 |
| Gender | -8.34 | 2.3 | -3.63 | <0.001 | -12.85 | -3.82 |
| History of anxiety/depression | -6.18 | 3.22 | -1.92 | 0.056 | -12.52 | 0.16 |
| Nose versus all other | 0.37 | 2.63 | 0.14 | 0.887 | -4.79 | 5.54 |
| Flap versus all other | -7.56 | 2.58 | -2.93 | 0.004 | -12.63 | -2.49 |
| Constant | 77.36 | 7.87 | 9.83 | <0.001 | 61.88 | 92.84 |
| Appraisal of scar | | | | | | |
| Age | 0.24 | 0.1 | 2.49 | 0.013 | 0.05 | 0.43 |
| Gender | -8.31 | 2.3 | -3.61 | <0.001 | -12.84 | -3.79 |
| History of anxiety/depression | -1.36 | 3.36 | -0.41 | 0.685 | -7.96 | 5.24 |
| Nose versus all other | -7.83 | 2.62 | -2.99 | 0.003 | -12.99 | -2.67 |
| Flap versus all other | -5.48 | 2.59 | -2.11 | 0.035 | -10.57 | -0.38 |
| Constant | 82.43 | 7.91 | 10.42 | <0.001 | 66.88 | 97.99 |

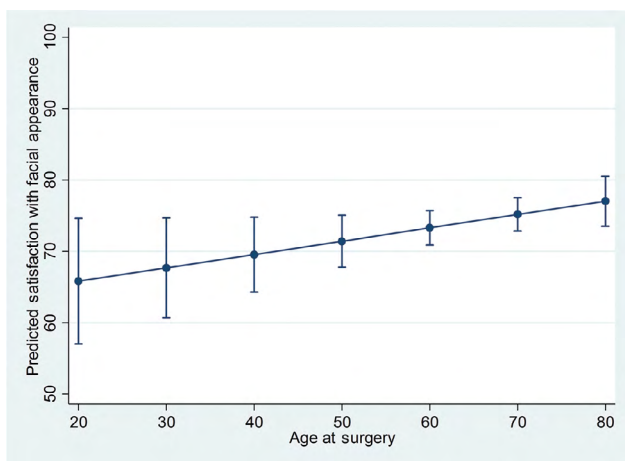


Fig. 1. Marginal-predicted values for FACE-Q Skin Cancer Satisfaction with Facial Appearance scores, by age with 95% CIs. Higher scores indicate greater facial satisfaction.

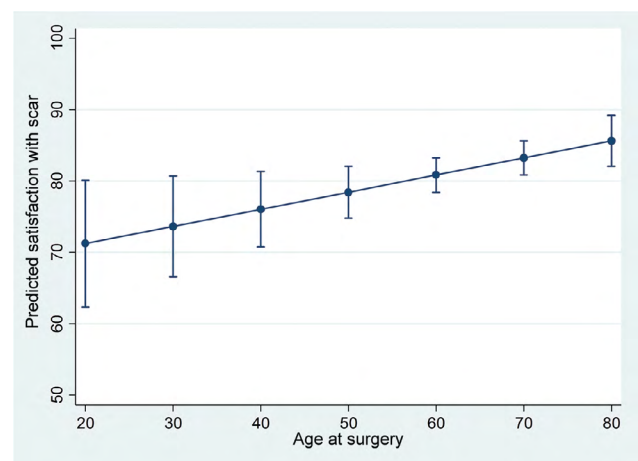


Fig. 2. Marginal-predicted values for FACE-Q Skin Cancer Appraisal of Scar scores, by age with 95% CI. Higher scores indicate less scar bother.

faction. Notably, younger age and female gender were independently predictive of lower postoperative facial aesthetic satisfaction. Young age has been identified as a negative predictor for satisfaction in patients seeking facial cosmetic surgery²⁰ and is associated with higher cosmetic expectations in breast surgery.²¹ As the incidence of skin cancer is on the rise in persons <40 years old, the disparity in cosmetic outcomes seen in the youngest patients demonstrate that tailored pre- and postoperative counseling may be required.²² Conversely, older age has been linked to more favorable cosmetic outcomes.²³ Greater skin laxity seen in older patients may provide additional local skin for repair, ultimately leading to less tension on the wound²⁴ and primary closure without the need for flaps. In addition, the presence of irregular contour and pigmentation in older patients can better camouflage surgical scars. Lower aesthetic satisfaction was reported by females as well. Compared with men, women experience greater difficulty adapting to facial cancers, place a higher value on facial aesthetics,^{25,26} and have worse appearance-related quality of life at baseline^{27,28} which may contribute to these findings.

Compared with all repair types, primary closure was associated with the highest aesthetic and scar satisfaction following surgery. Although second intention healing tends to be used for smaller, more superficial wounds, it is also associated with slower wound healing and possible scarring.²⁹ Lower satisfaction was seen in flap and graft repairs. Flap repairs require greater tissue movement and result in more swelling and bruising compared with other repair types. Flaps may also heal with pin-cushioning, creating uneven surface contour and a patch-like appearance,³⁰ which may contribute to lower aesthetic satisfaction scores ≥ 1 year following surgery compared with all other repair types. When appropriate, linear closure is preferred over a local flap. For graft repairs, differences in texture, color tone, and thickness compared with normal skin likely contribute to lower aesthetic satisfaction³¹ and lower scar appraisal in the long term. Larger defect size was also predictive of decreased facial satisfaction, likely due to the need for complex repairs.

Among facial anatomic sites, the lip and nose were associated with the lowest postoperative aesthetic and scar satisfaction. The lip is an important part of the face due

to both aesthetic and functional considerations. Large defects of the lip and buccal mucosa created after wide cancer resections are difficult to reconstruct due to loss of skin, muscle, and mucosa.³² Surgery on the lip also impacts facial expression during animation, which may contribute to decreased overall facial aesthetic satisfaction. Nasal skin is inelastic and frequently requires flap repair. Nasal flaps are more likely to develop pin-cushioning and scar erythema. The heightened scar dissatisfaction reported ≥ 1 year following surgery may be due to greater scar visibility, as the nose is prominent and centrally located. Within this cohort of patients, those who underwent surgery on the nasal tip report the lowest scar satisfaction. Previous studies suggest that patients undergoing rhinoplasty are least satisfied with the tip of their nose before surgery.³³ In addition, nasal tip reconstruction is a challenge due to the risk of asymmetry and irregularities in contour. Even a subtle irregularity in this highly convex area may be noticeable to the patient and to others.

Marital status and history of anxiety and/or depression were associated with significantly greater postoperative facial satisfaction. Studies have shown that marital status is predictive of unwillingness to undergo cosmetic surgery,^{34,35} indicating this cohort may be more satisfied with baseline aesthetics compared with unmarried individuals. History of anxiety and/or depression was associated with significantly lower facial satisfaction. Excessive body image dissatisfaction is a symptom of several psychiatric disorders and may contribute to the patient's perception of postoperative aesthetic satisfaction. Patients with a psychiatric history may have lower aesthetic satisfaction at baseline, contributing to poorer postoperative facial satisfaction. These data support findings across cancer disciplines that suggest that the psychosocial context, in addition to the disease itself, influences treatment outcomes.³⁶

Patients with a recent history of 2 or more facial cancer surgeries within the past 2 years reported significantly lower scar satisfaction compared with patients with only 1 recent surgery. The cumulative burden of multiple facial surgeries in a short period of time may impact perception of overall aesthetics. Patients reported the lowest facial and scar satisfaction <6 months following surgery, and satisfaction improved over time. Patients are often counseled that most scar issues will significantly improve or resolve in the first 12–18 months after surgery.³⁷ This study supports that healing continues in the long-term postoperative period and improves over time. Future studies using the FACE-Q Skin Cancer Module to examine specific postoperative time-intervals may identify optimal time points for follow-up and intervention. Our data also support the value of long-term follow-up, especially for those at higher risk for dissatisfaction. Although many facial distortions may resolve without intervention, treatments to improve reconstruction can be offered to those who desire significant aesthetic improvement.

Limitations

Limitations of our study include a population from a single tertiary center and cross-sectional design. Patients surveyed in the <1-year postoperative period were distinct

from patients in the ≥ 1 -year postoperative period; studies longitudinally following patients for their postoperative aesthetic satisfaction may better capture patient experience over time. Selection bias may have been present due to our study's survey-based nature. In addition, our results may underestimate patient aesthetic dissatisfaction, as it is possible that survey responders who agreed to participate were more satisfied overall compared with nonresponders.

CONCLUSIONS

Although most patients are generally satisfied with postoperative aesthetic outcomes, we have identified independent sociodemographic and clinical predictors for aesthetic dissatisfaction using the FACE-Q Skin Cancer Module. We showed that female gender, younger age, nose location, flap repair, and greater defect size are independently predictive of lower postoperative facial and scar satisfaction. The results of this patient-reported study may provide surgeons with valuable insight that may enhance preoperative planning and improve patient satisfaction.

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