Measuring aesthetic results after facial skin cancer surgery by means of the FACE-Q

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Received: 20 December 2019 / Accepted: 13 January 2020 / Published online: 29 January 2020
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Abstract

Background Skin cancer is the most commonly occurring type of cancer. However, the influence of facial skin cancer surgery on patients' perceived aesthetic appearance is poorly understood. The objective of this study was to provide an insight into how patients perceive the aesthetic outcome of facial skin cancer surgery by means of a specialised patient-reported outcome measure designed for the aesthetic evaluation of the face: the FACE-Q.

Methods A total of 47 patients with non-melanoma skin cancer who were scheduled for Mohs's micrographic surgery (MMS) or standard surgical excision (SE) were included. These patients filled out three different FACE-Q questionnaires: *satisfaction with facial appearance*, *social function*, and *satisfaction with outcome*. Follow-up was conducted after baseline at 1 month and 3 months post-surgery.

Results No significant differences were detected between baseline and follow-up regarding social function and satisfaction with facial appearance. However, after 3 months, patients were significantly more satisfied with the result of surgery when compared with the 1-month post-surgery follow-up.

Conclusions The perceived aesthetic appreciation of patients does not seem to be significantly influenced by facial skin cancer SE or MMS surgery in this 3-month follow-up study.

Level of evidence: Not ratable.

Keywords Facial skin cancer · Facial surgery · Reconstructive surgery · FACE-Q

Introduction

Skin cancer is the most commonly occurring type of cancer, of which basal cell carcinoma (BCC) is the most common form with an estimated incidence of more than four million cases in the US alone [1]. In the Netherlands, the incidence of BCC is of almost thirty thousand cases each year [2]. The incidence of BCC is rising annually [3].

Electronic supplementary material The online version of this article (<https://doi.org/10.1007/s00238-020-01625-z>) contains supplementary material, which is available to authorized users.

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Surgery is usually the first choice of treatment for non-melanoma skin cancer (NMSC). However, it can result in extensive facial defects with noticeable scars, negatively influencing the overall well-being of patients [4].

Surgical treatment techniques for NMSC include standard surgical excision (SE) and Mohs' micrographic surgery (MMS). MMS has been developed to spare the healthy tissue by delivering a comprehensive assessment of resection margins [5].

During the past decade, patient-reported outcome measures (PROMs) are becoming increasingly appreciated when evaluating different therapies in dermatology [6, 7].

To determine the health-related quality of life (QOL) after NMSC by means of PROMs, a number of studies have been conducted evaluating these types of tools. In patients with NMSC, promising PROMs with the most potential for clinical application include the Skin Cancer Index, Skindex, Skin Cancer Quality of Life Impact Tool, Skin Cancer Quality of Life questionnaire, and the Facial Skin Cancer Index [8–11]. These tools have proven to

have a role in the assessment of the overall quality of life of patients with (facial) skin cancer. However, when skin cancer occurs in such a delicate area as the face, it can be insightful to be able to comprehend how the facial appearance perceived by patients is influenced by the surgical removal of skin cancer. For this purpose, the abovementioned QOL tools are not useful as they do not focus on the assessment of facial appearance by patients in detail after the removal of facial skin cancer.

In order to assess (facial) scars, some specific tools have been applied. The Vancouver Scar Scale (VSS), developed to provide a more objective measurement of burn scars, has proven to be a reliable tool and has been widely used for the assessment of scars [12]. However, one of the major disadvantages of this tool is that it does not take patient scar perception into consideration; therefore, it does not evaluate the quality of life of patients. Since 2004, the Patient and Observer Scar Assessment Scale (POSAS) has been developed as a useful alternative tool for assessing scars [13, 14]. The distinctive characteristic of this tool is that it includes about the opinion of patients regarding their scar. Nevertheless, this tool does not cover the influence that scars have on patients' quality of life [15–17]. Regarding scars after NMSC surgery, a few studies have shown acceptable results in patients' perception [18, 19]. However, these data about the aesthetic evaluation after NMSC surgery are primarily limited because no validated PROMs were employed in these studies.

Extensive and qualitative data with respect to the patients' perceived facial appearance after face reconstruction after NMSC is lacking in times where there is an increasing emphasis in conserving a decent facial appearance after surgery.

The FACE-Q, developed by Klassen et al. in 2010, is a validated PROM designed to evaluate patients' experience and outcomes after facial aesthetic procedures. In contrast to POSAS, for example, FACE-Q entirely consists of questionnaires that are exclusively filled out by patients. The FACE-Q is composed of more than 40 independently functioning scales in four distinct domains: satisfaction with facial appearance, health-related quality of life, adverse effects, and process of care. It has proven to be a useful tool for evaluating multiple units of the face with respect to aesthetics [20–22]. Therefore, we consider this to be a helpful instrument in assessing patient satisfaction with facial appearance after the removal of facial skin cancer.

Aim

The aim of this study was to provide more insight in the perceived aesthetic outcome of patients after facial skin cancer

surgery. The judgement of aesthetic outcome will take place by means of a specialised aesthetic PRO instrument, the FACE-Q.

Materials and methods

Study design

This prospective study was conducted at the Maastricht University Medical Center (MUMC+) between October 2017 and April 2018. Patients undergoing a surgical treatment for a histologically proven facial skin cancer were approached and informed about the study via mail at least 1 week before the surgery was arranged.

Data collection

For the assessment of their facial image, patients were asked to complete three different FACE-Q questionnaires in total, at baseline and at the two follow-ups. Patients who had no cognitive impairment and who were fluent in Dutch were included. The questionnaires were sent to the patients via mail.

Study population and follow-up

Patients with different types of skin cancer, including basal and squamous cell carcinomas, intra-epidermal melanomas, and basosquamous carcinomas, were asked to participate. Only patients with malignancies located on the face were included. All patients were treated by a board certified or resident dermatologist by means of surgical excision or MMS. Reconstruction was performed either by the same dermatologist or by a board certified or resident plastic surgeon. Patients who already underwent facial surgery for a different lesion in a period shorter than 6 months prior to the start of this study were excluded. Additionally, patients requiring surgery for multiple skin cancer lesions simultaneously were excluded. Only one procedure per patient was performed. Evaluation took place at the baseline (1 to 2 weeks prior to surgery), 1 month, and 3 months post-surgery.

Assessment

For the assessment of patients' satisfaction with their facial appearance in general and in social situations, FACE-Q questionnaires were used (Appendices 1–3). This tool was chosen because FACE-Q is one of the few tools that meets the current recommendation for the development and validations of

PROMs [23]. Although the FACE-Q consists of over 40 scales in four domains, it is designed in a way that a subset of FACE-Q scales can be used, as each scale is scored independently. Therefore, it is not necessary to complete all scales.

Scales that were utilised in this study were *satisfaction with facial appearance* (for the assessment of patients' facial appearance in general), *social function* (to assess facial appearance in social situations), and *satisfaction with result*. The three scales were administered at baseline (except for the *satisfaction with result* questionnaire), 1 month, and 3 months follow-up. These questionnaires are part of the satisfaction with the facial appearance domain, the health-related quality of life domain, and the process of care domain of the FACE-Q, respectively.

Collected baseline characteristics were age, sex, the location of the skin cancer, and the maximum diameter of the skin cancer lesion in millimetres.

Data analysis

Responses to the FACE-Q questions were scored based on a Likert scale ranging from 1 to 4. FACE-Q questionnaires contain a table that transforms the sum of each FACE-Q questionnaire to a standardised Rasch transformed score from 0 to 100. A higher Rasch score indicates a greater satisfaction or quality of life. Mean overall transformed Rasch scores were compared using paired *t* tests when data was normally distributed and by means of Wilcoxon signed rank test when data was not normally distributed. Subgroup analyses were performed based on the location on the face and size of the defect. Power analysis indicated that a sample size of at least 35 patients was necessary to detect a one-point difference in answers (according to the Likert scale) for FACE-Q questionnaires between the different follow-up moments. A one-point difference includes a change from very or somewhat (dis)satisfied to somewhat or very (dis)satisfied or from somewhat or definitely (dis)agree to definitely or somewhat (dis)agree (see Appendices 1–3). The program SPSS (Statistical Package for Social Sciences, version 22.0.0) was used for statistical analysis.

Results

A total of 138 patients were approached, of whom 47 (23 men and 24 women) participated in the study for an overall response rate of 34%. From the initial 47 included patients, 35 filled out the 1-month questionnaires and 42 filled out the final 3-month questionnaires. The main reason for loss to follow-up is that patients who were lost to follow-up returned the 1-

month and 3-month questionnaires too late. A delay of no more than 1 week was considered acceptable by the researchers. Patients who were scheduled for surgery were recruited via mail. Patients who did not return the consent forms were not contacted again for non-participation.

The mean age of the patients was 71 years (ranging from 43 to 85). Forty patients had a basal cell carcinoma, 4 suffered from a squamous cell carcinoma, 2 were diagnosed with intra-epidermal melanoma, and 1 patient had a basosquamous carcinoma. Skin cancer was located on the nose (30%), eyelids (17%), frontal or temporal (32%), and the nasolabial folds (21%).

Lesion diameters were between 2 and 17 mm, with a mean diameter of 7.9 mm. Surgery was performed on 41 occasions by a (resident) dermatologist and six times by a (resident) plastic surgeon. In 27 cases, Mohs' surgery was used. The rest of the patients were treated by means of surgical excision. In 44 cases, the wounds were primarily closed. In two cases, full-thickness skin grafts were used and one time a Hughes flap was used for the closure of a defect at the lower eyelid. All patient characteristics are presented in Table 1.

Table 1 Patient characteristics

Mean age (years)	71
Min	43
Max	85
Sex	
Male	23
Female	24
Location	
Frontal/temporal	15
Nose	14
Eyelids	8
Nasolabial	10
Type of skin cancer	
BCC*	40
SCC*	4
Intra-epidermal melanoma	2
Basosquamous carcinoma	1
Lesion diameter	
Min (mm)	2
Max (mm)	17
Mean (mm)	7.9
< 5 mm	11
5–10 mm	14
> 10 mm	18

*BCC, basal cell carcinoma; SCC, squamous cell carcinoma

Fig. 1 FACE-Q scores at the start of the study (1 to 2 weeks prior to surgery) and at the two follow-ups

Social function

Mean transformed Rasch scores regarding patients' satisfaction with their facial appearance in social situations are shown in Fig. 1. No significant differences were found in social function between baseline (78.02, SD:19.41), 1 month (77.42, SD:22.79), and 3 months (80.78, SD:20.25) after surgery.

Satisfaction with facial appearance

When patients' satisfaction with their facial appearance in general was assessed, again no statistically significant differences were identified between the start of the study and the two follow-up moments (Fig. 1). Rasch scores were 70.27 (SD 17.98) at baseline, 68.53 (SD 17.34) 1 month post-surgery, and 73.05 (SD 22.32) at 3 months post-surgery.

Result satisfaction

Statistically significant differences in the mean Rasch scores were noticed when patients' satisfaction with the result of surgery was observed at the 1-month and 3-month follow-up. Mean Rasch scores rose from 59.48 (SD 30.05) at 1 month post-surgery to 71.63 (SD 24.11) at 3 months post-surgery, displayed by a *P* value of 0.041. When standard surgical excision (*n* = 20) was compared to Mohs' surgery (*n* = 27), no statistically

significant differences in satisfaction with the end result were observed (Table 2).

Figure 2 displays the satisfaction with the result surgery for the four different facial sites. The largest increase in satisfaction with the result between 1 and 3 months post-surgery was seen in skin cancer surgeries at the level of the nose (from 57.00, SD 39.12 to 84.92, SD 22.63), followed by skin cancer removal at the eyelids (from 58.67, SD 31.47 to 71.71, SD 22.02), nasolabial folds (from 46.00, SD 26.50 to 51.67, SD 26.49), and frontal/temporal (from 71.90, SD 17.50 to 73.15, SD 16.71). However, the improvement in satisfaction with the result for all facial sites was not considered statistically significant between the two follow-up moments. Also, no statistically significant differences were found between the four groups at the two follow-ups.

Table 2 Result satisfaction: standard surgical excision (SE) vs. Mohs' micrographic surgery (MMS)

	SE	SD	MMS	SD	<i>P</i>
1 month	51.38	28.45	64.12	30.59	0.22
3 months	64.75	27.32	76.96	20.50	0.11

Fig. 2 FACE-Q: satisfaction with outcome scores for four different facial sites at two follow-up moments

Regarding the size of skin cancer lesions, Fig. 3 shows the satisfaction with the result of surgery. Lesion sizes were divided into smaller than 5 mm, 5 to 10 mm, and larger than 10 mm lesions. The Rasch

scores from patients with lesions larger than 10 mm displayed a statistically significant increase between 1 month (62.79, SD 21.79) and 3 months (79.60, SD 20.64) post-surgery, displayed by a *P* value of 0.038.

Fig. 3 FACE-Q: satisfaction with outcome scores for the size of the skin cancer at two follow-up moments

Lesions smaller than 5 mm (51.00, SD 39.11 at 1 month and 63.18, SD 31.12 at 3 months) and lesions between 5 and 10 mm (62.17, SD 32.74 at 1 month and 69.89, SD 22.04 at 3 months) did not show a statistically significant increase in the mean Rasch scores between 1 and 3 months post-surgery (*P* values of 0.378 and 0.795, respectively). Furthermore, no statistically significant differences in result satisfaction were found between all lesion sizes at the two follow-ups.

Discussion

The major result of this study is that patients are significantly more satisfied with the aesthetic result of facial skin cancer surgery (by means of MMS or SE) at 3 months after the surgery when compared to 1-month post-surgery.

Our results also show that skin cancer surgery does not induce a significant decrease in the patients' perceived overall facial appearance between baseline, 1 month, and 3 months after surgery. These results have been, for the first time, measured by a PROM designed for the aesthetic evaluation of the face: the FACE-Q. FACE-Q has proven to be a helpful and valuable tool in the assessment of facial aesthetic procedures, for instance in the treatment with botulinum toxin, in face lifting procedures, and (non)surgical rhinoplasty [24–26].

The increase in the patients' satisfaction with their facial appearance over the course of 2 months post-surgery could be explained by the hypothesis that in the first 3 months, scars are erythematous and therefore more noticeable, as observed in a study by Bond and colleagues [27]. Furthermore, there is an increase in the net production of collagen until approximately 21 days after the skin injury takes place, giving scars a more thickened appearance. After this, the collagen synthesis rate decreases. Subsequently, capillary redness density decreases as the regression of the inflammatory process occurs and scars pass into the maturation phase, becoming less prominent [28].

The results also show that patients' satisfaction with the outcome of surgery significantly improves in larger defects on the face (> 10 mm) between 1 and 3 months post-surgery. The effect on patients' satisfaction with the surgery outcome over the course of 2 months for

smaller defects (< 10 mm) appears to be less noticeable in this study, as no significant differences in patients' satisfaction with the outcome were observed between the two follow-up moments. We hypothesise that patients' expectations about the outcome of the surgery could be influenced by the information about the expected aesthetic result that was expressed by the physician before surgery. Because the selection of patients took place by different physicians, observer bias could have occurred. For a better understanding of the correlation between the size of facial skin cancer and patients' satisfaction with the outcome of the surgery, larger study populations with unambiguous instructions from doctors in future studies are needed.

The study also revealed that no significant differences in patients' satisfaction with the result of therapy were observed between MMS and SE at the two follow-ups. However, this study was not designed to compare SE and MMS with respect to the aesthetic outcome. Considering that MMS does not belong to the standard treatment modalities in most hospitals in Europe yet, the results of this study can also be applicable in practices where the only therapeutic option is SE.

No significant differences were seen with respect to patients' outcome satisfaction when comparing different facial zones. However, in order to assess facial zones or better, the aesthetic subunits of the face where skin cancer surgery has the highest impact on the perceived aesthetic outcome, larger study populations are needed. Also, despite most patients' appreciation with their facial appearance in general and in social situations returns to baseline after 3 months follow-up, a longer follow-up period is preferable to assess the aesthetic impact of NMSC facial surgery more thoroughly.

Conclusion

This study showed that facial skin cancer surgery by means of SE or MMS is able to conserve the patients' perceived aesthetic appreciation of their face in a 3-month follow-up study assessed by means of FACE-Q scales. It also showed that patients' satisfaction with the aesthetic outcome resulted in a significant improvement between the 1- and 3-months post-surgery timeline.

Compliance with ethical standards

Conflict of interest Kant SB, Mosterd K, Kelleners-Smeets NWJ, Van der Hulst RRWJ, and Piatkowski A declare that they have no conflict of interest.

Informed consent All participants give their informed consent in writing prior to inclusion in the study.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee of the Maastricht University Medical Center (MUMC+) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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