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ORIGINAL ARTICLE

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Patient-reported outcome measurements in facial skin surgery and a comparison between Mohs micrographic surgery and conventional excisions

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Abstract

Background: Knowledge of the psychosocial impact of facial skin surgery on patients can help improve counselling strategies.

Objectives: The objective was to measure the psychological impact of facial skin cancer surgery on patients over a 1-year period. Secondary objective was to measure the difference between Mohs micrographic surgery (MMS) and conventional excision (CE) on these parameters.

Methods: This observational survey study was conducted between March 2019 and July 2020. Patients who had facial skin surgery using MMS or CE were selected. Five surveys were conducted on four timepoints (preoperative, 1 week, 3 months and 1 year post-operative) measuring the quality of life, perceived stigmatization, body image, satisfaction with facial appearance and psychosocial distress.

Results: A total of 228 patients (MMS 154 patients, CE 74 patients) were included for the analysis. Scores for quality of life did not significantly change, in the year after surgery (PCS-12 mean 50.5, SD 9.3 and MCS-12 50.6, SD 9.4); however, stigmatization (F (3, 235,39) 7,26, $p < 0.01$, $d = -0.07$), body image concerns (F (3, 198,28) = 3.75, $p < 0.01$, $d = -0.14$), satisfaction with facial appearance (F (3, 205,18) = 10.74, $p < 0.01$, $d = 0.43$) and psychosocial distress (F (3, 208,69) = 9.26, $p < 0.01$, $d = -0.15$) did change over time. The use of MMS or CE did not significantly affect outcome scores after 1 year.

Conclusions: Patients receiving facial skin cancer surgery exhibited low scores for perceived stigmatization and body image concerns. Their quality of life was not statistically influenced by facial surgery, and their satisfaction with their facial appearance and psychosocial distress even improved after 1 year. The results suggest that the surgical treatment type (MMS or CE) does not influence the outcome. The overall results can help in counselling strategies to improve expectations for patients receiving facial surgery.

INTRODUCTION

Non-melanoma skin cancers (NMSCs) are the most common type of cancer, and their incidence continues to increase.[1] Basal cell carcinomas (BCCs) and squamous cell carcinomas (SCCs) represent the largest proportion of NMSCs and surgery remains the standard treatment.[2] Frequently used treatments are conventional excision (CE) and Mohs micrographic surgery (MMS), which are effective treatments and exhibit low recurrence rates (12.2% and 4.4%, respectively), for BCC.[3] The difference is, that MMS is performed in stages, assessing the tissue while

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the patient waits, allowing 100% of the tissue margins to be examined. NMSCs are mostly located in the head and neck area (40.2% of BCCs and 33.4% of SCCs) requiring facial surgery.[4] Facial surgery, however, can lead to psychological distress, anxiety and reduced quality of life, due to changes in facial appearance.[5,6] MMS has been shown to have a high patient satisfaction,[7] but quality of life does not necessarily improve compared to CE.[8] Patient-reported outcome measures (PROMs) can help to understand the impact of surgical interventions.[9] New strategies have been attempted to improve patient satisfaction, for example, with extra care for MMS patients, but they have not always resulted in higher satisfaction.[10]

However, many different general PROMs are available (e.g. SF-36, Dermatology Life Quality Index [DLQI], Skin Cancer Index [SCI], FACE-Q), and only a few focus on skin cancer, making them difficult to compare.[11] In addition, there has been a tendency to focus on quality of life, while other clinically relevant psychosocial consequences of dermatological conditions have been studied less often. For example, perceived stigmatization refers to an individual's perception of negative attitudes or practices related to their condition. In visible skin conditions, stigmatization is common and is known for its impact on patients' mental health.[12] Patients could have negative feelings or shame due to a skin disease, such as psoriasis.[13–15] Also, the skin is the visible part of the body, and a skin disease can lead to body image concerns, which include a preoccupation with a patient's appearance.[16] Body image concern is an indication for body dysmorphic disorder (BDD), which is a psychiatric condition characterized by excessive concern and occupation in perceiving flaws or defects in appearance, causing distress and anxiety.[17] The prevalence of BDD symptoms has been found to be fivefold higher in dermatological patients, and a prevalence of 3.4% has been found in NMSC patients.[18] These features are becoming studied more often in dermatology, but not frequently in skin cancer patients.

The primary objective of this study was to measure the impact of facial skin cancer surgery on patients' psychological well-being over a 1-year period. Our hypothesis was that skin surgery negatively influences patients' psychological well-being. Secondary objective was to measure the difference between MMS and CE in affecting patients' psychological well-being. We believed that because MMS is a more extensive surgery with a lower recurrence rate, it would have a positive influence on the quality of life compared to CE.

MATERIALS AND METHODS

Participants and procedure

This study was conducted at the Leiden University Medical Center (LUMC) between March 2019 and July 2020. The medical ethical board approved this study and assessed that the Medical Research Involving Human Subjects Act (WMO) did not apply.

Participants were recruited in the outpatient clinic and asked to participate if they required surgery for a malignant skin lesion located on the face. All patients 18 years or older were eligible for inclusion. Patients who were illiterate, non-Dutch-speaking or had comorbidities that could influence self-reflection (e.g. dementia) were excluded.

Included participants received information regarding the study via email. The information, written informed consent and data were collected using Castor Electronic Data Capture (Castor B.V. Amsterdam, The Netherlands).[19] MMS and CE were performed in the outpatient clinic by the dermatologist. CE specimens were histologically examined by conventional bread loaf technique. Patients received the questionnaires 1 week before, 1 week after, 3 months after and 1 year after their surgery.

Instruments

This study employed self-report questionnaires measuring the patients' quality of life and psychosocial well-being. The shorter version of 12 questions (SF-12) from the standardized health-related questionnaire 'Short Form Survey Instrument' (SF-36) was used to determine the impact on quality of life. The physical component summary (PCS) and mental component summary (MCS) scores were calculated. For this study, scores were adjusted for the Dutch population.[20] Scores ranged from 0 to 100 with higher scores representing better physical and mental health functioning. The SF-12 has not been specifically validated in skin cancer patients, but has been validated and found reliable in cancer patients.[21] The stigmatization subscale of the 'Impact of Skin Diseases on Daily Life' (ISDL) questionnaire and the Body Image Concern Inventory (BICI) were used to measure the effect on perceived stigmatization and body image concerns. The six-item stigmatization subscale could be answered on a four-point Likert scale from 1 (not at all) to 4 (completely). The total score (range 6–24) was calculated, with a higher score representing higher levels of perceived stigmatization. The reliability and validity of the ISDL has been assessed in patients with psoriasis or atopic dermatitis.[22] The BICI consists of 19 items measuring body image concern. Questions are answered on a five-point Likert scale from 1 (never) to 5 (always).[23,24] The total score is calculated, with a higher score representing a higher concern. The BICI has been validated in an undergraduate sample.[25] Finally, two questionnaires from the FACE-Q skin cancer module ('satisfaction with facial appearance' and 'appearance-related psychosocial distress') were included which was specifically designed and validated for skin cancer patients.[26] The 'satisfaction with facial appearance' questionnaire consists of nine questions; answers range from 1 (very dissatisfied) to 4 (very satisfied). The higher the score, the more satisfied the patient is with their facial appearance. The 'appearance-related psychosocial distress' questionnaire consists of eight questions, with a scale from 1 (definitely disagree) to 4 (definitely agree). A higher score reflects more appearance-related psychosocial distress. For both, the total sum score was converted to an equivalent Rasch score (0–100). Baseline characteristics such

as age, gender, skin cancer type, location on the face, type of wound closure, size and Charlson Comorbidity Index (CCI) were extracted from the patients' files.

Data analysis

Statistical analysis was performed using a linear multilevel model in SPSS statistics (version 25.0, Armonk, IBM corp.) to measure the effect of facial skin cancer surgery on quality of life and psychological outcomes over time. In the first level, repeated outcomes of the questionnaire at the different timepoints were calculated. Next, the treatment (MMS or CE) was added on the second level, with cross-level interaction. Effect sizes were calculated by dividing the difference in the means by the preoperative standard deviation. A separate multilevel model was generated with individual baseline characteristics on the second level and cross-level interaction to adjust for confounders. Variables included were closure type, size, tumour type, location and CCI. Differences were considered to be statistically significant at $p < 0.05$.

RESULTS

A total of 630 patients were asked to participate. Four hundred and eighty-seven patients completed at least one questionnaire (response rate 77%). However, to be included in the analysis, it was required that the preoperative questionnaire (baseline) be completed, in addition to a questionnaire at one or more other timepoints. A total of 228 patients remained after exclusion (Figure 1). Gender was equally divided (50.2% male, 49.8% female) and the mean age was 66.8 years (SD 11.8). Three MMS patients required reconstruction by the plastic surgeon (2%) and one MMS patient was reconstructed by the ENT-surgeon (0.6%). In all other cases, reconstruction was done by the dermatologist. Reconstructions for MMS included local advancement, rotation, island pedicle flaps and full thickness skin grafts. For CE, reconstruction included island pedicle and advancement flaps. Baseline characteristics are summarized in Table 1.

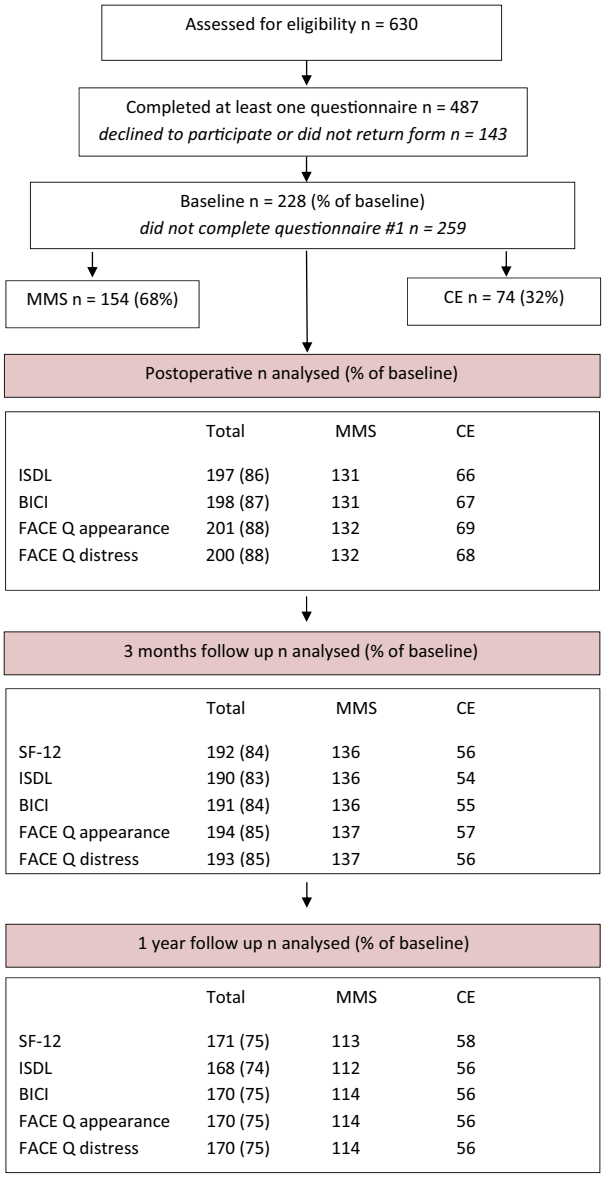

FIGURE 1 CONSORT flow diagram of participants. BICI, body image concern inventory; CE, conventional excision; ISDL, impact of skin diseases on daily life; MMS, Mohs micrographic surgery; *N*, number of patients; SF-12, short form-12.

Quality of life and psychological functioning following facial surgery: Overall outcome over time

The mean scores of all questionnaires are summarized in Table 2 and visualized in Figure 2.

The preoperative SF-12 scores, divided into the PCS-12 and MCS-12 scores, were 50.5 (SD 9.3) and 50.6 (SD 9.4), respectively, and did not significantly change over time ($p = 0.21$ and $p = 0.13$). The ISDL showed a significant overall effect over time (F (3, 235,39) = 7.26, $p < 0.01$, $d = -0.07$), but the effect could not be resolved to any specific timepoint. BICI scores showed a significant effect, with a lower score at 1 year (F (3, 198, 28) = 3.75, $p < 0.01$, $d = -0.14$) compared to the baseline. Two out of 228 patients had a score of 72 or more. The FACE-Q score satisfaction with facial appearance showed a significant effect, with higher satisfaction at 3 months (F (3, 215.97) = 10.74, $p < 0.01$), and 1 year (F (3,205.18) = 10.74, $p < 0.01$) compared to the baseline, but the effect was not significant after 1 week. The FACE-Q scores for psychosocial distress increased post-operatively (at 1 week) (F (3, 201.45) = 9.26, $p < 0.01$, $d = 0.22$), as compared to the baseline. After this time, psychosocial distress scores significantly decreased, with overall lower distress scores at 1-year follow-up than at baseline (F (3, 208.69) = 9.26, $p < 0.01$, $d = -0.15$).

MMS versus CE

A separate multilevel model with MMS versus CE on the secondary level (with time on the first level) was assessed.

TABLE 1 Baseline characteristics of patients in parenthesis percentage of total. CCI, Charlson Comorbidity Index; CE, convention excision; SD, standard deviation.

	Total	Mohs	CE	*p*-value
Total respondents	228 (100)	154 (67.2)	74 (32.8)	
Male (%)	115 (50.2)	73 (47.4)	42 (56.8)	
Female (%)	113 (49.8)	81 (52.6)	32 (43.2)	0.19
Age, mean in years	66.8 (SD 11.8)	66.6 (SD 12.3)	67 (SD 10.8)	0.84
Previous surgery, yes	125 (55)	79 (51.3)	46 (62.2)	
Previous surgery, no	103 (45)	75 (48.7)	28 (37.8)	0.12
Closure type				
Primary	104 (45.4)	43 (27.9)	61 (82.4)	
Secondary	10 (4.4)	8 (5.2)	2 (2.7)	
Reconstruction	112 (49.3)	103 (66.9)	9 (12.2)	0.00
Missing	2 (0.9)	0	2 (2.7)	
Size mean mm^2	120 (SD 243)	140 (SD 282)	70 (SD 69)	0.00
Missing	13	0	13	
Tumour type				
Basal cell carcinoma	190 (83.0)	148 (96.1)	42 (56.8)	
Squamous cell carcinoma	23 (10)	3 (1.9)	20 (27.0)	
Other	15 (7)	3 (1.9)	12 (16.2)	0.00
Location				
Forehead	22 (9.6)	11 (7.1)	11 (14.9)	
Periocular	12 (5.2)	10 (6.5)	2 (2.7)	
Nose	97 (42.8)	92 (59.7)	5 (6.8)	
Cheek	31 (13.5)	9 (5.8)	22 (29.7)	
Periorbital	11 (4.8)	9 (5.8)	2 (2.7)	
Ear	18 (7.9)	9 (5.8)	9 (12.2)	
Chin	4 (1.7)	2 (1.3)	2 (2.7)	
Scalp	12 (5.2)	4 (2.6)	8 (10.8)	
Temporal	18 (7.9)	7 (4.5)	11 (14.9)	
Lip	3 (1.3)	1 (0.6)	2 (2.7)	0.00
CCI (mean)	1.43 (SD 1.71)	1.06 (SD 1.37)	2.2 (SD 2.09)	0.00

This analysis identified a higher PCS-12 score for the MMS group at baseline (F (1, 226.00) = 11.82, p = <0.01), but there was no significant interaction with time after 1 week, 3 months or 1 year. The treatment type did not significantly affect the MCS-12, ISDL, FACE-Q satisfaction with facial appearance or FACE Q appearance-related psychosocial distress scores at baseline or over time. MMS had a negative effect on the BICI score at 1 week (F (3, 207.16) = 2.75, p 0.04, d = 0.04) but the effect did not persist at other timepoints.

Secondary analysis with other variates

Another separate, adjusted, multilevel model was generated with the covariates assigned as mentioned previously (with time on the first level). The covariate closure type, size of tumour and tumour type did not have a significant effect over time. The CCI showed a significant effect on PCS-12 scores over time after 1 year (F (2, 187.31) = 6.56, p < 0.01) with a positive slope. There also was an effect of CCI on BICI over time (p = 0.03). CCI also had a positive effect on satisfaction of facial appearance after 3 months (F (3,230.7) = 2.74, p = 0.03) and 1 year (F (3,198.91) = 2.74, p < 0.01). The treatment type (MMS vs. CE) did not change the effect of covariates.

DISCUSSION

To improve care for skin cancer patients, it is important to understand the psychosocial impact of facial skin surgery. The results of this PROM study regarding the influence of facial skin surgery on quality of life and psychological functioning in patients with NMSC indicate that there was no influence on quality of life in time, and that there was a

TABLE 2 Outcome scores for PCS-12 (physical component score), MCS-12 (mental component score), ISDL (Impact of Skin Diseases on Daily Life), BICI (Body Image Concern Inventory), FACE-Q satisfaction with facial appearance and FACE-Q psychosocial distress on each timepoint for total patients, MMS (Mohs micrographic surgery), CE (conventional excision), SD (standard deviation) and N (number of patients).

	Total						MMS				CE					
	Mean	SD	*n*	Effect size	Effect	*p* value	Mean	SD	*n*	Effect size	Mean	SD	*n*	Effect size	Effect	*p* value
PCS-12																
Pre	50.5	9.3	228				51.4	8.93	154		48.5	9.8	74			
3 months	51.3	8.97	192	0.09			52.7	7.65	136	0.15	48	10.91	56	−0.05	Time	0.09
1 year	51	9.81	171	0.05	Time	0.21	52	9.18	113	0.07	48.9	10.72	58	0.04	Group	0.01
MCS-12																
Pre	50.6	9.36	228				50.8	9.46	154		50.1	9.2	74			
3 months	51.5	9.76	192	0.11			51.8	9.67	136	0.11	50.6	10.02	56	0.05	Time	0.78
1 year	51.6	8.84	171	0.12	Time	0.13	52.1	8.67	113	0.14	50.8	9.19	58	0.08	Group	0.29
ISDL																
Pre	6.5	1.61	228				6.4	1.62	154		6.8	1.58	74			
1 week	6.7	1.41	197	0.11			6.7	1.31	131	0.15	6.8	1.61	66	0		
3 months	6.4	1.36	190	−0.07			6.4	1.19	136	−0.04	6.6	1.71	54	−0.13	Time	0.36
1 year	6.4	1.6	168	−0.07	Time	0.00	6.3	0.9	112	−0.09	6.7	2.48	56	−0.04	Group	0.26
BICI																
Pre	30.1	9.48	228				30.5	9.71	154		29.4	9	74			
1 week	30	10.92	198	−0.02			30.9	11.29	131	0.04	28.2	10	67	−0.12		
3 months	29.3	11.1	191	−0.08			29.8	11.38	136	−0.07	28.2	10.4	55	−0.13	Time	0.04
1 year	28.8	10.6	170	−0.14	Time	0.01	28.8	10.37	114	−0.18	28.8	11.13	56	−0.06	Group	0.38
FACE-Q																
Satisfaction with appearance																
Pre	69.9	17.89	228				70.3	17.9	154		69.1	18	74			
1 week	68.7	21.48	201	−0.07			69.2	20.72	132	−0.06	67.8	23	69	−0.07		
3 months	74.9	21.44	194	0.28			74.4	21.6	137	0.23	76.1	21.18	57	0.39	Time	0.37
1 year	77.7	21.23	170	0.43	Time	0.00	78.4	21.04	114	0.45	76.2	21.74	56	0.4	Group	0.84
Psychosocial distress																
Pre	24.8	11.84	228				24.8	11.53	154		24.9	12.54	74			
1 week	27.4	15.78	200	0.22			28.3	16.64	132	0.3	25.8	14	68	0.08		
3 months	24.5	13.51	193	−0.03			25.5	13.5	137	−0.02	24.4	13.77	56	−0.04	Time	0.19
1 year	23	11.22	170	−0.15	Time	0.00	22.3	10.56	114	−0.21	24.4	12.45	56	−0.04	Group	0.98

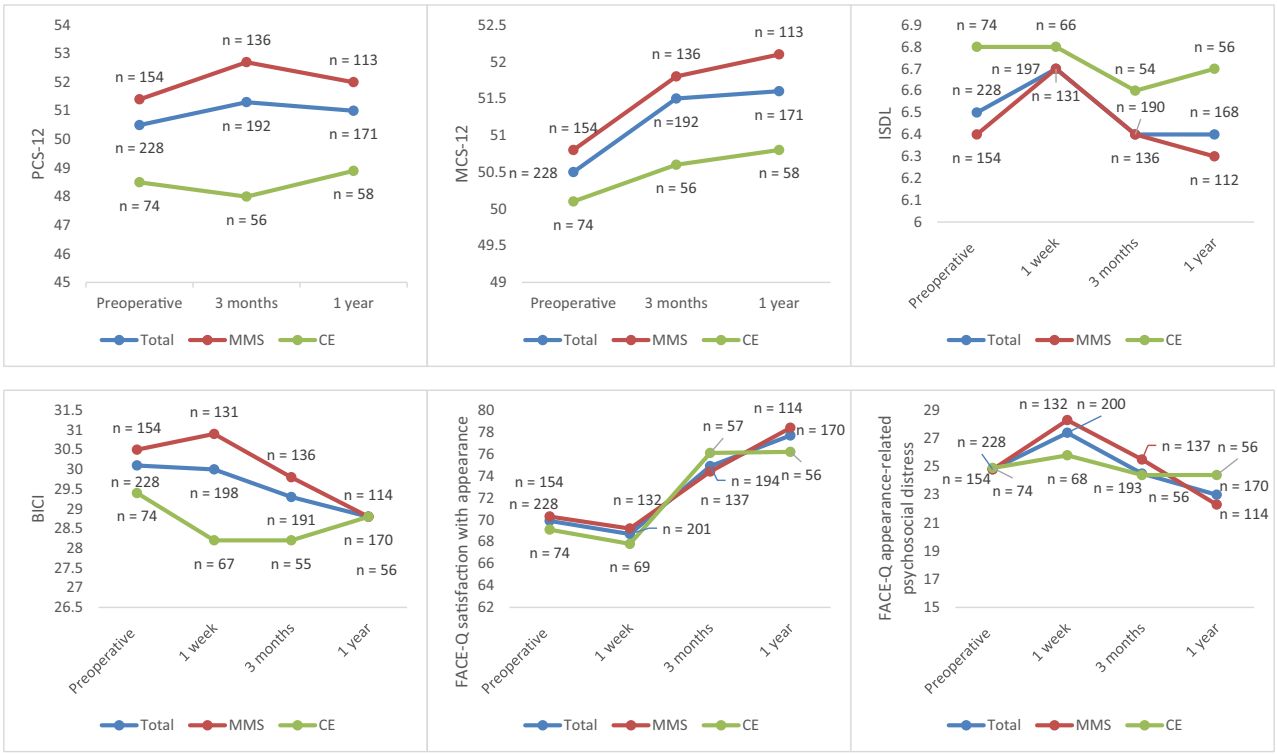

FIGURE 2 Graph of outcome scores of questionnaires over time. BICI, body image concern inventory; CE, conventional excision; ISDL, impact of skin diseases on daily life; MCS-12, mental component score; MMS, Mohs micrographic surgery; N, number of patients; PCS-12, physical component score.

positive effect over time on perceived stigmatization, body image concerns, satisfaction with facial appearance and psychosocial distress. The type of treatment (MMS or CE) did not seem to influence the outcome.

Other studies comparing MMS and CE using the DLQI and SCI questionnaires have noted an increase in quality of life after 4 months or longer post-operatively.[6,27,28] However, they have also indicated that there is no difference between the effects of MMS and CE.[8] This also highlights that, although MMS is a more extensive surgery with complete marginal clearance, it does not negatively affects patients satisfaction compared to CE. The SF-12 differs from the DLQI and SCI because it is a generic questionnaire as compared to the disease-specific DLQI and SCI and specific questionnaires tend to be more responsive than generic questionnaires.[29] Despite the discrepancy, it seems that facial skin surgery for NMSC does not negatively influence quality of life (with even a possible positive effect).

In general, levels of perceived stigmatization were relatively low (ranging from 6.4 to 6.7) as compared to levels found in other studies in dermatological populations (means of 10.4 and 9.9 in psoriasis and eczema, respectively).[14] The low scores are consistent with a recent European study in 5487 dermatological outpatients with a wide variety of skin conditions.[15] A possible explanation is that skin cancer is often not perceived as a chronic, visible or recurrent disease. Despite the low levels, we found that perceived stigmatization improved over time, but the effect size was small, indicating an uncertain clinical effect.

The low scores for BICI post-operatively are an important finding and suggests that surgical treated patients for facial skin cancer are unlikely to have or develop body image concerns, as we only found 0.01% patients with symptoms above the threshold. This is lower compared to a study by Schut et al.,[18] who employed the Dysmorphic Concerns Questionnaire (DCQ), and found that clinically relevant BDD symptoms were present in 3.4% of NMSC patients. The discrepancy may be explained by the use of a different cut-off: the cut-off for the BICI is 72 of 95 (76%), compared to 14 of 21 (67%) for the DCQ. Nonetheless, in both cases, low BDD symptoms were found.

Scores for satisfaction with facial appearance showed a slight, statistically insignificant decrease after surgery but recovered and even increased to scores that were higher than preoperative scores after 1 year. This result suggests that facial surgery did not negatively influence satisfaction. Furthermore, compared to aesthetic patients, the pre- and post-surgery satisfaction scores were descriptively higher.[30,31] Klassen et al.[30] reported a mean score of 44.6 for patients with rhinoplasty as compared to a mean score of 69.9 in our study. A study by Veldhuizen et al.,[31] conducted to analyse patient expectations of scars after MMS using the FACE-Q, produced comparable mean scores at each measurement timepoint, with a peak increase 3 months after surgery. This pattern was also noted in a smaller study by Kant et al.,[32] measuring the aesthetic results after facial skin surgery with the FACE-Q. The decrease in satisfaction after 1 week found in our study may be explained by the presence of active scars or wound healing, and this condition resolves after 3 months or longer. Hence, our results indicate that

patients undergoing facial skin surgery for skin cancer remain satisfied with their appearance after 3 months or more.

Scores for appearance-related psychosocial distress slightly increased after surgery and dropped below the preoperative scores after 1 year. This observation shows that facial skin cancer surgery negatively influences psychosocial distress in the short term, followed by a reduction in distress in the longer term up to 1 year. This slight increase after surgery is comparable with the results of a study by the original FACE-Q authors.[33] A pattern of recovery over time has been shown in previous studies.[31,34,35] The clinical effect of skin cancer and surgery on the score for psychosocial distress is however small, as the scores are considered low according to FACE-Q norm scores. This outcome is different compared to the psychosocial distress scores of patients who have been treated for cosmetic reasons. Patients who have undergone rhinoplasty for cosmetic and functional reasons have exhibited considerably higher preoperative psychosocial distress scores (mean 66.15) compared to our patients (mean 24.8).[36] We would have thought that the impact of facial surgery would be similar for any facial surgery, but it appears that the reason for surgery negates that effect.

Some limitations of this study should be noted. First, a proportion of patients did not complete all four measurement timepoints. We therefore used multilevel modelling to utilize all available data. Second, there were significant differences in our treatment groups. Patients with more comorbidities and squamous cell carcinoma are more often treated with CE than with MMS. There is a possible bias due to selection criteria to qualify for MMS as larger sizes were more often treated with MMS than CE. If a simple closure is possible, the preferred treatment type is CE. But if a reconstruction is needed (often due to the size of the lesion), MMS is the treatment of choice (Table 1). Furthermore, comorbidity was related to quality of life, body image concerns and satisfaction with facial appearance in both groups, highlighting the need for future research to clarify these relationships. Finally, this was a single-centre study, and thus the dermatological care (counselling) provided may have differed from that in other settings. It should also be noted that our results are specific to the Dutch population and are presumably relatable to Western countries with the same type of health care. There are many differences in Western countries access to MMS and their selection criteria. These factors could influence the outcome.

The results from these questionnaires can assist in the provision of better care and counselling for patients who require facial surgery for NMSC. In our clinical work, the focus predominantly lies on counselling on MMS. However, this study suggests that the outcome is identical despite the treatment type. Further research is needed to conclude whether counselling affects patients satisfaction. These results also show that facial skin surgery improves satisfaction with facial appearance and psychosocial distress over time. Based on our results, focus and support should occur within the first week post-operatively, as this period exhibited a peek in dissatisfaction with facial appearance and higher psychosocial distress.

CONCLUSIONS

Patients receiving facial skin cancer surgery exhibited low scores for perceived stigmatization and body image concerns. Their quality of life was not statistically influenced by facial surgery, and their satisfaction with facial appearance and psychosocial distress even improved after 1 year.

The results suggest that the type of surgical treatment (MMS or CE) does not influence the outcome.

The overall results can assist in counselling strategies to improve expectations for patients receiving facial surgery.

AUTHOR CONTRIBUTIONS

NM, RO and REG conceived and designed the study. NM, RO, YED, SB and JJG analysed the data. NM, RO, YED, SB, JJG and REG wrote the manuscript. All authors have reviewed and approved the final version.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest to disclose.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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