Evaluation of Interrelations Among Quality of Life, Facial Aesthetic Units, Cancer Worry, Perceived Appearance Changes, and Self-Esteem in Patients with Facial Basal Cell Carcinoma

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VILNIAUS UNIVERSITETAS

Domantas Stundys

Pacientų, sergančių veido srities bazinių ląstelių karcinoma, gyvenimo kokybės, veido estetinių vienetų, nerimo dėl vėžio, subjektyvių išvaizdos pokyčių ir savivertės tarpusavio sąsajų vertinimas

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I. ABSTRACT

Background

Basal cell carcinoma (BCC) is the most common type of non-melanoma skin cancer, with an increasing global incidence. Facial BCC presents unique challenges due to aesthetic and functional concerns. While surgical treatment is the gold standard, its impact on patient quality of life (QoL), psychological well-being, and self-esteem remains insufficiently studied. This study evaluates the clinical, aesthetic, and psychosocial factors affecting patients with facial BCC before and after surgery, focusing on tumor characteristics, surgical approaches, and scar perception.

Objectives

This study aims to: (1) assess pre- and postoperative QoL in patients with facial BCC, (2) evaluate anxiety related to skin cancer diagnosis and treatment, (3) examine the impact of postoperative scars on QoL, and the interrelations between self-esteem and long-term psychological adaptation, (4) explore the relationship between symptom diversity, QoL, and care-seeking behaviors, and (5) validate the Lithuanian versions of the Skin Cancer Index (SCI) and the Patient and Observer Scar Assessment Scale 2.0 (POSAS 2.0).

Methods

A prospective, longitudinal, observational study with a consecutive sampling design was conducted at Vilnius University Hospital Santaros Klinikos between November 2022 and April 2024. A total of 278 patients with histologically confirmed facial BCC underwent surgical treatment and were followed up at one month and six months postoperatively. Two 100-patient subgroups from this cohort were additionally analyzed to validate the Lithuanian versions of SCI and POSAS 2.0 and to assess QoL and postoperative scar perception. Patient-reported outcome measures included SCI, Dermatology Life Quality Index (DLQI), POSAS 2.0, WHO-5 Well-Being Index (WHO-5), and Rosenberg Self-Esteem Scale (RSES). Statistical analyses included descriptive statistics, paired t-tests (for pre- *vs.*

postoperative QoL comparisons), one-way ANOVA with Tukey's HSD post-hoc tests (for subgroup comparisons by demographics, tumor characteristics, and surgical techniques), multiple linear regression (to identify independent predictors of QoL outcomes), and confirmatory factor analysis (CFA) (for validating the Lithuanian versions of SCI and POSAS 2.0). The psychometric properties of the Lithuanian versions of SCI and POSAS 2.0 were assessed using Cronbach's alpha for internal consistency, intraclass correlation coefficients (ICC) for reliability, and standardized response means for responsiveness.

Results

QoL significantly improved after BCC surgery, with SCI scores rising by 8.83 points ($p < 0.001$) at six months postoperatively. Emotional distress significantly decreased post-surgery, particularly in patients with smaller tumors, and less complex reconstructions. However, patients with tumors in highly visible areas (nose, eyelids, cheeks) were more dissatisfied with scar appearance ($p < 0.05$). Women and younger patients exhibited higher postoperative psychological distress compared with men ($p < 0.05$), indicating a greater impact of aesthetic concerns.

Symptom burden significantly influenced consultation timing, with visible tumors, pain and discomfort prompting earlier visits, while non-specific symptoms such as erosion and itching led to longer delays (mean: 21 months). Interestingly, tumor size did not directly impact postoperative QoL, suggesting that subjective scar perception played a greater role in long-term satisfaction.

The validation of the Lithuanian versions of SCI and POSAS 2.0 demonstrated high internal consistency (Cronbach's alpha >0.80), excellent test-retest reliability (high ICC values), and strong construct validity confirmed via CFA.

Conclusions

This study highlights the complex interplay between oncologic, aesthetic, and psychological factors in facial BCC patients. While surgery improves overall QoL, concerns about appearance and scar perception significantly impact psychological adaptation, especially among younger patients, women, and

those who undergo complex procedures. Personalized counseling, scar management, and psychological support could be beneficial to optimize patient outcomes and enhance adaptation in high-risk subgroups. Care-seeking behavior is closely linked to symptom profile—patients with noticeable or painful lesions seek earlier treatment, while those with subtle signs often delay care. Such delays can lead to more extensive surgery, greater psychological distress, and lower satisfaction. The Lithuanian versions of SCI and POSAS 2.0 demonstrated strong validity and reliability, supporting their clinical and research use. Overall, the study findings suggest a holistic, patient-centered approach that integrates oncologic safety with psychological well-being and aesthetic outcomes.

II. ACKNOWLEDGEMENTS

III. TABLE OF CONTENTS

IV. LIST OF ABBREVIATIONS

ANCOVA – Analysis of Covariance
ANOVA – Analysis of Variance
BCC – Basal Cell Carcinoma
BMI – Body Mass Index
CFA – Confirmatory Factor Analysis
CFI – Comparative Fit Index
CI – Confidence Intervals
COSMIN – Consensus-Based Standards for the Selection of Health
Measurement Instruments
DLQI – Dermatology Life Quality Index
EADO – European Association of Dermato-Oncology
FACT-G – Functional Assessment of Cancer Therapy - General
HIV/AIDS – Human Immunodeficiency Virus/Acquired Immunodeficiency
Syndrome
HR – Hazard Ratio
HSD – Honest Significant Difference
ICC – Intraclass Correlation Coefficient
IQRs – Interquartile Ranges
ISPOR TCA – International Society for Pharmacoeconomics and Outcomes
Research Task Force for Translation and Cultural Adaptation
MEDLINE – Medical Literature Analysis and Retrieval System Online
NCCN – National Comprehensive Cancer Network
NMSC – Non-Melanoma Skin Cancer
OSAS – Observer Scar Assessment Scale
POSAS 2.0 – Patient and Observer Scar Assessment Scale 2.0
PROMs – Patient-Reported Outcome Measures
PSAS – Patient Scar Assessment Scale
QoL – Quality of Life
RMSEA – Root Mean Square Error of Approximation
RSES – Rosenberg Self-Esteem Scale
SCC – Squamous Cell Carcinoma
SCI – Skin Cancer Index
SDs– Standard Deviations
SEM – Standard Error of Measurement
SF-36 – Short Form-36 Health Survey

SRM – Standardized Response Mean
TLI – Tucker-Lewis Index
UV – Ultraviolet
V1 – Visit 1
V2 – Visit 2
V3 – Visit 3
VAS – Visual Analog Scale
VUH SK DVC – Vilnius University Hospital Santaros Klinikos Centre of Dermatovenereology
WHO-5 – WHO-5 Well-Being Index

1. INTRODUCTION

1.1 Basal Cell Carcinoma: An Overview

Basal cell carcinoma (BCC) is the most common type of non-melanoma skin cancer (NMSC) and one of the most prevalent cancers among white population. The majority of NMSC cases involve facial BCC (1–5). Its development is closely linked to chronic ultraviolet (UV) exposure, with other risk factors including fair skin, immunosuppression, and genetic predisposition (1,2,6–10).

Although BCC rarely metastasizes, its locally invasive nature makes it a significant concern, especially when located on the face, where it can cause functional impairment and severe aesthetic consequences (11–13). Beyond its physical effects, BCC can also have a significant impact on patients' quality of life (QoL), contributing to emotional distress and social withdrawal (14–18).

The highest incidence rates have been reported in Australia (1,000 per 100,000 inhabitants), the USA (212–407 per 100,000 inhabitants), and Europe (76.21 per 100,000 inhabitants per year)(19). Globally, BCC cases continue to rise significantly each year, with reported increases of 4–8 % in the USA (1) and 2 % in Australia (6). BCC is most commonly diagnosed in older adults, with individuals aged 55–75 up to 100 times more likely to develop the disease than those in their 20s (6). However, a concerning trend indicates a steadily increasing incidence of BCC in individuals under 40, particularly in women (20).

BCC presents in different clinical forms, each associated with distinct histopathological subtypes. The most common form is nodular BCC, accounting for 50–80 % of cases (2,3,21). It typically presents as a shiny, pearly nodule or papule with a smooth surface, often featuring arborizing telangiectasias at the tumor's center. As the lesion progresses, central erosion develops, eventually leading to ulceration. The tumor and ulcer diameter gradually increase over time, forming a characteristic pearly, shiny papular border that remains as the ulcer expands—this feature is considered pathognomonic for nodular BCC (2,3). Approximately 90 % of nodular BCC cases occur on the face, most frequently affecting the cheeks, nasolabial folds, forehead, and eyelids (22).

Superficial BCC, the second most common subtype, accounts for around 15–20 % of cases (2,19). It appears as multiple erythematous macular lesions with well-defined borders. In some cases, spontaneous tumor regression may occur, leaving behind areas of depigmentation and dry, scaly patches. Superficial BCC most frequently affects the trunk and extremities and can manifest with multiple lesions (1,2).

Morpheaform (sclerosing, infiltrative) BCC accounts for about 5–10 % of cases. It appears as firm, white, yellowish, or pink plaques resembling a scar, often with surface depressions and irregular margins, sometimes accompanied by areas of atrophy. Occasionally, small telangiectasias, erosions, or crusts may develop on the lesion's surface. This subtype tends to be more aggressive, initially presenting with subtle clinical signs but ultimately leading to extensive local tissue destruction. Morpheaform BCC most commonly affects the head and neck regions (2,3).

The primary goal of BCC treatment is to remove the tumor while preserving the function of the affected area and maintaining an optimal aesthetic outcome. Various options exist for both conservative and surgical treatments of BCC. The choice of the treatment method is largely determined by the risk of tumor recurrence, which is further categorized into low-risk and high-risk BCC. Tumor criteria (location, size, histological findings, assessment of tumor margins, possible perineural spread, recurrent tumor) and patient criteria (age, immunosuppression, genetic syndromes, chronic scarring, ulceration, foci of inflammation, and history of other malignancies) are considered (7).

Despite being the most common skin cancer, BCC is often not perceived by patients as an urgent health concern. Early signs—such as small nodules, telangiectasia, or mild ulceration—often go unnoticed, leading to delays in seeking medical attention. This delay is frequently driven by denial, neglect, or fear of diagnosis and treatment (23–27). As the disease advances, the resulting tissue damage necessitates more complex reconstruction techniques, increasing the disease burden, lowering patient QoL, and elevating healthcare costs (17,28–33).

1.2 The Effect of Facial Basal Cell Carcinoma on Quality of Life: Insights from Recent Studies

Facial BCC presents significant functional and aesthetic challenges, particularly when located in highly visible and functionally important areas of the face. Due to its locally destructive nature, even relatively small tumors in these regions may require extensive surgical removal, leading to both functional impairments and aesthetic concerns.

Functional Impairments

While the distribution of BCC in specific facial regions has been previously described (34,35), it has never been explicitly linked with health-related QoL. It is plausible to suggest that tumors located in prominent or highly expressive areas of the face are more likely to affect QoL compared to lesions in less visible sites. For example, BCC in the periorbital region can lead to vision impairment, lagophthalmos, or ectropion, especially when large excisions with grafting or local flaps are required (36–38). Similarly, nasal tumors, particularly those involving the alar region, can disrupt normal breathing mechanics, resulting in nasal obstruction after surgery (39,40). BCC in the perioral region may impair lip function, and oral competence, particularly in cases requiring full-thickness lip excisions and complex reconstructions, necessitating specialized surgical approaches (41).

These functional deficits contribute to reduced QoL, as patients struggle to adjust to its physical and psychological impact.

Aesthetic and Psychosocial Concerns

Facial scars and disfigurement following BCC surgery are major causes of postoperative emotional distress and social anxiety (42–44). Since the face, head, and neck are the most affected areas, this can significantly impact a person's body image, self-esteem, and QoL (17,28). The psychosocial impact of BCC is influenced by multiple factors, including the skin tumor itself, treatment-related changes, alterations in aesthetic appearance, and additional burdens such as the cost of treatment and interference with daily activities (15).

Findings from QoL Studies

Studies (45–49) indicate that head and neck NMSC patients generally experience postoperative QoL improvement, particularly in emotional well-being and mental health. However, the extent of improvement varies significantly across individuals. Factors such as age, gender, marital status, education level, and employment status strongly influence postoperative QoL, particularly in long-term follow-ups. Younger patients are often more affected by appearance-related concerns, such as scarring and facial disfigurement, whereas older patients report declines in general health, physical function, mental health, and social engagement due to comorbidities, tumor location, and size (50).

Rhee et al. (45) conducted a prospective study on 121 NMSC patients, assessing QoL, smoking habits, and sun-protective behavior before and after surgery using Short Form (36) Health Survey (SF-36) and Functional Assessment of Cancer Therapy – General (FACT-G). Only slight changes in QoL were observed, with postoperative scars being less bothersome than lesions. Tumor size and location had no significant impact on overall QoL, but mental health (SF-36) and emotional well-being (FACT-G) showed notable improvement, particularly in patients under 65 and those who were employed ($p < 0.04$). Postoperatively, many patients adopted sun-protective behaviors ($p = 0.001$), but smoking habits remained unchanged. The authors questioned the effectiveness of generic QoL tools for NMSC and proposed disease-specific instruments to better assess anxiety, distress, and overall disease management.

Maciel et al. (46) evaluated QoL and self-esteem in 50 head and neck skin cancer patients before surgery and five years postoperatively using SF-36 and the Rosenberg Self-Esteem Scale (RSES). They found significant improvements in mental health ($p = 0.011$) and self-esteem ($p = 0.002$), although other QoL domains remained unchanged. A high loss to follow-up (56 %) was attributed to the minimally invasive nature of skin cancer and a lack of patient interest in returning for assessments.

Çetinarslan et al. (47) assessed 255 facial NMSC patients using the Turkish version of Dermatology Life Quality Index (DLQI) before and three months after surgery. Significant QoL improvements were observed in both BCC and squamous cell carcinoma (SCC) patients ($p < 0.001$). Preoperatively,

symptoms and feelings were the most affected subscales, while auricular and preauricular tumors had the worst impact. No gender-based differences were found, likely due to DLQI's limited focus on aesthetic outcomes. Patients with a university education and those requiring graft reconstructions reported lower QoL scores, possibly due to greater awareness of cosmetic changes and higher aesthetic expectations.

García-Montero et al. (48) studied 229 cervicofacial NMSC patients using the Spanish version of Skin Cancer Index (SCI) questionnaire at diagnosis and at one week, one month, and six months postoperatively. QoL improved significantly ($p < 0.05$), influenced by factors such as gender, education level, tumor type, treatment approach, and VAS scores. Women reported greater improvement in the aesthetic domain, likely due to heightened concern for facial appearance. Patients with lower levels of education showed the most improvement in emotional well-being, while married patients experienced the greatest social and aesthetic benefits. The authors recommended further research into non-surgical treatment options.

Kinde et al. (49) examined 45 periocular NMSC patients undergoing Mohs surgery using SCI and FACE-Q. QoL significantly improved at the three-month follow-up. Older age correlated with better QoL, whereas medial canthus tumors, myocutaneous flap or full-thickness graft reconstruction, female sex, and NMSC history were linked to worse QoL. Patients with higher baseline QoL were more likely to experience better postoperative outcomes. Study limitations included a lack of ethnic diversity, a small sample size, and a short follow-up period.

Sanz Aranda et al. (50) assessed 25 NMSC patients over the age of 85 years using SF-36 preoperatively and three months after surgery. The only significant decline was observed in physical role function ($p = 0.026$), especially in patients with comorbidities, facial tumors, or lesions >1 cm. The authors cautioned that surgery may not always improve QoL in elderly patients and should be carefully weighed against alternative treatment options.

Impact of Delayed Treatment on QoL

Many patients underestimate the severity of BCC, mistakenly believing that NMSC is not a serious condition. As a result, they often delay seeking medical attention, particularly when initial symptoms are mild. Such delays contribute

to greater tumor burden, more complex surgical interventions, worse aesthetic outcomes, and ultimately, lower postoperative QoL. This highlights the need for increased awareness and improved skin cancer prevention strategies. Addressing these challenges requires not only effective medical treatment but also enhanced patient education, psychological support, and a healthcare system that prioritizes early intervention.

1.3 Rationale for the Study

Despite the high prevalence of BCC, a significant gap remains in research evaluating the impact of treatment on patients' QoL, particularly in those with facial lesions. Most existing studies prioritize oncologic safety and surgical outcomes, while psychosocial, aesthetic, and long-term well-being aspects remain underexplored. Research has shown that mental health often improves after surgical treatment, particularly in younger and actively employed patients, suggesting that treatment benefits extend beyond survival and tumor clearance (45,48,49).

QoL considerations are especially relevant in facial BCC, where concerns about disfigurement persist even after successful tumor removal. Many patients experience ongoing emotional distress, lower self-esteem, and social withdrawal. The psychological impact of surgical scars is particularly pronounced in women and younger individuals, who tend to have higher aesthetic concerns and report lower satisfaction with postoperative outcomes (48,49).

Additionally, the surgical approach plays a critical role in shaping both functional and psychosocial recovery. Although a significant amount of research exists on surgical techniques, few studies have systematically compared different reconstructive approaches and their long-term effects on patients' emotional well-being. This study aims to address this knowledge gap by integrating oncologic, surgical, and patient-reported outcomes.

The relevance of this research is further emphasized by the limited number of scientific studies available when this study protocol has been developed in 2022. A literature search conducted in the PubMed (MEDLINE) bibliographic medical database identified only 322 scientific articles matching the following keyword combinations in English: "basal cell carcinoma", "NMSC" or "non-melanoma skin cancer" along with "quality of life." Following a detailed

review, only 54 studies were found to have assessed QoL in BCC or NMSC patients using structured interviews and standardized patient-reported outcome measures (PROMs).

1.4 Study Objectives

This study aims to assess QoL, psychological adaptation, and changes in self-esteem in patients with facial BCC by evaluating their experiences before and after surgery, with a focus on emotional well-being, objective postoperative scar characteristics, and perceived changes in facial appearance.

The study's key objectives are:

1. To evaluate preoperative and postoperative QoL in patients with facial BCC.

2. To assess perioperative anxiety related to skin cancer diagnosis and treatment.

3. To examine the impact of postoperative scars on QoL, and the interrelations between changes in self-esteem and long-term psychological adaptation.

4. To explore the relationship between symptom diversity, QoL, and care-seeking behaviors.

5. To validate SCI and the Patient and Observer Scar Assessment Scale 2.0 (POSAS 2.0) for Lithuanian-speaking patients.

By addressing these objectives, this study aims to provide clinically relevant insights into the psychological, aesthetic, and functional challenges experienced by facial BCC patients.

2. METHODS

2.1 Study Design

This study utilizes a prospective, longitudinal, observational design with a consecutive sampling approach to assess the QoL, psychosocial adaptation, and clinical outcomes of patients diagnosed with facial BCC who undergo various surgical treatment methods. By integrating PROMs and scar

assessment tools, the research study provides a comprehensive, long-term analysis of treatment effects in real-world settings.

The total study cohort comprised 278 patients with histologically confirmed facial BCC. From this cohort, two independent subgroups of 100 consecutively enrolled patients each were analyzed in detail for specific outcomes: one for the validation of the Lithuanian version of the SCI and the assessment of short- and long-term QoL, and the other for the validation of the POSAS 2.0 and the evaluation of postoperative scar perception. The remaining analyses, including symptom diversity, care-seeking behavior, self-esteem, and cross-sectional QoL outcomes, were conducted using the full 278-patient cohort.

Study Setting and Ethical Compliance

The study was conducted from November 2022 to April 2024 at Vilnius University Hospital Santaros Klinikos Centre of Dermatovenereology (VUH SK DVC), a secondary and tertiary medical center specializing in dermatologic disease management, including skin oncology and reconstructive surgery. As a referral center for complex dermatologic and oncologic cases, the Centre of Dermatovenereology treats over 25,000 patients annually from Lithuania and abroad.

To ensure compliance with ethical research standards, the study protocol adheres to Good Clinical Practice guidelines, the Helsinki Declaration, and relevant national and international regulations. The study was reviewed and approved by the Vilnius Regional Biomedical Research Ethics Committee (Approval No. 2022/11-1476-943). Participation is voluntary, and all patients provided informed consent before data collection to uphold ethical integrity.

2.2 Inclusion and Exclusion Criteria

To ensure a homogeneous and clinically relevant patient cohort, the following eligibility criteria were established:

Inclusion Criteria:

Participants must meet all of the following criteria to be included in the study:

- Patients referred to VUH SK DVC with suspected or histologically confirmed facial BCC.

- Individuals aged 18 years or older.

- Patients capable of independently completing study questionnaires.

- Patients who voluntarily consent to participate in the study and sign the informed consent form.

Exclusion Criteria:

Participants will be excluded if they meet any of the following conditions:

- Individuals younger than 18 years old.

- Patients with psychiatric disorders that may impair their ability to provide reliable responses.

- Patients who have undergone facial surgery within the past 12 months.

These criteria ensure that the study population remains clinically meaningful and comparable, allowing for valid assessments of psychosocial well-being, scar perception, and postoperative QoL.

2.3 Patient Recruitment and Follow-Up Timeline

Eligible patients were identified during routine outpatient consultations at the VUH SK DVC. Upon arrival, they received both verbal and written study information from the investigator. Patients who expressed interest provided written informed consent and were assigned a unique study number to maintain confidentiality throughout the study.

Based on their standard skin cancer treatment plan, patients were assigned to one of three study groups:

- Surgical excision group (E group) – standard excision with primary closure.

- Skin plasty group (P group) – excision followed by local flap reconstruction.

- Skin graft transplantation group (T group) – excision with full-thickness skin grafting.

The study included three scheduled visits, each seamlessly integrated into routine clinical care to minimize inconvenience for participants:

1. Baseline preoperative visit (V1).

2. Early postoperative visit (V2) – (one month post-surgery).

3. Late postoperative visit (V3) – (six months post-surgery).

Baseline Preoperative Visit

The initial appointment (V1) coincided with the recruitment process and served as the baseline evaluation. During this visit, patients underwent a detailed clinical consultation, a demographic and physical assessment, and a comprehensive medical examination. They also completed standardized questionnaires, including:

- DLQI.

- SCI.

- RSES.

- WHO-5 Well-Being Index (WHO-5).

Facial anthropometric measurements and body size parameters were recorded using non-invasive standard instruments. Following the baseline evaluation, patients underwent their prescribed treatment for facial BCC in accordance with guidelines from the European Association of Dermato-Oncology (EADO) (51), the National Comprehensive Cancer Network (NCCN) (52), and protocols established by VUH SK DVC.

Early Postoperative Visit – One Month After Surgery

One month after surgery, patients returned for the early postoperative visit (V2), where the immediate effects of treatment were assessed. The investigator conducted a clinical examination to evaluate wound healing, scar formation, and the condition of surrounding tissues. Medical documentation, including the histological report, was also reviewed.

During this visit, patients again completed the DLQI, SCI, RSES, and WHO-5 questionnaires, with the addition of POSAS 2.0, which included both patient-reported and observer-reported scales. The appointment concluded with the scheduling of the next routine check-up, set for six months after the surgery.

Late Postoperative Visit – Six Months After Surgery

The final visit (V3) took place approximately six months after the surgical procedure and marked the completion of the patient's participation in the study. A comprehensive assessment was conducted, including a clinical review of the patient's facial appearance and postoperative scar. The investigator also inquired about any ongoing complaints and completed the observer scale of the POSAS 2.0.

Patients again completed the DLQI, SCI, RSES, WHO-5, and the patient scale of POSAS 2.0. At the conclusion of V3, the study participation ended, and all collected data were prepared for subsequent analysis.

This structured timeline ensured that recruitment, treatment, and follow-up assessments were integrated into routine care, providing a robust framework for data collection while minimizing the additional burden on patients.

2.4 Data Collection and Assessment Tools

To ensure a comprehensive evaluation of clinical outcomes, psychological adaptation, and QoL in patients with facial BCC, a structured data collection approach was implemented. The study incorporated clinical assessments, structured interviews, and validated PROMs to capture both objective and subjective aspects of the patient experience. Data collection focused on demographic and clinical characteristics, symptom burden, treatment methods and outcomes, postoperative adaptation, enabling a detailed analysis of factors influencing long-term recovery.

Clinical and Demographic Data Collection

A comprehensive dataset was compiled to analyze patient demographics, tumor characteristics, and surgical outcomes:

- Demographic and Socioeconomic Data

    o Age, gender, marital status, education level, employment status.

    o Place of residence (urban *vs.* rural).

    o Family and social support: Presence of children, close relatives, and frequency of social interactions.

- Skin Type and Sun Exposure History

    o Fitzpatrick skin type classification.

    o Sun exposure habits, including occupational and recreational exposure.

    o Sunscreen usage behaviors (frequency, SPF level, consistency of use).

- Clinical Tumor Characteristics

    o Tumor location: Categorized using T.T. Fattahi's Facial Aesthetic Unit Classification, which accounts for anatomical and aesthetic importance (53).

    o Tumor size (measured in mm).

    o Histopathological subtype.

    o Tumor presentation: Presence of erythema, ulceration, telangiectasia, and other visible changes.

    o Symptom burden: Assessment of pain, bleeding, itching, discomfort, erosion, and visibility of the tumor.

- Personal and Family History of Skin Cancer

    o Previous diagnosis of BCC, SCC, or melanoma.

    o Family history of NMSC or other hereditary skin conditions.

- Time to Consultation

    o Symptom onset date and self-reported initial recognition of the lesion.

    o Date of first medical visit.

- o Delay between symptom onset and consultation.

  - o Patient-reported reasons for delaying consultation.

- Immunosuppression and Chronic Diseases

  - o History of immunosuppressive conditions (e.g., organ transplantation, HIV/AIDS, long-term use of immunosuppressants).

  - o Presence of other major chronic diseases (e.g., diabetes, cardiovascular diseases, autoimmune disorders).

- Planned Surgical Treatment Approach

  - o Primary excision with direct closure of the excision site.

  - o Local flap reconstruction using adjacent tissue to close the defect.

  - o Skin grafting with full-thickness skin graft application.

- Facial and Body Measurements

  - o Standardized non-invasive measurements of facial symmetry and body proportions.

Structured Patient Interviews

Structured patient interviews were conducted at each visit to gain deeper insight into patient perceptions of their diagnosis, treatment experience, and postoperative adaptation:

- The preoperative interview explored patients' initial emotional responses to their diagnosis, perception of tumor burden, and expectations regarding treatment outcomes and scarring.

- Postoperative interviews focused on perceived treatment experiences, satisfaction with surgical results, adaptation to scarring, as well as self-reported changes in emotional well-being, self-esteem, and social interactions.

- A thematic qualitative analysis was conducted to identify common emotional and psychological concerns raised by patients.

Patient-Reported Outcome Measures

To evaluate QoL, psychological well-being, self-esteem and scar perception, the study utilized five validated PROMs. Each tool was selected based on its reliability, psychometric properties, relevance to skin cancer patients, and ability to capture treatment-related changes in patient well-being.

- Dermatology Life Quality Index is a general dermatology questionnaire developed to assess the impact of dermatological conditions on daily activities, work performance, and emotional well-being (54). It has 10 questions, each scored from 0 to 3. Total scores range from 0 to 30, with higher scores indicating a greater impairment and reflecting a negative impact on QoL. DLQI also measures how skin disease impacts social interactions and personal relationships. This measure is highly sensitive to changes over time and helps quantify the psychological burden of visible skin conditions. DLQI is widely used in dermatology and helps compare QoL before and after treatment.

- Skin Cancer Index is a QoL questionnaire specifically designed for patients with skin cancer (55). It consists of 15 questions rated on a scale from 1 to 5. Higher scores indicate better QoL. The SCI covers three key areas:

    o Emotional: Feelings about the cancer diagnosis and treatment.

    o Social: Impact on work, daily life, and relationships.

    o Appearance: Concerns about facial disfigurement and scars.

    This tool allows for a detailed assessment of how skin cancer and its treatment impact daily life, self-image, and mental well-being. The SCI has been adapted and validated for use in multiple languages, ensuring its accuracy in assessing skin cancer-related QoL changes.

- Patient and Observer Scar Assessment Scale 2.0 is a widely used dual-assessment tool that evaluates both patient-reported and clinician-evaluated scar characteristics (56,57). The patient scar assessment scale (PSAS) assesses subjective perception of the scar - patients rate their scars based on pain, color, thickness, texture, and overall

appearance. The observer scar assessment scale (OSAS) provides an objective clinical evaluation, completed by a healthcare specialist. It ensures a comprehensive understanding of scar outcomes, including vascularity, pigmentation, thickness, pliability, and overall aesthetic impact. Scores range from 6 to 60, with higher scores indicating more severe scarring. The tool has been validated in many surgical specialties, confirming its reliability in assessing scar severity and patient satisfaction.

- WHO-5 Well-Being Index is a simple questionnaire that measures overall mental well-being (58). It has five short statements about mood, energy levels, and general well-being over the past two weeks. Scores range from 0 to 100, with higher scores indicating better emotional state. It is often used to screen for depression and reduced well-being.

- Rosenberg Self-Esteem Scale is a short and widely used tool to measure self-esteem and self-worth (59). It consists of 10 statements rated on a 4-point scale. Higher scores indicate greater self-esteem. It evaluates how people feel about themselves, their confidence in their abilities, and how they perceive their worth in social settings. This tool helps assess how a medical condition and its treatment affect self-image.

Together, these PROMs enabled a detailed multidimensional analysis of patient experiences with facial BCC and recovery following treatment.

2.5 Sample Size and Justification

Using the approach presented by *Hulley et al.* (p. 81), a sample of 246 participants was required to estimate the impact of postoperative scars with an expected proportion of 80 % ($P = 0.8$), 95 % confidence interval (CI), and a ±10 % margin of error ($W = 0.1$) (60).

According to the methodology described by *Chow et al.* (p. 50), to detect small effect size differences ($E = 0.2$) in subjective appearance ratings before and after the procedures with 80 % power ($\beta = 0.20$), $\alpha = 0.05$, and a standard deviation of the difference ($S\Delta = 1$), 197 participants were needed (61,62).

Following the method outlined by *Chow et al.* (p. 79), to detect a small correlation ($r = 0.2$) between appearance ratings and QoL with 80 % power and $\alpha = 0.05$, 194 participants were required (60).

Accounting for an anticipated 20 % dropout rate, a total sample size of 300 participants was planned.

2.6 Data Processing and Statistical Analysis

Data analysis was performed using R Statistical Software (version 4.2.2; R Foundation for Statistical Computing, Vienna, Austria), and Python 3.12.5 was used for statistical computations and modeling. Additionally, MedCalc Software Ltd. (version 20.305, Ostend, Belgium) was utilized for specific statistical tests related to the validation of SCI and POSAS 2.0. Collected data were digitized, anonymized, and stored in compliance with ethical standards (Approval No. 2022/11-1476-943). Structured data collection ensured consistency, confidentiality, and accuracy for subsequent statistical analyses. Missing data were minimal (<0.5 %) and were addressed using mode imputation for categorical variables.

Descriptive Statistics

Descriptive analyses were conducted to summarize baseline patient characteristics and assess changes over time in key variables:

- Continuous variables were summarized using means, standard deviations (SDs), medians, and interquartile ranges (IQRs) when appropriate.

- Categorical variables were reported as frequencies and percentages, with group comparisons performed using chi-square tests.

Group Comparisons (Pre- and Postoperative Analysis)

To evaluate changes in QoL outcomes, paired t-tests, one-way ANOVA and ANCOVA were performed:

- Paired t-tests compared preoperative and postoperative QoL scores (SCI, DLQI, WHO-5) to assess longitudinal changes in psychological and aesthetic adaptation.

- One-way ANOVA and one-way ANCOVA were used to assess subgroup differences, with ANCOVA adjusting for potential confounders such as age and gender. F-tests were used to test model significance.

- Cox proportional hazards modeling was used to assess the association between symptom presence and time to first consultation, ensuring valid time-to-event (survival) analysis.

These tests determined whether post-treatment QoL improvements were statistically significant and whether specific symptoms disproportionately affected SCI subdomains (Emotional, Social, and Appearance domains).

Regression Analyses for Predictors of Dissatisfaction

To identify factors influencing postoperative dissatisfaction, multiple linear regression models were applied:

- Multiple linear regression was used to examine how tumor size, tumor location, and reconstruction type influenced patient-reported satisfaction and aesthetic concerns.

- Multivariate logistic regression assessed the likelihood of delayed consultation behavior based on symptom presence.

- Interaction effects were tested when clinically justified to determine whether certain symptoms or patient characteristics exacerbated postoperative QoL impairments.

Reliability Testing and Sensitivity Analysis

To ensure the validity and reliability of SCI and POSAS 2.0, additional psychometric assessments were conducted:

- Intraclass Correlation Coefficients (ICC) were used to assess inter-rater reliability of POSAS 2.0 scores, with values >0.75 indicating strong agreement.

- Standard Error of Measurement (SEM) was calculated to estimate the precision of repeated scar severity assessments.

- Floor and ceiling effects were analyzed to determine the sensitivity of SCI, POSAS 2.0, and DLQI in detecting meaningful changes. They were considered present if >15 % of participants scored at the lowest or highest values, potentially affecting interpretability.

- Confirmatory Factor Analysis (CFA) was performed to evaluate the structural validity of SCI and POSAS 2.0, ensuring that the scales adequately measured distinct domains of QoL and scar assessment.

- Standardized Response Mean (SRM) evaluated longitudinal responsiveness of SCI and POSAS 2.0 to treatment effects.

Effect Size Calculations

To assess the clinical significance of QoL and scar perception changes, effect size metrics were computed:

- Cohen's *d* effect size:

  o Small (0.2–0.5): Minor but detectable change

  o Moderate (0.5–0.8): Meaningful clinical improvement

  o Large (>0.8): Substantial change with strong clinical significance

This structured methodology ensured an extensive evaluation of patient adaptation and recovery, improving the accuracy and clinical relevance of findings.

2.7 Translation and Cultural Validation of SCI and POSAS 2.0

Why Was This Translation and Validation Necessary?

To evaluate QoL and scar perception in patients with facial BCC, it is crucial to use reliable and validated PROMs. However, prior to this study, no skin cancer-specific QoL questionnaire or scar assessment tool had been officially adapted and validated for Lithuanian-speaking patients.

Although general dermatology PROMs, such as the DLQI, were available in Lithuanian, they lacked specificity for skin cancer patients and did not address post-surgical scar perception. The SCI and POSAS 2.0 were identified as the most appropriate tools for this study because they have been widely validated in oncology, dermatology, and reconstructive surgery.

As language and cultural differences can influence how patients interpret health-related questionnaires, a thorough translation and validation process was necessary to ensure that Lithuanian version of SCI and POSAS 2.0 would be conceptually and psychometrically equivalent to their original versions.

This section describes the translation, cultural adaptation, and validation process of SCI and POSAS 2.0 for use in the Lithuanian patient population.

Translation and Cultural Adaptation

The translation process followed the ISPOR Task Force for Translation and Cultural Adaptation (ISPOR TCA) guidelines (63) and the COSMIN Study Design Checklist (64,65), ensuring a standardized approach. Following the recommended sample size for patient-reported outcome measure validation, the data of 100 consecutive patients was analyzed in the phase of SCI and POSAS 2.0 validation.

- Forward Translation

  - Two independent bilingual medical professionals translated the original English versions of SCI and POSAS 2.0 into Lithuanian.

  - A multidisciplinary team, including dermatologists and plastic surgeons, reviewed the initial translations to ensure medical and linguistic accuracy.

  - Any terminological inconsistencies were resolved through a consensus process to ensure conceptual equivalence.

- Backward Translation

  - The Lithuanian versions were independently back-translated into English by two dermatologists unfamiliar with the original questionnaires.

- Discrepancies between the original and back-translated versions were analyzed, leading to minor linguistic refinements to improve conceptual accuracy.

- Cognitive Debriefing

  - A pilot test was conducted with 15 patients diagnosed with facial BCC and 15 healthcare professionals (plastic surgery residents, dermatologists, and nurses) at VUH SK DVC.

  - Participants evaluated the clarity, comprehensibility, and cultural relevance of each questionnaire.

  - Based on participant feedback, minor modifications were made to enhance semantic and conceptual equivalence.

- Finalization

  - The final Lithuanian versions of SCI and POSAS 2.0 were approved after reaching a consensus and ensuring linguistic and clinical validity.

Psychometric Validation

Following translation, both scales underwent statistical validation, including internal consistency analysis, structural validity testing, and reliability assessment.

- Internal Consistency

  - Cronbach's alpha coefficient was used to measure internal consistency, with values between 0.70 and 0.95 considered acceptable.

  - SCI subscales showed Cronbach's alpha values of 0.81–0.88, confirming high reliability (Emotional: 0.81; Social 0.85; Appearance: 0.88)

  - POSAS 2.0 subscales (PSAS and OSAS) demonstrated Cronbach's alpha values ranging from 0.79 to 0.85 respectively, indicating strong internal consistency.

- Structural Validity

- CFA was conducted to verify the expected three-factor structure of SCI (Emotional, Social, and Appearance subscales).

- CFA results indicated excellent model fit, meeting key statistical criteria: Comparative Fit Index (CFI) > 0.95, Tucker Lewis Index (TLI) > 0.92, and Root Mean Square Error of Approximation (RMSEA) < 0.08.

- Construct and Criterion Validity

  - SCI convergent validity was confirmed by strong positive correlations with WHO-5 ($p = 0.61$) and negative correlations with DLQI ($p = $ -0.47 to -0.83), confirming its ability to assess QoL changes in skin cancer patients.

  - POSAS 2.0 criterion validity was established by demonstrating significant correlation with DLQI ($p < 0.001$), confirming its ability to assess scar-related QoL impact.

- Measurement Reliability

  - Test-retest reliability was assessed in 50 patients over a 5–7 day interval, with ICC > 0.80, indicating high reliability over time.

  - Floor and ceiling effects were analyzed to determine if SCI and POSAS 2.0 scales captured clinically meaningful variations, revealing that 23 % of PSAS respondents scored at the lowest level, aligning with findings in other validation studies.

- Sensitivity to Change and Responsiveness

  - SCI demonstrated moderate to large responsiveness levels, with SRM above 0.50 for SCI Total, Emotional, and Social subscales, suggesting it effectively measures QoL changes over time.

  - POSAS 2.0 patient-reported scores showed significant improvement between the second and third visits ($p < 0.001$, mean difference −8.44 points), confirming its responsiveness in tracking scar-related QoL changes.

o OSAS also showed significant improvement ($p < 0.001$, mean difference −8.18 points), demonstrating objective improvements over time.

This comprehensive translation and validation process ensured that the Lithuanian versions of SCI and POSAS 2.0 maintain their original psychometric properties, making them reliable tools for accurate assessment of QoL and scar perception in Lithuanian-speaking patients with facial BCC.

3. RESULTS

3.1 Patient Characteristics

This study analyzed 278 patients diagnosed with facial BCC who underwent surgical treatment at VUH SK DVC. The cohort was predominantly female (65 %), while males comprised 35 % of the study population, aligning with previously reported gender distribution in BCC patients (66).

Age Distribution and Risk Factors

- The mean age of patients at diagnosis was 68 years.

- The largest proportion of patients fell within the 65–74-year age group (27 %), followed by those aged 75–84 years (25 %).

- A marked proportion of patients (19 %) belonged to the 55–64-year age group, reinforcing the trend of increased prevalence in middle-aged and elderly individuals.

- Only 5 % of cases were observed in patients younger than 44 years, suggesting that facial BCC is significantly more common in older adults.

These findings align well with global epidemiological data, which suggest a rising incidence of BCC in older populations.

Tumor Characteristics and Distribution

- 74% of patients had a single histological BCC type, while 26 % had collision tumors, where multiple histological subtypes coexisted.

- Nodular (65 %) and infiltrative BCC (66 %) were more common in women, whereas superficial BCC (50 %) was equally distributed among both sexes. As some patients had multiple BCC subtypes, the percentages exceed more than 100 %.

- The average tumor size at diagnosis was 10.07 mm.

- Tumors were most commonly located in the cheek region (31 %), followed by the nasal (29 %), forehead (27 %), and periorbital area (8 %). This anatomical distribution reflects significant aesthetic and functional consequences of tumor presence in such prominent facial areas.

High Risk Patient Subgroups

Certain demographic and clinical features identified subgroups of patients with significantly higher psychological distress:

- Women, particularly those with tumors in highly visible areas (nose, eyelids, cheeks), exhibited significantly lower postoperative QoL scores, suggesting a greater psychological burden due to aesthetic concerns.

- Patients requiring more complex reconstructions (e.g., local flaps, skin grafts) were more likely to report psychological distress related to post-surgical appearance.

- 12 % of patients had a previous history of multiple BCCs, indicating a higher likelihood of recurrence, potentially due to genetic predisposition or ongoing high-risk UV exposure.

These findings highlight the need for personalized treatment strategies, proper preoperative counseling, and multidisciplinary care approaches.

3.2 Impact of Surgery on Quality of Life

As reflected in SCI scores, surgical treatment of facial BCC significantly influences patients' QoL, with statistically significant improvements across emotional, social, and appearance-related domains. However, the degree of change varies based on tumor location, gender, and reconstruction approach, suggesting that both objective (tumor size, surgical technique) and subjective

(patient perception, psychological adaptation) factors contribute to postoperative QoL.

Postoperative Changes in QoL

- SCI total scores improved significantly six months after surgery ($p < 0.001$), with meaningful improvements across all subscales.

- Emotional well-being improved as early as one month post-surgery ($p = 0.044$, mean difference +2.02), indicating that removal of the tumor provided immediate psychological relief.

- The most substantial overall improvement in QoL occurred between the first and third postoperative visits (mean difference +8.83 points, $p < 0.001$).

- Preoperative emotional distress, particularly anxiety about disease progression and social interactions, declined significantly postoperatively.

These findings underscore the psychological burden of BCC before surgery and suggest that surgical intervention plays a major role in alleviating emotional distress.

Persistent Distress in Specific Patient Groups

Despite overall QoL improvements, certain subgroups continued to experience distress, especially regarding scar appearance and social interactions:

- Patients with tumors in highly visible areas (cheek, nose, eyelid) had significantly lower preoperative SCI scores, indicating a greater psychological burden associated with facial BCC.

- Postoperatively, the highest distress levels were reported by patients with nasal and periorbital tumors, likely due to aesthetic concerns and functional impairments.

Gender Differences in QoL Post-Surgery

Statistically significant gender differences were found in postoperative SCI scores, indicating differences in psychological adaptation:

- Men consistently reported higher SCI scores, particularly in the Emotional ($p < 0.01$) and Appearance ($p < 0.01$) subscales, suggesting better psychological resilience.

- Men with nasal tumors had significantly better emotional adaptation ($p < 0.01$) compared to women, reinforcing the need for gender-specific psychological support strategies.

- Women had significantly lower SCI scores at one month post-surgery, especially in cases involving cheek reconstructions ($p < 0.05$).

- Both men and women expressed dissatisfaction when tumors were located in the cheek or eyelid areas, highlighting the strong aesthetic impact of surgical scars in these regions. However, before surgery, men had higher SCI Total, Social, and Appearance scores compared to women for tumors in the cheek ($p < 0.05$) and eyelid unit ($p < 0.05$). This trend persisted postoperatively, particularly in the cheek region ($p < 0.05$).

These findings suggest that psychological interventions should be tailored to patient expectations, with a focus on gender-specific concerns about scar perception and self-image.

Influence of Tumor Size on Postoperative QoL

Tumor size had no statistically significant effect on appearance, emotional or social well-being:

- Across different anatomical regions, no statistically significant differences were observed in SCI Total, Emotional, or Social scores at the first, second, and third postoperative visits based on tumor size ($p > 0.05$). This suggests that factors such as patient perception of scarring, tumor location, and pre-existing psychological distress played a more significant role in postoperative QoL than tumor size itself.

- Patients with tumors >10 mm reported significantly worse SCI Appearance scores at the second postoperative visit ($p < 0.05$), reflecting greater aesthetic concerns.

- Patients with tumors measuring 6–10 mm exhibited higher SCI Total scores than those with tumors 11–15 mm ($p < 0.05$) at the second postoperative visit, further confirming that larger tumor size correlates with lower QoL in the SCI Appearance domain but not in other QoL subscales.

These findings emphasize that while tumor size affects appearance-related QoL, long-term emotional and social adaptation depend more on individual perception and support strategies.

Surgical Approach and QoL Outcomes

The type of surgical intervention influenced short-term emotional well-being, but long-term QoL adaptation was similar across all surgical groups:

- Patients undergoing primary excision reported better emotional scores preoperatively than those requiring skin grafting or flap reconstruction ($p < 0.05$), particularly when tumors were located in the cheek region. This suggests that more complex reconstructive procedures may contribute to early emotional distress, reinforcing the need for preoperative counseling and careful postoperative management.

- By six months post-surgery, there were no significant differences in SCI scores between surgical groups, suggesting that patients gradually adapted to the aesthetic and psychological impact of surgery.

These findings underscore the importance of individualized treatment planning, psychological support, and patient counseling to mitigate postoperative distress and enhance long-term satisfaction with surgical outcomes.

3.3 Scar Perception and Emotional Distress

Surgical removal of BCC results in post-surgical scarring, which significantly influences patients' QoL and emotional well-being. Scars in highly visible areas, such as the nose, cheeks, and periorbital region, tend to provoke the greatest distress. The POSAS 2.0 was used to evaluate the impact of scars over time, capturing both patient-reported experiences (PSAS) and clinician-assessed outcomes (OSAS).

Scar Perception and Aesthetic Concerns

Patients exhibited a statistically significant improvement in scar appearance over time, with PSAS scores decreasing by 8.44 points ($p < 0.001$) and OSAS scores by 8.18 points ($p < 0.001$) between the second and third postoperative visits. However, aesthetic dissatisfaction persisted in some groups:

- Patients with cheek tumors had the highest postoperative dissatisfaction scores on POSAS 2.0 ($p < 0.01$), highlighting the significant impact of scars in this region.

- Younger patients (34–56 years) rated their scars significantly worse than older individuals (≥70 years), particularly in the cheek and upper lip regions ($p < 0.05$).

- Men had worse observer-rated scar evaluations in the forehead region, indicating a gender-based difference in perception ($p < 0.05$).

- Women consistently reported higher distress levels related to scar aesthetics, especially six months postoperatively, when their ratings were significantly worse than those of men ($p < 0.05$).

Emotional and Psychosocial Impact

The link between scar severity and emotional well-being was statistically significant, particularly in the SCI Appearance subscale, where higher POSAS 2.0 scores correlated with lower QoL (Spearman's correlation $= -0.51$, $p < 0.001$).

Additional findings include:

- Patients with larger tumors (6–10 mm) had significantly worse observer-rated scar evaluations, particularly in the eyelid region, underscoring the impact of larger tumor excisions on aesthetic perception ($p < 0.05$).

- At one month postoperatively, no significant correlation between POSAS 2.0 and QoL was observed ($p > 0.05$). However, at six months, a significant negative correlation emerged, indicating that patients who perceived their scars more negatively had lower QoL scores ($p < 0.001$).

These findings suggest that while scars improve objectively over time, subjective patient perception remains a crucial determinant of psychological recovery, influencing long-term QoL outcomes.

Influence of Surgical Techniques on Scar Satisfaction

The choice of reconstructive approach significantly influenced patient satisfaction with scars:

- Patients who underwent local flap reconstruction had better aesthetic outcomes compared to those who received skin grafting, as flaps generally provide superior color and texture matching ($p < 0.05$).

- However, patients requiring complex reconstructions, including skin grafts, reported higher levels of aesthetic distress and more negative scar perceptions ($p < 0.05$), highlighting the psychological burden associated with larger, more noticeable scars.

- Observer ratings aligned with patient assessments, as grafted scars received lower evaluations compared to flap reconstructions ($p < 0.05$).

These results indicate that surgical planning should prioritize not only oncologic safety but also patient expectations and psychological outcomes.

3.4 Self-Esteem Changes and Influencing Factors

The RSES was used to assess changes in self-esteem over time in patients with facial BCC, specifically investigating whether self-esteem was influenced by key demographic factors (age, gender), clinical characteristics (tumor size,

time until consultation), psychosocial impact (SCI subscales) as well as face and body parameters (facial areas based on T.T. Fattahi's Facial Aesthetic Unit Classification, BMI).

Overall RSES Score Changes

The RSES scores increased over time, with statistically significant changes across all comparisons ($p < 0.05$). However, real-world improvements were minimal due to small effect sizes:

- Mean change from V1 to V2 increased by 0.46 points, from V2 to V3 by 0.51 points and from V1 to V3 - 0.98, respectively.

- While *p*-values confirmed statistical significance, the effect sizes (Cohen's *d*) were small:

    o V1 *vs.* V2: $d = 0.14$ (very small)

    o V1 *vs.* V3: $d = 0.27$ (small)

    o V2 *vs.* V3: $d = 0.16$ (very small)

Although patients showed a slight increase in self-esteem scores, their self-esteem remained relatively stable, and this small change was unlikely to have a meaningful clinical impact on overall well-being.

Gender-Based RSES Score Changes

Women showed an earlier and slightly more pronounced improvement in self-esteem than men. However, for men, the change became statistically significant only at the third visit. Despite these differences, the effect sizes remained small, meaning the observed improvements were statistically significant but clinically negligible.

- For men:

    o No significant change from V1 to V2 ($t = -0.45$, $p = 0.656$, $d = -0.045$)

    o Significant increase from Visit 1 to Visit 3 ($t = -2.75$, $p = 0.007$, $d = -0.28$)

- o Significant increase from Visit 2 to Visit 3 (t = -2.41, p = 0.018, d = -0.24)

- For women:

    - o Significant increase from Visit 1 to Visit 2 (t = -2.65, p = 0.009, d = -0.20)

    - o Significant increase from Visit 1 to Visit 3 (t = -3.54, p = 0.0005, d = -0.26)

    - o No significant change from Visit 2 to Visit 3 (t = -1.59, p = 0.112, d = -0.12)

Age Group Differences in RSES Score Changes

Self-esteem changes varied across age groups, but for most, there was no statistically significant improvement over time ($p > 0.05$). The only exception was observed in the middle-aged adult group (45-54 years), which showed a statistically significant increase in self-esteem between V1 and V3 (t = -2.55, p = 0.015). However, the effect size for this change (Cohen's d = 0.42) suggests that while the change was statistically significant, it had only a small-to-moderate real-world impact.

For those younger than 44 years, there was a borderline significant increase in self-esteem from V2 to V3 (t = -1.94, p = 0.073, d = 0.50), suggesting that some improvement may have occurred later in follow-up. However, it did not reach strong statistical significance.

Correlation Between Time Until Visit and RSES Score Changes

Pearson correlation analysis found no meaningful relationship between the time patients waited until their visit and changes in RSES scores (all r-values were close to 0):

- V1 to V2: r = 0.057, p = 0.347
- V1 to V3: r = 0.057, p = 0.340
- V2 to V3: r = 0.007, p = 0.906

Therefore, the time elapsed before a visit does not predict self-esteem improvement or decline.

Correlation Between Tumor Size and RSES Score Changes

Tumor size did not meaningfully impact changes in self-esteem over time. Even though the correlation coefficients were slightly positive, they were too small to indicate any real-world significance:

- V1 to V2: $r = 0.008$, $p = 0.892$
- V1 to V3: $r = 0.056$, $p = 0.351$
- V2 to V3: $r = 0.056$, $p = 0.348$

Correlation Between SCI Subscales and RSES Changes

Pearson correlation analysis found no significant link between SCI Emotional or Total scores and changes in RSES ($p > 0.05$). SCI Social showed a weak negative trend from V1 to V2 ($r = -0.113$, $p = 0.061$), but it was not significant. Only SCI Appearance had a statistically significant but very weak correlation from V2 to V3 ($r = 0.121$, $p = 0.043$).

Gender and Age-Based Correlation Between SCI Subscales and RSES Score Changes

Pearson correlation analysis was conducted separately for men and women, as well as different age groups, to assess the relationship between SCI subscales and changes in RSES scores over time. However, no meaningful gender or age differences were noted with any SCI subscale ($p > 0.05$).

While RSES scores increased significantly over time, the effect sizes remained small across all analyses, suggesting no meaningful clinical improvement. Demographics and clinical characteristics also did not significantly influence self-esteem changes, meaning that other psychological or external factors may have a greater impact on self-esteem recovery.

RSES Score Differences Based on Tumor Location

A one-way ANOVA was performed to compare RSES scores across different tumor locations at three visits to identify statistically significant differences in self-esteem scores between tumor location groups. The analysis revealed that tumor location had a significant impact on self-esteem at V1 ($p = 0.043$), meaning some tumor locations were associated with higher or lower RSES scores initially:

- Visit 1: $F = 2.20$, $p = 0.043$ (Statistically significant difference between tumor locations).

- Visit 2: $F = 1.82$, $p = 0.096$ (No significant difference, $p > 0.05$).

- Visit 3: $F = 1.75$, $p = 0.109$ (No significant difference, $p > 0.05$).

By V2 and V3, self-esteem differences between tumor locations were no longer statistically significant ($p > 0.05$).

To further investigate the statistically significant ANOVA result at V1, a Tukey's HSD post-hoc test was performed to determine which specific tumor locations had significantly different self-esteem scores at V1. However, no specific pairwise comparison reached significance (all p-values > 0.05).

BMI Impact on RSES Score Changes

BMI did not significantly impact changes in self-esteem as measured by the RSES. The correlation values were all very weak, indicating that BMI was not a strong predictor of self-esteem changes across visits:

- V1 *vs.* V2: $r = 0.060$

- V1 *vs.* V3: $r = -0.024$

- V2 *vs.* V3: $r = -0.101$

Interestingly, a gender-based (BMI *vs.* RSES score changes) correlation revealed that in men there was a weak positive correlation ($r = 0.212$) with self-esteem changes between V1 and V2, suggesting that BMI may have had a small influence on early self-esteem changes. However, these effects were too weak to have any meaningful clinical impact.

3.5 Symptom Presentation and Consultation Delays

Patients presented with a wide spectrum of symptoms, with tumor presence (27 %) being the most frequently reported, followed by erosion (18 %) and discomfort (17 %). Less commonly reported symptoms included bleeding (13 %), itching (10 %), and pain (2 %). Despite experiencing noticeable symptoms, many patients delayed seeking medical care for extended periods, increasing the risk of disease progression.

Symptom Burden and Consultation Timing

- The mean time from symptom onset to first medical visit was 21 months, indicating a significant delay in diagnosis.

- Patients who noticed a visible tumor or experienced pain were significantly more likely to seek medical care within 12 months ($p < 0.05$).

- Symptoms such as bleeding, itching, and erosion did not significantly influence consultation timing, indicating that their presence alone did not create a sense of urgency.

- Nearly half of all patients (46 %) reported experiencing three or more symptoms at the time of diagnosis. However, having multiple symptoms did not necessarily lead to faster consultation ($p > 0.05$). Instead, psychological, social, and healthcare access barriers played a greater role in delaying medical visits.

Psychological Barriers

- Many patients underestimated their symptoms, assuming the lesion was harmless or would resolve on its own.

- Fear of a cancer diagnosis and difficulty accessing specialized care contributed to delays in seeking medical help.

- Patients with higher anxiety levels were more likely to seek consultation earlier ($HR = 1.24$, $p = 0.08$). This suggests that emotional distress, rather than symptom severity alone, was a key motivating factor for seeking medical attention.

Gender and Age Trends in Delays

No statistically significant differences were observed in consultation delays based on gender or age ($p > 0.05$), indicating that both men and women, across different age groups, experienced similar delays in seeking medical care.

These findings highlight the need for targeted patient education, public awareness campaigns, and early dermatologic referral strategies to improve early BCC detection and treatment outcomes.

3.6 Symptom Patterns and Histopathological Correlations

The clinical presentation of facial BCC varied significantly by histopathological subtype, with distinct symptom distributions:

- Superficial BCC was less likely to present with bleeding ($\beta = -0.93$, $p = 0.033$), reflecting its less invasive nature. Instead, it more commonly exhibited erythema and mild irritation rather than ulceration.

- Nodular BCC, the most common subtype (65 %), was strongly associated with palpable tumor presence (82 %) but had no significant associations with bleeding, erosion, or discomfort ($p > 0.05$), indicating that it remains largely asymptomatic until it grows larger.

- Infiltrative BCC was less likely to be a palpable tumor ($\beta = -1.21$, $p = 0.005$), reflecting its diffuse subclinical growth, which may contribute to delayed detection. This subtype showed a borderline association with erosion ($\beta = 0.59$, $p = 0.067$), though this was not statistically significant.

- Collision tumors (26 % of cases) often presented with multiple symptoms, such as tumor presence, erosion, and discomfort. These cases tended to involve larger tumor sizes and often required more complex reconstruction.

Overall, patients with multiple symptoms did not seek care earlier than those with fewer symptoms, reinforcing that perceived severity, rather than symptom count, influenced consultation behavior.

Impact of Symptoms on QoL

To assess the impact of symptoms on patient-reported outcomes, symptom burden was analyzed in relation to SCI scores:

- Tumor-related discomfort was the strongest predictor of lower SCI scores, significantly affecting emotional ($F = 6.55$, $p = 0.011$), social ($F = 5.35$, $p = 0.022$), and appearance-related QoL ($F = 4.06$, $p = 0.045$).

- Pain, bleeding, itching, and erosion did not significantly impact SCI scores, suggesting that patient distress was linked to tumor presence and discomfort rather than acute physical symptoms.

- Regression analysis confirmed that discomfort was a major predictor of overall QoL impairment:

    - Emotional QoL ($\beta = -1.96$, $p = 0.011$)

    - Social QoL ($\beta = -1.00$, $p = 0.022$)

    - Total SCI ($\beta = -3.71$, $p = 0.006$)

These findings suggest that symptom burden alone does not predict consultation timing or QoL outcomes. Instead, psychological responses, aesthetic concerns, and health perceptions play a greater role.

Histopathological Subtypes and Consultation Timing

While Section 3.5 examined overall delays in care-seeking, this section explores how histopathology influenced consultation timing:

- Tumor presence, a symptom frequently associated with nodular BCC, was a strong motivator for seeking medical care ($p = 0.040$), though no statistically significant link between histologic subtype and consultation timing was found.

- Superficial BCC tends to present with subtle, non-alarming symptoms like erythema or irritation, which may contribute to delayed consultation, though this was not statistically tested.

- Infiltrative BCC was significantly less likely to present as a palpable tumor ($\beta = -1.21$, $p = 0.005$), reflecting its diffuse and often subclinical growth pattern, potentially complicating early detection.

These findings confirm that symptom count or severity alone do not dictate when patients seek care. Instead, psychological perception, aesthetic impact, and visible symptoms are critical. Incorporating histopathology-specific symptom awareness into patient education may support earlier detection and treatment of high-risk subtypes.

4. DISCUSSION

4.1 Key Findings and Interpretation

This study provides a comprehensive, multidimensional evaluation of QoL, symptom burden, scar perception, and psychological well-being in patients treated surgically for facial BCC. By combining patient-reported outcomes with detailed clinical and surgical data, it demonstrates how preoperative symptoms, treatment outcomes, and emotional adaptation interact over time.

Symptom Burden and Delayed Care-Seeking

One of the rather unexpected findings of this study is the significant delay in seeking medical attention—on average, patients waited 21 months before their first consultation. Despite the progressive nature of BCC, most patients sought care only after visible tumor growth or pain, rather than in response to early symptoms such as discomfort, itching, or erosion. This highlights a critical gap in symptom awareness, contributing to delayed treatment and potentially worse surgical and psychological outcomes.

The SCI results further confirmed the emotional and social burden of preoperative symptoms. Patients who reported higher levels of discomfort prior to surgery had consistently lower SCI scores, particularly in emotional and appearance-related subdomains. It suggests that the subjective BCC symptoms extend beyond physical discomfort and affect overall psychological well-being. These findings underscore the need for public health initiatives aimed at improving symptom recognition and promote

earlier medical consultation, particularly for patients with non-painful but persistent lesions.

Postoperative QoL Improvements and Variability in Recovery

After surgery, most patients experienced significant improvements in QoL, as demonstrated by higher SCI and DLQI scores over time. The most noticeable improvements were in emotional well-being, reflecting relief from preoperative concerns about tumor burden and disease progression. These benefits were most pronounced six months postoperatively, suggesting that while early postoperative distress is common, most patients adapt positively over time.

However, recovery was highly variable across different patient subgroups. Women and younger patients exhibited greater distress related to postoperative appearance, especially when tumors were located in highly visible areas such as the nose, eyelids, or cheeks. Similarly, patients with larger tumors or those requiring complex reconstructions had lower postoperative SCI appearance scores, indicating that aesthetic and functional outcomes significantly influence long-term satisfaction.

Study findings align well with existing research showing that while surgery restores oncologic safety, psychological, and social reintegration may require additional support. This highlights the importance of preoperative counseling and long-term psychosocial interventions, particularly for patients at higher risk of appearance-related distress.

The Role of Scar Perception in Psychological Adjustment

Scarring emerged as a major determinant of postoperative QoL, with subjective scar perception strongly linked with overall satisfaction. The POSAS 2.0 scores revealed that dissatisfaction with scars peaked at one month postoperatively, when healing was still in progress and tissue remodeling was incomplete. By six months, most patients reported a significant improvement in scar perception, though the extent of improvement varied based on age, gender, and tumor location.

Notably, women and younger patients were more likely to express dissatisfaction, particularly when scars were located in central facial regions.

This finding is consistent with literature indicating that facial scars have a profound impact on social interactions, particularly for individuals with higher aesthetic concerns, who may feel a greater impact on their social and professional lives.

Interestingly, objective scar severity, as assessed by POSAS 2.0, did not always correlate with patient dissatisfaction, reinforcing the idea that subjective perception plays a greater role than clinical evaluation in determining postoperative satisfaction. Patients with scars in more visible areas reported greater dissatisfaction, even when their scars were objectively mild.

Given these results, proactive scar management should be a standard component of postoperative care, including interventions such as laser therapy, topical treatments, and psychological counseling for patients at higher risk of appearance-related distress.

The Role of Tumor Location and Surgical Approach in Recovery

The location of the tumor significantly influenced postoperative QoL. Tumors in the central face (nose, periocular region, and lips) were linked to higher distress levels than those in less prominent areas like the forehead or lateral cheek. Central facial tumors not only carry a higher psychological burden due to their visibility but also pose greater surgical and functional challenges. Periorbital tumors, for example, may affect eyelid function and ocular health, while lip tumors can impact speech and oral competence. These functional concerns compound the aesthetic distress, making targeted interventions crucial for improving recovery.

Tumors located in high-mobility regions (e.g., lips, eyelids) were associated with more patient-reported concerns about postoperative asymmetry, stiffness, and functional tension, whereas tumors on the lateral cheek or forehead were more commonly linked to purely aesthetic concerns. This distinction reinforces the need for region-specific counseling and rehabilitation strategies.

The surgical approach also played a decisive role in recovery. Patients who underwent primary closure generally reported the most favorable outcomes, likely due to minimal scarring and a shorter recovery period. In contrast, those

requiring skin grafts or flap reconstructions faced a more complex psychological adjustment. Skin graft patients frequently reported concerns about color mismatch and texture differences, while those undergoing flap reconstructions noted prolonged healing times and unpredictable scarring. Managing patient expectations preoperatively and incorporating secondary interventions such as skin resurfacing or staged scar revision can help improve satisfaction.

4.2 Strengths and Novel Contributions

This study presents several methodological and conceptual strengths and contributes new insights into the psychological, aesthetic, and functional impact of facial BCC treatment.

Strengths of the Study

One of the key strengths of this study is its prospective design, which allows to track the changes of QoL over time rather than relying on retrospective recall. It captures immediate post-surgical effects and long-term adaptation trends, offering a more detailed understanding of the recovery process.

Additionally, the study employed multiple validated PROMs, including SCI, DLQI, POSAS 2.0, WHO-5, and RSES, to comprehensively evaluate emotional, social, and appearance-related aspects of QoL. This multidimensional approach strengthens the reliability of findings, as it ensures that psychological distress, self-esteem, and scar perception are examined from different perspectives.

The study's exclusive focus on facial BCC provides a unique contribution to the literature by highlighting the specific aesthetic and functional concerns associated with tumors in highly visible and sensitive areas of the face. The emphasis on tumor location as a determinant of postoperative distress is particularly valuable, as it provides clinically relevant insights for surgical planning and patient counseling.

Finally, the translation and validation of the Lithuanian versions of the SCI and POSAS 2.0 scales represent an important contribution for both local clinical practice and international research. These validated tools now enable more precise measurement of QoL and scar outcomes in Lithuanian-speaking

populations as well as can serve as a model for adaptation in other languages and cultural contexts.

Novel Contributions to the Field

This study contributes to NMSC research by addressing several underexplored areas:

- Symptom Burden and Delayed Care-Seeking: Unlike previous studies that focused primarily on oncologic outcomes, this research demonstrates that patients often delay seeking care due to non-painful symptoms, which significantly affects postoperative psychological adaptation. These findings underscore the need for improved patient education and early symptom recognition strategies to prevent delays in treatment.

- Psychological Impact of Scar Perception: While prior studies have acknowledged that scarring influences QoL (42–44), this study provides quantitative evidence that subjective scar dissatisfaction is more predictive of emotional and social impairment than objective clinical assessments. This highlights the importance of preoperative counseling and postoperative scar management strategies for improving patient satisfaction.

- Surgical Approach on Long-Term Adaptation: The study challenges previous assumptions that primary closure always leads to better psychological outcomes, demonstrating that while patients who underwent skin grafting reported greater aesthetic distress initially, their SCI scores improved over time. These findings suggest that long-term adaptation is influenced by both surgical technique and patient expectations.

- Gender and Age Differences in QoL Recovery: The study confirms that younger patients and women exhibit higher levels of postoperative distress, particularly in cases involving tumors in the nose, eyelids, or upper lip. These findings reinforce the need for tailored interventions that address gender- and age-specific concerns in BCC management.

- Insights into Self-Esteem Changes: This study tracks RSES scores over three visits, revealing that self-esteem gradually improves postoperatively but remains lower in patients with persistent aesthetic concerns.

4.3 Limitations of the Study

This study provides important insights into the psychological, aesthetic, and functional impact of facial BCC treatment, but several limitations should be considered when interpreting the findings. These include study design constraints, follow-up duration, potential biases in patient-reported outcomes, and variability in surgical approaches, all of which may influence the generalizability of results.

Sample Size and Representativeness

The study design combined both cross-sectional and longitudinal approaches by analyzing the full 278-patient cohort alongside two focused 100-patient subgroups, This approach allowed for detailed psychometric validation and patient-centered insights. However, findings from the smaller subsamples should be interpreted within the context of their size.

While the overall sample of 278 patients provides solid statistical power, the single-center setting may limit the generalizability of findings to other geographic, cultural, or healthcare contexts.

Additionally, even if the sample included a range of tumor sizes, locations, and surgical techniques, certain subgroups, such as younger patients and those undergoing complex reconstructions, were relatively small. This may limit the statistical power in detecting subgroup differences. Expanding the study across multiple centers would enhance the generalizability of findings.

Follow-Up Duration and Long-Term Adaptation

Patients were evaluated at baseline, one month, and six months postoperatively, a timeframe sufficient for assessing early and mid-term QoL changes. However, longer follow-up (12+ months) would provide better insight into long-term psychosocial adaptation. Some patients may experience

delayed dissatisfaction with scars, changes in self-esteem, or social reintegration concerns beyond the six-month period. Future studies should extend follow-up to detect these delayed effects.

Potential Biases in Patient-Reported Outcomes and Operator Influence

The study utilized validated PROMs (SCI, DLQI, POSAS 2.0, RSES, WHO-5) to assess self-esteem, scar perception, and psychological adaptation. While these instruments provide valuable insights, several biases must be considered:

- Recall bias: Patients may not remember accurately their preoperative distress levels, leading to potential over- or underestimation of improvements.

- Social desirability bias: Some patients may have reported higher satisfaction levels than they truly felt, particularly in a clinical setting where they interacted with their treating physicians.

- Mismatch between clinician-assessed and patient-perceived scar severity: While objective scar severity improved over time, subjective dissatisfaction persisted in certain groups.

- Operator bias: Even if the study included multiple operative techniques, variations in surgical expertise, scar management strategies, and postoperative care protocols may have influenced outcomes.

These factors highlight the need for integrating qualitative assessments or structured psychological interviews alongside PROMs to gain deeper insights into patient experiences as well as comparison of outcomes across multiple surgeons and centers to minimize operator bias.

Unexplored Psychosocial Interventions

This study identified psychosocial distress related to scar perception, but it did not evaluate the effectiveness of preoperative counseling to address these concerns. Future studies should explore whether integrating psychosocial interventions, such as preoperative counseling for aesthetic expectations,

cognitive-behavioral therapy, and support groups, improve QoL outcomes in patients with high aesthetic concerns or persistent distress.

By addressing these areas, future research can further refine patient-centered approaches to facial BCC management, ensuring both oncologic success and optimal psychological recovery.

4.4 Clinical Implications and Future Directions

The findings from this study emphasize that successful BCC treatment extends beyond tumor removal and oncologic safety—it must also address psychological adaptation and long-term QoL. While surgical treatment effectively improves overall QoL, specific patient subgroups, including younger patients, women, and those with tumors in highly visible areas, require additional support to achieve optimal psychosocial recovery.

Short-Term and Feasible Clinical Interventions

Several practical measures can be implemented relatively quickly and with minimal resource investment to reduce distress in facial BCC patients:

- Routine psychological screening during initial consultations can help identify patients at risk of heightened anxiety or appearance-related distress. Simple tools like SCI, WHO-5 or VAS can be integrated into standard consultation without significantly extending visit time.
- Integrating a psychologist—even on a part-time basis—into dermatologic oncology clinics can provide timely emotional support, particularly during the preoperative period when anxiety levels are typically highest.
- Preoperative counseling focused on realistic aesthetic expectations and potential scar appearance can be carried out by surgeons, nurses, or trained staff.
- Low-cost patient education materials, such as printed or online images showing examples of scar healing, can help patients in the recovery process.
- Postoperative follow-up focused on scar management, including application of silicone gels, scar massage, and referrals for laser therapy when appropriate.

These interventions are cost-effective, practical, and easily integrated into existing routines without the need for major structural changes.

Long-Term Systemic and Policy-Level Changes

To ensure sustainable improvements in psychosocial outcomes as well as decrease significant diagnostic delay of skin cancer, larger-scale reforms are required:

- Clinical guidelines for skin cancer management should integrate psychological screening and support as part of routine care.
- Health care reimbursement policies should include coverage for psychological consultation services and evidence-based scar therapies. While often considered "aesthetic", these interventions have a direct impact on patient's mental health, self-esteem, and social functioning.
- National Health Insurance Fund resources should be properly allocated to allow timely skin cancer diagnosis and treatment, including postoperative follow-up check-ups based on international guidelines.
- Specialized continuous medical education programs and access to teledermatology for general practitioners are essential to assist in timely diagnosis and referral of suspicious facial lesions for specialist evaluation.
- Skin cancer public awareness campaigns focused on early disease detection are needed. It should help the public understand that skin cancer is not always a minor concern and that even slow-growing lesions on the face can lead to significant emotional distress if untreated.

By integrating these strategies, clinicians can improve not only oncologic outcomes but also the psychosocial recovery of facial BCC patients.

5. CONCLUSIONS

This study provides a comprehensive evaluation of the psychological, aesthetic, and functional impact of facial BCC treatment, offering clinically meaningful insights into dermatologic oncology and reconstructive surgery.

The findings highlight the crucial interplay between aesthetic results and psychological adaptation, by deepening the understanding of how facial BCC treatment affects patients beyond their oncologic outcomes. They provide clinically relevant insights that address the five original objectives:

Changes of Preoperative and Postoperative QoL

Surgical treatment of facial BCC led to significant improvements in overall QoL, particularly in emotional, appearance-related, and social domains. These improvements were most pronounced six months postoperatively, although early emotional benefits were also observed one month after surgery. However, the extent of improvement varied across patient subgroups. Younger individuals and women exhibited more concern about postoperative appearance, especially when tumors were located in highly visible facial zones such as the nose, eyelids, and cheeks. Patients undergoing more complex reconstructions (e.g., skin grafts or local flaps) reported lower satisfaction with aesthetic outcomes, underscoring the need for personalized perioperative counseling and support.

Perioperative Anxiety Related to Cancer Diagnosis and Treatment

Patients' QoL was closely associated with anxiety, which peaked during the preoperative phase due to fears related to cancer diagnosis, surgical outcomes, and potential changes in facial appearance, but gradually declined after the surgery. While tumor excision brought emotional relief for most, anxiety persisted longer in patients with higher aesthetic expectations and those undergoing complex procedures. These results emphasize the importance of early psychological intervention and individualized patient education to reduce treatment-related distress.

Influence of Postoperative Scars on QoL, Self-Esteem, and Psychological Adaptation

Postoperative scars following surgical treatment of BCC had a significant impact on patients' psychosocial well-being and QoL. Although the objective appearance of scars improved over time, subjective aesthetic dissatisfaction often persisted—particularly among younger patients, women, those with

tumors larger than 10 mm or scars located in the most visible facial areas. Patients who underwent local tissue reconstruction reported more favorable scar assessments than those who received skin grafts. Although self-esteem scores increased slightly over time, the effect sizes were small, suggesting no meaningful clinical improvement. These findings highlight the importance of considering both aesthetic outcomes and patients' emotional and psychological needs when planning surgical treatment.

Relationship Between Symptom Profile, QoL, and Care-Seeking Behaviors

The diversity of symptoms played a major role in determining when patients sought care. Patients experiencing pain, discomfort, or visible tumors were more likely to seek timely consultation, whereas those with subtle symptoms like erosion or itching tended to delay care—often for more than a year. Delayed treatment not only increased surgical complexity but also negatively affected emotional well-being and satisfaction with outcomes. These findings reveal the need for increased public awareness about early warning signs of BCC.

Validation of the Lithuanian Versions of SCI and POSAS 2.0

The Lithuanian versions of SCI and POSAS 2.0 demonstrated excellent psychometric properties. High internal consistency, reliability, and construct validity were confirmed through statistical analyses, including Cronbach's alpha, confirmatory factor analysis, and test-retest reliability metrics. These validated tools are now available for clinical use and research within Lithuanian-speaking population, enabling accurate monitoring of QoL in dermatologic oncology patients and effective scar assessment.

In conclusion, this study highlights the importance of a holistic, patient-centered approach to facial BCC treatment—one that harmonizes oncologic safety with psychological well-being and aesthetic recovery. By integrating these findings into clinical practice, dermatologic oncologists and plastic surgeons can not only achieve optimal medical outcomes but also enhance patients' overall QoL, confidence, and long-term satisfaction with their treatment.

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V. LIST OF PUBLICATIONS

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VI. LIST OF CONFERENCE PRESENTATIONS

1. 6th International Conference "Evolutionary Medicine: How Evolutionary Thinking Can Contribute to the Medical and Health Sciences", organized by the Doctoral School of Medicine and Health Sciences, Vilnius University, Faculty of Medicine
June 18–21, 2024, Vilnius, Lithuania
Abstract and Oral Presentation:
Facial Surgical Scars vs. Body Constitution: Unraveling the Greater Influence on Early Perioperative Well-being and Self-esteem

2. 53rd Annual ESDR Meeting, organized by European Society for Dermatologic Research
September 4–7, 2024, Lisbon, Portugal
Abstract, Poster, and Oral Presentation:
Exploring the Impact of Symptom Diversity on Preoperative Quality of Life in Patients with Facial Basal Cell Carcinoma: A Comprehensive Analysis Using the Skin Cancer Index

3. Conference of The Lithuanian Plastic and Reconstructive Surgery Society
September 27, 2024, Vilnius, Lithuania
Oral Presentation:
Assessment of Postoperative Scars Using POSAS 2.0: Validation of the Questionnaire in Lithuanian and Presentation of Pilot Study Results

VII. SUMMARY IN LITHUANIAN (SANTRAUKA LIETUVIŲ KALBA)

SANTRUMPOS

BLK – bazinių ląstelių karcinoma
CFA – patvirtinančioji faktorinė analizė
DLQI – Dermatologinis gyvenimo kokybės indeksas
ICC – tarpklasinis koreliacijos koeficientas
OSAS – stebėtojo randų vertinimo skalė
POSAS 2.0 – Paciento ir stebėtojo randų vertinimo skalė 2.0
PSAS – pacientų randų vertinimo skalė
PSO-5 – PSO-5 geros savijautos indeksas
RSES – Rosenbergo savivertės vertinimo skalė
SCI – Odos vėžio indeksas
SEM – standartinė matavimo paklaida
SRM – standartizuotas atsako vidurkis
VULSK DVC – Vilniaus universiteto ligoninės Santaros klinikos Dermatovenerologijos centras
V1 – pirmasis vizitas
V2 – antrasis vizitas
V3 – trečiasis vizitas
ŽIV – žmogaus imunodeficito virusas

1. ĮVADAS

1.1 Bazinių ląstelių karcinoma: apžvalga

Bazinių ląstelių karcinoma (BLK) yra labiausiai paplitęs nemelanominio odos vėžio tipas bei viena iš dažniausių vėžio rūšių baltųjų rasėje (1–5). Didžiausias sergamumas užfiksuotas Australijoje (vidutiniškai 1000 / 100 000 gyventojų, JAV (atitinkamai 212-407/100 000 gyventojų) ir Europoje (vidutiniškai 76,21 / 100 000 gyventojų per metus) (19). Sergamumas šia liga kasmet ženkliai didėja visame pasaulyje – JAV – 4-8 % (1), Australijoje – 2 % (6). Dažniausiai

ši liga pasireiškia vyresnio amžiaus žmonėms – 55-75 metų asmenų rizika susirgti BLK yra 100 kartų didesnė nei 20 metų amžiaus žmonių (6). Tačiau stebima nerimą kelianti tendencija, jog sergamumas BLK sparčiai didėja jaunesnių nei 40 metų asmenų, ypač moterų, grupėje (20).

Svarbiausi rizikos veiksniai, skatinantys BLK atsiradimą, yra UV šviesos spindulių poveikis odai, Fitzpatrick I ir II odos tipas, imunosupresija (ŽIV, organų transplantacija), genetiniai sindromai (pvz., Gorlino sindromas, pigmentinė kseroderma, Bazex-Dupre-Christol sindromas) (1,2,6–10).

Dažniausiai BLK atsiranda saulės pažeistoje vietoje – veide, galvos ir kaklo odoje, rečiau – galūnėse (3,19).

Dėl skirtingų histopatologinių tipų BLK pasireiškia skirtingai. Dažniausia klinikinė BLK forma yra mazginė BLK, sudaranti 50-80 % visų BLK atvejų (2,3,21). Ji pasireiškia kaip blizgūs perliniai mazgeliai arba papulės išoriškai lygiu paviršiumi, naviko centre stebimos šakotos kraujagyslės. Navikui progresuojant susidaro centrinė erozija, vėliau opa, naviko bei opos skersmuo didėja, aplink susidaro būdingas perlinių blizgių papulių volelis, kuris lieka opai plečiantis ir yra vienas iš patognominių mazginės BLK formos požymių (2,3). 90 % atvejų mazginė BLK atsiranda veido odoje (skruostų, nazolabialinių raukšlių, kaktos ir akių vokų srityje (22).

Paviršinė BLK yra antroji pagal atvejų skaičių klinikinė naviko forma, sudaranti apie 15-20 % atvejų (2,19). Ji primena daugybinį eriteminį makulinį bėrimą aiškiomis ribomis. Galima naviko spontaninė regresija, kuri palieka depigmentacijos zonas, taip pat sausos odos fragmentai, žvyneliai. Paviršinė BLK dažniausiai pasitaiko liemens ir galūnių srityje, galimi daugybiniai pažeidimai (1,2).

Morfeaforminė (sklerozuojanti, infiltracinė) BLK sudaro apie 5-10 % atvejų. Tai baltos, gelsvos ar rausvos spalvos kietos plokštelės, primenančios randą su įdubimais bei netolygiais kraštais, dažnai lydimos atrofijos zonų. Kartais jų paviršiuje gali susidaryti smulkių teleangiektazijų, erozijų bei šašų. Šiai formai būdingas agresyvesnis augimas: prasidėjus lėtai, bet kliniškai mažai išreikštai naviko proliferacijai, ilgainiui sukeliama vietinė audinių destrukcija. Ši BLK forma dažniausiai pažeidžia galvos ir kaklo srities odą (2,3).

BLK yra lėtai augantis ir retai metastazuojantis odos vėžys. Iš pradžių dėl mažai kliniškai pastebimos audinių infiltracijos per ilgesnį laikotarpį navikas

perauga ir suardo audinius visomis kryptimis. Tai sukelia plačią audinių destrukciją, jų funkcijos sutrikimą ir ženklius estetinius defektus (3,7).

BLK gydymo tikslas – pašalinti naviką, išsaugoti pažeistos vietos funkciją bei gerą estetinę išvaizdą. Yra daug tiek konservatyvaus, tiek chirurginio BLK gydymo būdų. Metodo pasirinkimą daugiausia lemia naviko recidyvo rizika, pagal kurią BLK papildomai skirstoma į mažos ir didelės rizikos. Dar atsižvelgiama į naviko kriterijus (vietą, dydį, histologinius radinius, vertinami naviko kraštai, galimas perineuralinis plitimas, esant recidyvuojančiai BLK) bei ligonio kriterijus (amžius, imunosupresija, genetiniai sindromai, lėtiniai randai, opos, uždegimo židiniai, kiti piktybiniai navikai anamnezėje) (7).

Pagrindinis BLK gydymo būdas yra chirurgija, kuris pasirenkamas priklausomai nuo recidyvo rizikos (7,9,19). Jeigu nustatoma didelė recidyvo rizika, atitinkamai parenkamas agresyvesnis gydymo metodas. Mažiau agresyvias BLK, pvz.: mažos rizikos paviršines, galima gydyti minimaliai invaziniais chirurginiais (elektrodestrukcija, kiuretažas, krioterapija) arba nechirurginiais metodais (radioterapija, vietinė imunoterapija, fotodinaminė terapija) (7,19).

1.2 Veido bazinių ląstelių karcinomos poveikis gyvenimo kokybei

Odos vėžys dažnai siejamas su įvairiomis neigiamomis psichologinėmis pasekmėmis, tokiomis kaip depresija, nerimas ir asmens pažeidžiamumas. Nors BLK paprastai nekelia pavojaus žmogaus gyvybei, liga pažeidžia didžiausią kūno organą – odą, kuri yra vizualiai ryškiausia ir gerai matoma sau ir kitiems. Kadangi pagrindinis BLK gydymo būdas yra chirurginis, po taikyto gydymo lieka daugiau ar mažiau matomas pooperacinis randas. Taip pat gali susidaryti įvairios minkštųjų audinių deformacijos, asimetrija, funkcijos sutrikimai (11–13). Veido pažeidimas gali reikšmingai paveikti kūno įvaizdį, savivertę ir gyvenimo kokybę, todėl BLK gydymo baigtys tampa ypač svarbios (17,18).

Nors literatūroje buvo pastebėta, kad nemelanominis odos vėžys gyvenimo kokybę pablogina sąlyginai nedaug, kai kurių autorių duomenimis šis pablogėjimas dėl pasireiškiančių simptomų yra labiau ryškus nei odos piktybinės melanomos atveju (67). Gyvenimo kokybė gali pablogėti tiek dėl paties odos naviko, tiek dėl taikyto gydymo: simptomų, funkcinių apribojimų, išvaizdos pasikeitimo ir papildomų aplinkybių, tokių kaip gydymo išlaidos ir

kasdienio gyvenimo veiklos trikdžiai (15). Labiau paveikiama jaunesnių, nevedusių / netekėjusių pacientų grupė, taip pat asmenys, kuriems odos navikas yra atsiradęs matomoje kūno vietoje (68).

1.3 Tyrimo aktualumas

Nepaisant to, kad BLK yra viena iš dažniausių žmonijos vėžio rūšių, o sergamumas šia liga sparčiai didėja, nėra daug mokslinių tyrimų, kuriuose būtų vertinama šių pacientų perioperacinė gyvenimo kokybė. Atlikus paiešką kompiuterinėje bibliografinėje medicininėje duomenų bazėje „PubMed" (MEDLINE), talpinančioje daugiau nei 38 milijonus biomedicininės literatūros šaltinių ir santraukų, iš viso rasti 322 moksliniai straipsniai, kurių paieška atitiko šių raktinių žodžių derinius anglų kalba: „basal cell carcinoma", „NMSC" arba „non melanoma skin cancer" ir „quality of life". Juos išanalizavus atrinkti tik 54 straipsniai, kurių autoriai nagrinėjo BLK arba odos nemelanominiu vėžiu sergančių pacientų gyvenimo kokybę pasitelkdami gyvenimo kokybės klausimynus ir struktūrizuotus interviu.

Svarbu paminėti, kad mokslinėje literatūroje yra daugiau straipsnių, vertinančių konkrečius chirurginius gydymo būdus, onkologinius aspektus, tačiau neatsižvelgiama į ilgalaikį veido randų poveikį psichologinei adaptacijai, netiriamas pacientų pasitenkinimas, kurį dažnai lemia subjektyvus rando ir veido išvaizdos suvokimas. Daugelis autorių teigia, kad tos ligos gydymo baigtys, kurios labiausiai rūpi pacientams, nėra pakankamai ištirtos arba bendrieji gyvenimo kokybės klausimynai, siekiantys įvertinti odos vėžio įtaką pacientų gyvenimo kokybei, yra nepakankamai jautrūs ir specifiški (69,70).

Kadangi pacientų, sergančių veido BLK, gyvenimo kokybės perioperaciniai pokyčiai nėra pakankamai ištirti, ypač trūksta duomenų apie veido randų poveikį psichologinei adaptacijai. Šis tyrimas orientuotas į išsamią minėtų aspektų analizę.

1.4. Tyrimo tikslai

Įvertinti veido BLK sergančių ir skirtingais chirurginiais būdais gydytų pacientų priešoperacinę ir pooperacinę gyvenimo kokybę, psichosocialinę adaptaciją bei savivertės pokyčius, atsižvelgiant į odos vėžio sukeltą nerimą,

objektyvias pooperacinio rando charakteristikas ir veido subjektyvios išvaizdos pasikeitimą.

Pagrindiniai uždaviniai:

- Įvertinti pacientų gyvenimo kokybę prieš operaciją ir po jos, naudojant validuotus gyvenimo kokybės vertinimo klausimynus.

- Įvertinti pacientų perioperacinį nerimą, kurį sukėlė odos vėžio diagnozė ir ligos gydymas.

- Ištirti pooperacinių randų poveikį gyvenimo kokybei, savivertės pokyčių ir ilgalaikės psichologinės adaptacijos sąsajas.

- Išnagrinėti kaip klinikiniai simptomai lemia gyvenimo kokybę, laiko trukmę iki diagnozės nustatymo bei ligos progresavimą.

- Išversti Odos vėžio indekso (SCI) ir Paciento ir stebėtojo randų vertinimo skalės 2.0 (POSAS 2.0) klausimynus į lietuvių kalbą, juos kultūriškai adaptuoti ir validuoti.

2. METODAI

2.1 Tyrimo dizainas ir etiniai aspektai

Perspektyvinis išilginis stebėsenos tyrimas, kuriame taikytas nuoseklios imties principas, buvo vykdomas Vilniaus universiteto ligoninės Santaros klinikų Dermatovenerologijos centre (VULSK DVC) nuo 2022 m. lapkričio iki 2024 m. balandžio mėnesio, gavus Vilniaus regioninio biomedicininių tyrimų etikos komiteto leidimą vykdyti biomedicininį tyrimą (leidimo Nr. 2022/11-1476-943).

Dalyvauti tyrime buvo kviečiami asmenys, kurie ambulatorine tvarka kreipėsi į VULSK DVC Konsultacijų skyrių ir kuriems, atlikus gydytojo dermatologo konsultaciją bei dermatoskopiją, buvo įtariama arba, atlikus darinio biopsiją, histologiškai patvirtinta veido BLK.

Tyrime taikytas mišrus – skerspjūvio ir išilginis – dizainas: analizuota visa 278 pacientų imtis bei du atskiri 100 pacientų pogrupiai. Vienas iš jų buvo skirtas lietuviškos SCI versijos validavimui bei gyvenimo kokybės vertinimui,

kitas – POSAS 2.0 skalės validavimui lietuvių kalba bei pooperacinių randų vertinimui. Toks modelis leido atlikti nuodugnią psichometrinę analizę ir išsamiai įvertinti pacientų patirtis.

2.2 Įtraukimo ir neįtraukimo kriterijai

Siekiant suformuoti metodologiškai tinkamą tiriamųjų grupę, tyrime buvo taikomi aiškūs įtraukimo ir atmetimo kriterijai.

Tiriamųjų įtraukimo į biomedicininį tyrimą kriterijai:

- pacientai, kuriems įtariama arba histologiškai verifikuota veido srities BLK,
- vyresni nei 18 metų pacientai,
- pacientai, savarankiškai gebantys atsakyti į klausimynuose pateikiamus klausimus,
- laisva valia sutinkantys dalyvauti vykstančiame tyrime ir pasirašantys informuoto asmens sutikimo formą.

Tiriamųjų neįtraukimo į biomedicininį tyrimą kriterijai:

- nepilnamečiai asmenys,
- psichikos sutrikimais sergantys asmenys, kuriems anksčiau yra nustatyta psichinė liga, dėl galimos jų ligos įtakos tyrimo rezultatams,
- pacientai, kurių veido sritis buvo gydyta chirurginiu būdu per mažiau nei 12 mėnesių.

2.3 Tiriamųjų priskyrimas tyrimo grupei, tyrimo etapai

Pacientai, kuriems buvo įtariama arba histologiškai verifikuota veido srities BLK, priklausomai nuo jiems rekomenduoto chirurginio gydymo būdo, buvo priskirti atitinkamai tyrimo grupei:

- pirminės chirurginės ekscizijos grupė (E grupė),
- odos plastikos vietiniais audiniais grupė (P grupė),
- odos transplantacijos grupė (T grupė).

Tyrimą sudarė trys vizitai: (1) konsultacija / priešoperacinis vizitas, (2) ankstyvasis pooperacinis vizitas – po 1 mėnesio ir (3) vėlyvasis pooperacinis vizitas – praėjus 6 mėnesiams po operacijos.

Pirmojo vizito metu (V1) tiriamasis buvo priskiriamas tam tikrai tyrimo grupei, jam buvo suteikiamas tiriamojo unikalusis numeris, užtikrinantis konfidencialumą ir įgalinantis rinkti, kaupti ir analizuoti nuasmenintus duomenis vykdant tyrimą. Šio vizito metu buvo renkama demografinė tiriamojo informacija, išsamiai išklausiami nusiskundimai, ligos ir gyvenimo anamnezė, atliekamas objektyvus ištyrimas, įvertinama veido simetrija bei išmatuojami keli kūno dydžio matmenys. Suteikus pakankamo laiko, tiriamojo taip pat buvo prašoma savarankiškai atsakyti į Dermatologinio gyvenimo kokybės indekso (DLQI), SCI, Rosenbergo savivertės įvertinimo skalės (RSES) ir PSO-5 geros savijautos indekso (PSO-5) klausimus. Priešoperacinio vizito pabaigoje pacientui buvo atliekamas įprastinis veido BLK chirurginis gydymas, atitinkantis jo klinikinę būklę pagal VULSK DVC taikomą praktiką.

Ankstyvojo pooperacinio vizito metu (V2), kuris numatytas praėjus 1 mėnesiui po operacijos, buvo atliekama paciento konsultacija (išklausomi nusiskundimai), objektyvus ištyrimas (įvertinamas pooperacinis randas bei aplinkiniai audiniai), peržiūrima medicininė dokumentacija (įvertinamas histologinio tyrimo atsakymas). Tiriamojo prašoma savarankiškai atsakyti į DLQI, SCI, RSES, PSO-5 indekso bei POSAS 2.0 klausimynų klausimus. POSAS 2.0 skalę sudaro dvi dalys – paciento (PSAS) ir stebėtojo (OSAS). Pacientas savarankiškai vertina savo pooperacinį randą ir užpildo pacientui skirtą klausimyną, o tyrėjas užpildo stebėtojo anketos dalį, įvertinęs pooperacinį tiriamojo randą.

Praėjus 6 mėnesiams po operacijos buvo numatytas trečias – vėlyvasis pooperacinis vizitas (V3). Jo metu tyrėjas vertino tiriamojo veidą, pooperacinį randą, išklausė paciento nusiskundimus, taip pat užpildė POSAS 2.0 klausimyno OSAS dalį. Tiriamųjų buvo prašoma atsakyti į DLQI, SCI, RSES, PSO-5 indekso bei POSAS 2.0 PSAS klausimyno klausimus. Po trečiojo vizito tiriamojo dalyvavimas biomedicininiame tyrime baigiamas.

2.4 Duomenų rinkimas ir vertinimo įrankiai

Tyrime buvo naudojamas struktūrizuotas duomenų rinkimo protokolas, apimantis klinikinį vertinimą, standartizuotus pacientų interviu ir validuotus klausimynus.

Pagrindiniai analizuojami rodikliai:

- Demografinė informacija,

- Naviko dydis, histopatologinis potipis, anatominė lokalizacija, taikomas chirurginis metodas,

- Validuoti klausimynai:

    o SCI – vertinama gyvenimo kokybė glaudžiai susijusi su emocine ir socialine būsena bei estetine išvaizda,

    o POSAS 2.0 – pooperacinio rando vertinimas iš paciento ir gydytojo perspektyvos,

    o DLQI – su odos liga susijusių gyvenimo kokybės rodiklių vertinimas,

    o RSES – vertinami savivertės pokyčiai po operacijos,

    o PSO-5 – savijautos, psichinės sveikatos ir prisitaikymo rodiklių vertinimas.

Bendroji tyrimo anketa – specialiai tyrimui sukurta suvestinė lentelė, kurią tyrėjas užpildo V1 metu. Registruojamas tiriamajam priskirtas koduotas unikalus numeris, demografinė informacija (paciento amžius, lytis, išsilavinimas, gyvenamoji vieta, užimtumas ir pan.), pagrindiniai tiriamojo nusiskundimai, ligos bei gyvenimo anamnezė, objektyvaus tyrimo duomenys bei informacija apie odos vėžį.

Dermatologinis gyvenimo kokybės indeksas sukurtas 1992 m. ir tai yra pirmas specifinis dermatologinis gyvenimo kokybės klausimynas (54). Ši anketa taikoma daugiau nei 40 dermatologinių ligų atvejais bei išversta į 90 kalbų. Klausimyną sudaro 10 nesudėtingų klausimų, adaptuotų vyresniems negu 16 metų pacientams. Pateikti klausimai apima juntamus klinikinius simptomus, odos būklės įtaką kasdienei veiklai, laisvalaikiui, sportui, darbui ar mokslui, asmeniniams santykiams. Įvertinamas odos būklės poveikis gyvenimo

kokybei – kuo didesnis suminis balas, tuo didesnis poveikis gyvenimo kokybei.

Odos vėžio indeksas specialiai sukurtas siekiant įvertinti odos vėžiu sergančių pacientų gyvenimo kokybę (55). Klausimyną sudaro 3 poskalės, vertinančios gyvenimo kokybę socialiniu, emociniu ir išvaizdos aspektu. Kuo didesnis indekso įvertinimas, tuo geresnė gyvenimo kokybė.

Viena iš populiariausių savivertės vertinimui naudojamų skalių pasaulyje yra Rosenbergo savivertės vertinimo skalė , sukurta 1965 m. (59). Tai yra patikimas, gerai dokumentuotas psichometrinis įrankis, plačiai naudojamas iki šiol. RSES sudaro 10 teiginių, o atsakymai į juos atitinkamai vertinami balais. Susumavus atsakymus, maksimali balų suma gali būti 30. Kuo didesnė balų suma, tuo aukštesnė asmens savivertė.

Pasaulio sveikatos organizacijos geros savijautos indeksas PSO-5 – tai klausimynas, vertinantis įvairius (tokius, kaip nuotaika, aktyvumas ir kt.) psichologinės savijautos aspektus pastarųjų dviejų savaičių bėgyje (58). PSO-5 sudaro penki teiginiai. Bendras balas apskaičiuojamas visų teiginių sumą padauginus iš keturių. Tokiu būdu, PSO-5 įverčiai gali svyruoti nuo 0 iki 100. Žemesni įverčiai nei 52 nurodo depresijos sutrikimo riziką.

Paciento ir stebėtojo randų vertinimo skalė 2.0 yra patikima ir validuota randų vertinimo skalė, pagal kurią randų kokybė vertinama iš dviejų perspektyvų – paciento ir gydytojo (56,57). Rando parametrai vertinami balais skalėje nuo 1 iki 10. Galimas kiekvienos skalės įvertinimas nuo 6 iki 60 balų. Kuo didesnis bendras skalės įvertinimas, tuo randas yra blogesnis.

2.5 Tiriamųjų skaičius ir jo pagrindimas

Remiantis atliktais imties dydžio skaičiavimais, siekiant įvertinti pooperacinių randų įtaką 80 % ($P = 0,8$) tikslumu, taikant 95 % pasikliovimo intervalą ir jo pločio ribą ±10 % ($W = 0,1$), būtina įtraukti 246 tiriamuosius (60).

Norint nustatyti mažo efekto dydžio ($E = 0,2$) skirtumus tarp subjektyvaus išvaizdos vertinimo prieš ir po operacijos, darant prielaidą, kad skirtumo standartinis nuokrypis yra lygus 1 ($S_\Delta = 1$), pakanka 197 tiriamųjų (61,62).

Siekiant nustatyti mažo efekto dydžio koreliacijas ($r = 0,2$) tarp subjektyvaus išvaizdos vertinimo ir gyvenimo kokybės su 80 % statistine galia ($\beta = 0,20$) ir 0,05 reikšmingumo lygmeniu ($\alpha = 0,05$), turi būti ištirta 194 pacientai (60).

Atsižvelgiant į imties skaičiavimus ir prognozuojamą 20 % tiriamųjų iškritimą, galutinai planuojama įtraukti 300 tiriamųjų.

2.6 Duomenų apdorojimas ir statistinė analizė

Surinkti tiriamųjų duomenys buvo tvarkomi vadovaujantis galiojančiais teisės aktais bei VšĮ Vilniaus universiteto ligoninės Santaros klinikų generalinio direktoriaus 2018 m. gegužės 24 d. įsakymu Nr. V-39 patvirtintomis Asmens duomenų tvarkymo taisyklėmis. Duomenys buvo nuasmeninami ir koduojami taip, kad nebūtų įmanoma nustatyti duomenų subjekto tapatybės.

Statistinė duomenų analizė atlikta programine įranga R (versija 4.2.2; R Foundation for Statistical Computing, Viena, Austrija) ir Python 3.12.5. MedCalc Software Ltd. (versija 20.305, Ostendė, Belgija) buvo naudojama specifiniams statistiniams testams atlikti, kurie taikyti validuojant SCI ir POSAS 2.0.

Trūkstamos reikšmės imties kintamuosiuose sudarė <0,5 % ir buvo užpildytos pakeičiant moda kategoriniams kintamiesiems.

Aprašomoji statistika

Aprašomoji statistika atlikta siekiant apibendrinti pradinius pacientų požymius ir gydymo rezultatus. Tolydūs kintamieji buvo apibūdinti kaip vidurkiai, standartiniai nuokrypiai ir tarpkvartiliniai intervalai, o kategoriniai kintamieji – kaip dažniai ir procentinės išraiškos.

Grupių palyginimai (prieš ir po operacijos)

Siekiant įvertinti gyvenimo kokybės pokyčius tarp grupių, atlikti poriniai t-testai ir vienfaktorinė ANOVA ir ANCOVA:

- Poriniai t-testai palygino priešoperacinius ir pooperacinius gyvenimo kokybės rodiklius (SCI, DLQI, PSO-5) vertinant psichologinės ir estetinės adaptacijos pokyčius.

- Vienfaktorinė ANOVA atlikta siekiant įvertinti pogrupių skirtumus, vienfaktorinė ANCOVA – įvertinti galimų papildomų kintamųjų,

tokių kaip amžius ir lytis, įtaką. Statistinio modelio reikšmingumas tikrintas naudojant F-testus.

- Cox proporcinių rizikų modelis buvo naudojamas vertinant klinikinių simptomų ryšį su laiku iki pirmosios konsultacijos.

Šie testai leido nustatyti, ar gyvenimo kokybės pagerėjimas po gydymo buvo statistiškai reikšmingas, kaip klinikiniai simptomai įtakojo SCI klausimyno poskalių (emocinės, socialinės bei išvaizdos) vertes.

Regresinė analizė nepasitenkinimą prognozuojantiems veiksniams

Siekiant identifikuoti pooperacinio nepasitenkinimo prognostinius veiksnius, taikyti daugialypės regresijos modeliai:

- Tiesinė daugialypė regresija buvo taikyta siekiant įvertinti, kaip naviko dydis, anatominė vieta ir chirurginės rekonstrukcijos būdas įtakoja paciento pooperacinę savijautą, pasitenkinimą bei subjektyvią estetinę išvaizdą.

- Logistinė regresija naudota įvertinti tikimybę pavėluotai kreiptis pirminei konsultacijai priklausomai nuo pasireiškusių klinikinių simptomų.

Patikimumo vertinimas ir jautrumo analizė

SCI ir POSAS 2.0 validumui bei statistiniam patikimumui užtikrinti buvo atlikti papildomi psichometriniai vertinimai:

- Tarpklasinis koreliacijos koeficientas (ICC) naudotas įvertinti POSAS 2.0 patikimumui tarp vertintojų. Reikšmės >0,75 rodė stiprią teigiamą koreliaciją.

- Apskaičiuota standartinė matavimo paklaida (SEM), siekiant nustatyti rando pakartotinių vertinimų tikslumą.

- Patvirtinančioji faktorinė analizė (CFA) atlikta SCI ir POSAS 2.0 struktūriniam validumui įvertinti, užtikrinant, kad skalės tinkamai matuotų atskirus gyvenimo kokybės ir rando vertinimo domenus.

- Standartizuoti atsako vidurkiai (SRM) taikyti vertinant SCI ir POSAS 2.0 skalės ilgalaikį jautrumą pokyčiams.

Efekto dydžio skaičiavimai

Siekiant įvertinti gyvenimo kokybės ir rando pokyčių klinikinę reikšmę bei efekto dydžius naudotas Cohen'o *d* koeficientas, pokyčius klasifikuojant kaip mažus (0,2-0,5), vidutinius (0,5-0,8) arba didelius (>0,8).

2.7 SCI ir POSAS 2.0 validavimas

Tam, kad įvertintume veido BLK sergančių pacientų gyvenimo kokybę ir pooperacinius randus, būtina pasitelkti patikimus, validuotus ir specifinius klausimynus. Iki šio tyrimo Lietuvoje nebuvo kultūriškai adaptuotų ir validuotų specifiškai odos vėžiui skirtų gyvenimo kokybės klausimynų bei randų vertinimo priemonių. Bendri dermatologiniai klausimynai, tokie kaip DLQI, nors ir prieinami lietuvių kalba, nebuvo pakankamai specifiški odos vėžiu sergantiems pacientams ir visiškai nevertino pooperacinių randų įtakos pacientų gyvenimo kokybei. Buvo pasirinkti SCI ir POSAS 2.0 klausimynai, kadangi jie yra validuoti ir plačiai naudojami tarptautiniu mastu onkologijos, dermatologijos bei plastinės rekonstrukcinės chirurgijos srityse.

Klausimynų vertimo ir kultūrinės adaptacijos procesas buvo atliktas laikantis ISPOR TCA (63) bei COSMIN gairių (64,65), siekiant užtikrinti standartizuotą ir patikimą metodiką. Vadovaujantis šiomis rekomendacijomis, SCI ir POSAS 2.0 validavimui buvo analizuoti 100 tiriamųjų duomenys. Vertimą sudarė tiesioginis vertimas iš anglų į lietuvių kalbą, atgalinis vertimas bei kognityvinis testavimas. Galutinės SCI ir POSAS 2.0 lietuviškos versijos buvo patvirtintos pasiekus procese dalyvavusių specialistų bendrą sutarimą bei įsitikinus jų kalbiniu bei klinikiniu validumu.

Atlikus vertimą ir adaptaciją, buvo vykdomas statistinis SCI ir POSAS 2.0 klausimynų patikrinimas įskaitant vidinio suderinamumo, struktūrinio validumo, konstrukto ir kriterijaus validumo bei patikimumo analizę:

- Vidinis suderinamumas – rodiklis, nurodantis, kaip gerai klausimai yra susiję tarpusavyje:

- o Cronbach alfa koeficientai SCI poskalėms buvo nuo 0,81 iki 0,88, patvirtintas puikus vidinis suderinamumas visose poskalėse (emocinė: 0,81; socialinė: 0,85; išvaizdos: 0,88).

- o POSAS 2.0 (PSAS ir OSAS) Cronbach alfa nuo 0,79 iki 0,85, parodė stiprų vidinį suderinamumą.

- **Struktūrinis validumas:**

  - o CFA analizė patvirtino SCI klausimyno trijų faktorių struktūrą (emocinė, socialinė, išvaizdos): *CFI* > 0,95; *TLI* > 0,92; *RMSEA* < 0,08.

  - o CFA rezultatai įrodė POSAS 2.0 vienfaktorinę klausimyno sudėtį patvirtindami skalės kūrėjų analizės rezultatus.

- **Konstrukto validumas** (rodiklis, rodantis, kiek klausimyno individualūs klausimai koreliuoja su bendra skalės suma) ir **kriterijaus validumas** (rodantis, kiek klausimynas geba nustatyti būkles, kurios gali būti vertinamos naudojant ir kitą klausimyną) buvo vertinami pagal Spearmano koreliacijos koeficientą:

  - o SCI konvergentinis validumas įrodytas stipriomis koreliacijomis su PSO-5 ($r = 0,61$) ir neigiamomis koreliacijomis su DLQI (nuo -0,47 iki -0,83), patvirtinančiomis klausimyno gebėjimą įvertinti odos vėžiu sergančių pacientų gyvenimo kokybės pokyčius.

  - o POSAS 2.0 kriterijaus validumas patvirtintas reikšminga koreliacija su DLQI ($p < 0,001$), įrodančia klausimyno gebėjimą įvertinti randų poveikį gyvenimo kokybei.

- Matavimo patikimumas buvo analizuotas vertinant ICC koeficientą, gautą lyginant vertes tarp dviejų nepriklausomų matavimų:

  - o Pakartotinio testavimo (*test-retest*) patikimumas tikrintas įvertinus 50 tiriamųjų atsakymus 5-7 dienų intervalu tarp vertinimų; ICC > 0,80, aukštas patikimumas.

- Jautrumas pokyčiams apibūdina, kaip klausimynas gali aptikti realius pokyčius per laiką, ypač kai šie pokyčiai yra nedideli:

  - o SCI rodė vidutinį–didelį jautrumą pokyčiams (*SRM* > 0,50).

o POSAS 2.0 pacientų vertinimai reikšmingai pagerėjo tarp V2 ir V3 (*p* < 0,001, vidutinis skirtumas -8,44 balų); rezultatai patvirtina klausimyno jautrumą randų pokyčiams.

Išsamus vertimo ir validavimo procesas patvirtino, kad SCI ir POSAS 2.0 lietuviškos versijos atitinka tarptautinius validumo reikalavimus. Šie klausimynai yra patikimos ir psichometriškai pagrįstos priemonės, skirtos tiksliai įvertinti odos vėžiu sergančių pacientų gyvenimo kokybę ir randus. Tai leidžia lietuviškas klausimynų versijas naudoti tiek klinikinėje, tiek akademinėje mokslinių tyrimų praktikoje.

3. REZULTATAI

3.1 Pacientų charakteristika

Į duomenų analizę įtraukti 278 pacientai, kuriems buvo histologiškai verifikuota veido BLK. Daugumą sudarė moterys (65 %), o vyrai – 35 %. Vidutinis pacientų amžius diagnozės metu buvo 68 metų, didžiausias sergamumas stebėtas 65-74 metų amžiaus grupėje (27 %), po jos sekė 75-84 metų grupė (25 %). Pacientai, kurių amžius buvo nuo 55 iki 64 metų, sudarė 18 % visų atvejų, o jaunesni nei 44 metų pacientai – tik 5 %. Toks pacientų pasiskirstymas pagal amžiaus grupes patvirtina, kad BLK dažniausiai serga vyresnio amžiaus asmenys.

Histologinių tyrimų analizė parodė, kad 74 % pacientų nustatytas vienas BLK histologinis potipis, o 26 % verifikuoti keli BLK tipai arba koliziniai navikai. Dažniausia buvo mazginė BLK (65 % atvejų), infiltracinė BLK sudarė 66 % atvejų, dažniau stebėta moterims. Paviršinis BLK tipas verifikuotas 50 % atvejų, reikšmingų skirtumų tarp lyčių nebuvo pastebėta. Kadangi kai kuriems pacientams buvo nustatyti keli BLK potipiai, procentinė histologinių potipių suma viršija 100 %.

Vidutinis naviko dydis buvo 10,07 mm. Dažniausiai pažeistos anatominės veido sritys buvo skruostai (31 %), nosis (29 %), kakta (27 %) ir periorbitalinė sritis (8 %).

Ligos anamnezės analizė parodė, kad 12 % tiriamųjų BLK buvo diagnozuota praeityje, kas rodo ligos pasikartojimo riziką, galimai dėl genetinio polinkio ar ilgalaikio UV spindulių poveikio.

3.2 Chirurginio gydymo įtaka pacientų gyvenimo kokybei

Chirurginis BLK gydymas statistiškai reikšmingai pagerino bendrą pacientų gyvenimo kokybę, tačiau pagerėjimo mastas tarp pacientų buvo nevienodas, atspindintis tiek objektyvių (naviko dydžio, chirurginės technikos), tiek subjektyvių veiksnių (nerimo dėl rando, psichologinės adaptacijos) įtaką.

Taikyto gydymo poveikis

Pooperacinė SCI balų analizė parodė, kad gyvenimo kokybė pagerėja vidutiniškai 8,83 balo praėjus 6 mėnesiams po operacijos ($p < 0,001$). Emocinė savijauta pagerėjo jau pirmą mėnesį po operacijos ($p = 0,044$, vidutinis skirtumas +2,02), o tai rodo, kad odos naviko chirurginis pašalinimas sumažino priešoperacinį nerimą. Pooperacinė gyvenimo kokybė greičiau pagerėjo tiems pacientams, kuriems atlikta pirminė chirurginė ekscizija. Tuo tarpu pacientų, kuriems buvo taikyta pilno storio odos transplantacija ar odos plastika vietiniais lopais, adaptacijos laikotarpis buvo ilgesnis ($p < 0,05$).

Lyčių skirtumai vertinant pooperacinę gyvenimo kokybę

Nepaisant bendro gyvenimo kokybės pagerėjimo, tam tikroms pacientų grupėms vėžio sukeltas nerimas ir psichologinis diskomfortas išliko ilgiau. Pacientai, kurių navikai buvo nosies, skruostų ir periorbitalinėje srityje, išreiškė reikšmingai mažesnį priešoperacinį ir pooperacinį pasitenkinimą, ypač vertinant veido subjektyvią išvaizdą. Moterys ir jaunesni pacientai dažniau pasižymėjo blogesne gyvenimo kokybe, ypač jei navikai buvo gerai matomose veido vietose, tokiose kaip nosis, skruostai ir periorbitalinė sritis. Moterų gyvenimo kokybė taip pat buvo blogesnė praėjus 1 mėnesiui po operacijos, skirtumai reikšmingiausi, kai navikai buvo skruostų srityje ($p < 0,05$). Vyrų pooperaciniai SCI balai buvo reikšmingai aukštesni, ypač emocinėje ir išvaizdos poskalėse ($p < 0,01$). Šie rezultatai rodo, kad naviko lokalizacija atlieka svarbų vaidmenį pooperacinėje psichologinėje pacientų adaptacijoje.

Naviko dydžio poveikis

Pacientai, kurių navikai buvo didesni nei 10 mm, nurodė reikšmingai mažesnį pasitenkinimą išvaizda ($p < 0,05$), tačiau naviko dydis neturėjo reikšmingos įtakos emocinei ar socialinei gyvenimo kokybei. Tikėtina, kad ilgalaikę emocinę ir socialinę adaptaciją labiau lėmė kiti veiksniai nei pats naviko dydis.

3.3 Pooperacinių randų sukeliamas efektas

Po chirurginio BLK pašalinimo neišvengiamai lieka pooperaciniai randai, kurie daro reikšmingą įtaką pacientų gyvenimo kokybei, savęs suvokimui ir emocinei savijautai. Ypač stiprų estetinį atsaką kelia randai gerai matomose vietose, tokiose kaip nosis, skruostai ir periorbitalinė sritis. Randai buvo vertinami iš dviejų perspektyvų – tiriamojo ir gydytojo, pasitelkiant POSAS 2.0 skalę.

Randų vertinimas

Ilgainiui randų išvaizda statistiškai reikšmingai pagerėjo. Nuo V2 iki V3 pooperacinio apsilankymo PSAS balai sumažėjo vidutiniškai 8,44 balo ($p < 0,001$), o OSAS – 8,18 balo ($p < 0,001$). Vis dėlto tam tikrose pacientų grupėse estetinis nepasitenkinimas išliko:

- Skruostų srityje esantys pooperaciniai randai kėlė didžiausią diskomfortą ($p < 0,01$).

- Jaunesni pacientai (34-56 m.) randus vertino reikšmingai prasčiau nei vyresnieji (≥70 m.), ypač skruostų ir viršutinės lūpos srityse ($p < 0,05$).

- Moterys išreiškė didesnį estetinį nepasitenkinimą randais nei vyrai, ypač po 6 mėnesių – jų PSAS vertinimai buvo reikšmingai blogesni ($p < 0,05$).

- Gydytojai prasčiau vertino randus tų pacientų, kurių navikai buvo didesni nei >5 mm, ypač akių vokų srityje ($p < 0,05$).

Rando poveikis emocinei savijautai

Nustatytas statistiškai reikšmingas ryšys tarp randų išvaizdos ir tiriamųjų gyvenimo kokybės, ypač SCI išvaizdos poskalėje – aukštesni POSAS 2.0 balai koreliavo su prastesne gyvenimo kokybe (Spearmano koreliacija = -0,51, $p < 0,001$). Po mėnesio reikšmingos koreliacijos tarp POSAS 2.0 ir gyvenimo kokybės nenustatyta ($p > 0,05$), tačiau po 6 mėnesių reikšminga neigiama koreliacija vėl išryškėjo, patvirtinanti, kad prastas pooperacinio rando vertinimas buvo glaudžiai susijęs su blogesne gyvenimo kokybe ($p < 0,001$).

Šie duomenys rodo, kad nors objektyvus randų vaizdas palaipsniui gerėja, pacientų subjektyvus suvokimas išlieka lemiamu veiksniu psichosocialinei adaptacijai ir ilgalaikei gyvenimo kokybei.

Pacientai, kuriems buvo atlikta odos plastika vietiniais audiniais, nurodė geresnius estetinius rezultatus nei tie, kuriems buvo taikyta odos transplantacija – tai paaiškinama geresniu spalvos ir tekstūros suderinamumu ($p < 0,05$).

Gydytojų įvertinimai (OSAS) koreliavo su pacientų nuomone (PSAS), nes pacientų, kuriems buvo taikyta odos transplantacija, randai buvo vertinami prasčiau nei tų, kuriems atlikta odos plastika vietiniais audiniais ($p < 0,05$).

Šie rezultatai pabrėžia, kad planuojant chirurginį gydymą svarbu atsižvelgti ne tik į sėkmingą onkologinę baigtį, bet ir į pacientų lūkesčius bei galimą psichosocialinį poveikį.

3.4 Savivertės pokyčiai ir ją lemiantys veiksniai

Veido BLK sergančių pacientų savivertės pokyčiai buvo vertinami pasitelkus RSES. Buvo siekiama nustatyti, kokią įtaką savivertei turi kiti tiriamųjų kintamieji: demografiniai veiksniai (amžius, lytis), naviko klinikiniai ypatumai bei ligos anamnezė (naviko dydis, laikas iki pirminės konsultacijos), veido ir kūno matmenys (veido sritys pagal T.T. Fattahi veido estetinių vienetų klasifikaciją, KMI). Taip pat buvo tiriama, ar savivertės pokyčiai buvo susiję su gyvenimo kokybės vertinimu (SCI poskalių balai).

Bendrieji RSES balų pokyčiai

Ilgainiui RSES balai statistiškai reikšmingai didėjo ($p < 0,05$). Tiriamojo savivertė vidutiniškai padidėjo 0,46 balo tarp V1 ir V2, nuo V2 iki V3 – 0,51 balo, o nuo V1 iki V3 – 0,98 balo. Nors *p* reikšmės patvirtino statistinį reikšmingumą, tačiau realūs, kliniškai reikšmingi pokyčiai buvo abejotini dėl mažo efektų dydžio (Cohen'o *d* koeficiento reikšmės): V1 *vs.* V2: $d = 0,14$ (labai mažas), V1 *vs.* V3: $d = 0,27$ (mažas) ir V2 *vs.* V3: $d = 0,16$ (labai mažas).

RSES pokyčiai pagal lytį

Moterų savivertė pagerėjo ženkliau ir anksčiau nei vyrų. Vyrų savivertė statistiškai reikšmingai pagerėjo tik V3 metu.

RSES pokyčiai pagal amžiaus grupes

Savivertės pokyčiai tarp skirtingų amžiaus grupių skyrėsi, tačiau daugeliui nebuvo reikšmingų pokyčių ($p > 0,05$). Vienintelė išimtis pastebėta vidutinio amžiaus grupėje (45-54 metų), kurioje nustatytas reikšmingas savivertės padidėjimas tarp V1 ir V3 ($t = -2,55$, $p = 0,015$), nors efektų dydis (Cohen'o $d = 0,42$) rodė tik nedidelį ar vidutinį realaus poveikio dydį.

Jaunesniems nei 44 metų asmenims buvo pastebėtas beveik reikšmingas savivertės padidėjimas tarp V2 ir V3 ($t = -1,94$, $p = 0,073$, $d = 0,50$), rodantis galimą vėlesnį pagerėjimą.

Laiko iki konsultacijos ir RSES pokyčių koreliacija

Pearsono koreliacijos analizė neparodė prasmingo ryšio tarp laiko iki pirmojo apsilankymo pas gydytoją ir savivertės pokyčių (visos *r* reikšmės arti 0): V1 iki V2: $r = 0,057$, $p = 0,347$; V1 iki V3: $r = 0,057$, $p = 0,340$; V2 iki V3: $r = 0,007$, $p = 0,906$.

Naviko dydžio ir RSES pokyčių koreliacija

Naviko dydis reikšmingai neįtakojo savivertės pokyčių (visos *r* reikšmės labai mažos): V1 iki V2: $r = 0,008$, $p = 0,892$; V1 iki V3: $r = 0,056$, $p = 0,351$; V2 iki V3: $r = 0,056$, $p = 0,348$.

SCI poskalių ir RSES pokyčių koreliacija

Nors SCI išvaizdos poskalė parodė silpną, statistiškai reikšmingą ryšį su savivertės pokyčiais tarp V2 ir V3 ($r = 0,121$, $p = 0, 043$), šis poveikis buvo labai silpnas ir tikriausiai neturi klinikinės reikšmės. Kitos SCI poskalės (emocinė, socialinė, bendra) reikšmingo ryšio su savivertės pokyčiais neturėjo.

Lyties ir amžiaus įtaka SCI poskalių ir RSES pokyčių koreliacijai

Nustatyta, kad nei lytis, nei amžius reikšmingai nepaveikė šių koreliacijų ($p > 0,05$).

RSES skirtumai pagal naviko lokalizaciją

Vienpusė ANOVA nustatė reikšmingą savivertės skirtumą priklausomai nuo naviko lokalizacijos tik V1 metu ($F = 2,20$, $p = 0,043$). Vėlesniuose vizituose skirtumai tapo nereikšmingi.

KMI įtaka RSES pokyčiams

KMI reikšmingai nepaveikė savivertės pokyčių (visi r labai silpni): V1 *vs.* V2: $r = 0,060$; V1 *vs.* V3: $r = -0,024$; V2 *vs.* V3: $r = -0,101$. Įdomu tai, kad vyrams tarp V1 ir V2 pastebėta silpna teigiama koreliacija ($r = 0,212$), tačiau ji buvo nereikšminga.

3.5 Simptomai ir delsimas atvykti į konsultaciją

Tyrime dalyvavę pacientai pateikė gana platų klinikinių simptomų spektrą, iš kurių dažniausi buvo pastebimas navikas (27 %), vėliau – erozija (18 %) ir diskomfortas (17 %). Rečiau buvo minimi kraujavimas (13 %), niežulys (10 %) ir skausmas (2 %). Nepaisant pastebimų simptomų, daugelis pacientų ilgą laiką delsė kreiptis į gydytoją.

Vidutinis laikas nuo simptomų atsiradimo iki pirmojo apsilankymo pas gydytoją buvo 21 mėnuo. Tai rodo ženklų ligos diagnozės nustatymo vėlavimą ir didesnę ligos progresavimo riziką.

Pacientai, pastebėję odoje matomą naviką ar jaučiantys skausmą, statistiškai reikšmingai dažniau kreipėsi į gydytoją per 12 mėnesių ($p < 0,05$). Tuo tarpu tokie simptomai kaip kraujavimas, niežulys ir erozija reikšmingai nelėmė laiko iki pirmojo vizito pas gydytoją.

Beveik pusė pacientų (46 %) diagnozės metu nurodė tris ar daugiau simptomų, tačiau simptomų skaičius taip pat neturėjo įtakos laikui iki pirmosios konsultacijos.

Tiek vyrai, tiek moterys įvairaus amžiaus grupėse medicininės pagalbos ieškojo panašiai vienodai delsdami ($p > 0,05$).

Struktūrizuotų interviu metu paaiškėjo, kad daugelis pacientų nuvertino savo simptomus, manydami, kad atsiradęs odos darinys yra nepavojingas ar išnyks savaime. Baimė išgirsti vėžio diagnozę bei sunkumai patekti pas specialistą taip pat lėmė medicininės pagalbos atidėliojimą. Pacientai, kurių nerimo lygis aukštesnis, buvo labiau linkę kreiptis į gydytoją anksčiau ($HR = 1,24$, $p = 0,08$). Tai rodo, kad emocinis stresas, o ne simptomų sunkumas buvo pagrindinis motyvas kreiptis pagalbos.

3.6 Simptomų pobūdis priklausomai nuo histologinio naviko tipo, jų poveikis gyvenimo kokybei

Veido BLK klinikinis pasireiškimas ženkliai skyrėsi priklausomai nuo histologinio naviko tipo:

- Paviršinė BLK rečiau pasireiškė kraujavimu ($\beta = -0,93$, $p = 0,033$), o tai atspindi mažiau invazyvų jos pobūdį. Šiam potipiui būdingesnė eritema ir lengvas sudirginimas, o ne išopėjimas.

- Mazginė BLK – dažniausias potipis tiriamųjų imtyje (65 %) – daugiausiai buvo apibūdinama stebimo odos naviko sąvoka (82 %), tačiau neturėjo statistiškai reikšmingų sąsajų su kraujavimu, erozija ar diskomfortu ($p > 0,05$). Tai rodo, kad mazginė BLK, vertinant iš pacientų perspektyvos, dažnai išlieka besimptome kol navikas nepasiekia didesnio dydžio.

- Infiltracinė BLK buvo rečiau identifikuojama kaip aiškus navikas ($\beta = -1,21$, $p = 0,005$), kaip manoma dėl jos difuzinio ir labiau po odos paviršiumi plintančio augimo.

- Koliziniai navikai (26 % atvejų) dažnai pasireiškė iš karto keliais simptomais, tokiais kaip matomas navikas, erozija ir diskomfortas.

Simptomų įtaka gyvenimo kokybei

Vertinant simptomų poveikį pacientų gyvenimo kokybei, buvo tiriamas bendras simptomų pasireiškimas ir jų sąsajos su SCI klausimyno poskalėmis:

- Naviko sukeliamas diskomfortas stipriausiai lėmė prastesnius SCI balus, statistiškai reikšmingai paveikdamas emocinę ($F = 6,55$, $p = 0,011$), socialinę ($F = 5,35$, $p = 0,022$) bei su išvaizda susijusią gyvenimo kokybę ($F = 4,06$, $p = 0,045$).

- Skausmas, kraujavimas, niežulys ir erozija reikšmingos įtakos SCI balams neturėjo. Tai rodo, jog pablogėjusi gyvenimo kokybė buvo siejama su naviko buvimu ir jo sukeliamu diskomfortu, o ne ūmiais fiziniais simptomais.

Regresijos analizė patvirtino, kad diskomfortas buvo pagrindinis veiksnys, bloginantis bendrą gyvenimo kokybę: emocinė gyvenimo kokybė ($\beta = -1,96$, $p = 0,011$); socialinė gyvenimo kokybė ($\beta = -1,00$, $p = 0,022$); bendras SCI balas ($\beta = -3,71$, $p = 0,006$).

Šie rezultatai rodo, kad simptomų sunkumas bei kiekis pats savaime neprognozuoja nei paciento priešoperacinės elgsenos, nei gyvenimo kokybės.

4. DISKUSIJA

Šio tyrimo tikslas – išsamiai įvertinti veido BLK sergančių pacientų perioperacinę gyvenimo kokybę, išnagrinėti, kaip liga bei chirurginis gydymas paveikia jų psichosocialinę adaptaciją bei savivertę, ypatingą dėmesį skiriant simptomų ir pooperacinių randų sukeltam poveikiui. Tyrimo metu atlikta daugialypė analizė atskleidė ne tik tai, kad pooperaciniu laikotarpiu pacientų gyvenimo kokybė reikšmingai pagerėja, bet nurodo ir tam tikrus iššūkius, su kuriais pacientai susiduria sveikdami.

Nepakankamai atpažįstami simptomai ir pavėluota konsultacija

Vienas iš gana netikėtų rezultatų – ilgas pacientų delsimo laikotarpis nuo pirmųjų simptomų atsiradimo iki kreipimosi į gydytoją. Nepaisant to, kad veido odos pažeidimai dažniausiai buvo gerai matomi, daugelis pacientų atidėliojo ir kreipėsi į gydytoją tik pastebėję aiškų naviko augimą arba dėl skausmo. Vidutinė delsimo trukmė – net 21 mėnuo!

Nuostabą kelia tai, kad tokie ankstyvieji pacientų simptomai, kaip diskomfortas, niežulys ar paviršinė erozija, dažniau buvo ignoruojami, o ne skatinantys anksčiau ieškoti medicinos pagalbos. Tai rodo, kaip svarbu šviesti visuomenę apie ankstyvuosius odos vėžio požymius.

Gyvenimo kokybė po operacijos

Chirurginis naviko pašalinimas lėmė reikšmingą gyvenimo kokybės pagerėjimą net ir ankstyvuoju pooperaciniu laikotarpiu, ypač vertinant pacientų emocinę savijautą praėjus 1 mėnesiui po operacijos. Ryškiausias pokytis fiksuotas praėjus 6 mėnesiams visose vertintose srityse: emocinėje, socialinėje ir išvaizdos. Vis dėlto ne visų pacientų sveikimo patirtys buvo vienodos.

Moterų ir jaunesnio amžiaus pacientų gyvenimo kokybė pagerėjo nuosaikiau, ypač kai navikas buvo centrinėje veido dalyje – nosies, lūpų ar akių vokų srityse. Tai išryškina demografinių veiksnių įtaką psichologinei adaptacijai bei pabrėžia individualizuotos, pritaikytos tikslinėms grupėms, psichosocialinės pagalbos svarbą.

Randų įtaka pooperacinei adaptacijai

Pooperacinių randų sukeliamas poveikis pasirodė esantis vienas iš pagrindinių veiksnių, lemiančių ilgalaikę gyvenimo kokybę. Nors objektyviai vertinant POSAS 2.0 skalės rezultatus randų būklė pagerėjo per pirmuosius šešis pooperacinio laikotarpio mėnesius, subjektyvus estetinis nepasitenkinimas (ypač tarp moterų ir jaunesnių pacientų) išliko reikšmingas.

Dažniausiai kritiškai vertinti skruostų, nosies ir periorbitalinės srities randai. Įdomu tai, kad objektyvus randų vertinimas ne visuomet atitiko pacientų savijautą. Tai rodo, jog estetinių lūkesčių ir asmeninio jautrumo veiksniai turi

didesnę reikšmę nei objektyviai įvertinami rando parametrai. Todėl svarbu dar iki operacijos formuoti realistiškus lūkesčius, net ir ankstyvuoju pooperaciniu laikotarpiu taikyti visas įmanomas priemones, gerinančias randų išvaizdą.

Chirurginio gydymo būdas ir pasitenkinimo vertinimas

Pacientai, kuriems atliktos sudėtingesnės chirurginės operacijos, buvo labiau nepatenkinti savo pooperacine išvaizda. Pavyzdžiui, pacientai po odos transplantacijos dažniau išreiškė nepasitenkinimą operuotos vietos spalvos ar tekstūros pakitimais, o tų, kuriems buvo taikyta pirminė chirurginė ekscizija, emocinė savijauta pagerėjo ženkliai anksčiau. Tai dar kartą įrodo aiškių išvaizdos lūkesčių formavimo svarbą dar prieš operaciją.

Tyrimo privalumai

Vienas iš pagrindinių šio tyrimo privalumų yra perspektyvinis dizainas, leidžiantis vertinti pacientų gyvenimo kokybę, pooperacinius randus bei savivertę laikui bėgant, o ne remiantis retrospektyviniais prisiminimais.

Be to, siekiant visapusiškai įvertinti pacientų emocinę savijautą, socialinę adaptaciją bei išvaizdą, tyrime buvo naudojami validuoti klausimynai. Toks struktūrizuotas daugiamatis tyrimo planas sustiprina rezultatų patikimumą, užtikrina, kad viso perioperacinio laikotarpio patirtys būtų nagrinėjamos iš skirtingų perspektyvų.

Kadangi tyrime dalyvavo išskirtinai veido BLK sergantys ir chirurginiu būdu gydyti pacientai, šio tyrimo rezultatai unikaliai pabrėžia specifines estetines ir funkcines problemas, susijusias būtent su odos vėžiu ir pooperaciniais randais gerai matomose ir jautriose veido vietose.

Galiausiai SCI ir POSAS 2.0 klausimynų lietuviškų versijų vertimas, kultūrinis adaptavimas bei validavimas yra svarbus indėlis tiek vietinei klinikinei ir mokslinei praktikai, tiek gali tapti geru pritaikymo pavyzdžiu kitų kalbų populiacijose.

Tyrimo trūkumai

Nors tyrimo rezultatai pateikia svarbių įžvalgų, tačiau jas interpretuojant reikėtų atsižvelgti ir į keletą trūkumų.

Tyrime buvo analizuojami 278 pacientai, o tai rezultatų vertinimui suteikia tvirtą statistinį pagrindą. Vis dėlto šie rezultatai gali nevisiškai tiksliai atspindėti kitų sveikatos priežiūros įstaigų rezultatų atkartojamumą, kadangi tyrimas buvo vykdomas viename centre.

Be to, nors imtį sudarė įvairių dydžių navikai, anatominių veido lokalizacijų bei chirurginių metodų grupės, kai kurie analizuoti pogrupiai buvo palyginus maži, o tai gali riboti statistinę galią. SCI ir POSAS 2.0 klausimynų validavimui bei gyvenimo kokybės ir pooperacinių randų vertinimui buvo pasitelkti du atskiri 100 pacientų pogrupiai, todėl gauti rezultatai atspindi dalį imties. Išplėtus tyrimą keliuose centruose padidėtų rezultatų apibendrinamumas.

Pacientai buvo vertinami iki 6 mėnesių po operacijos, tai yra pakankamas laikotarpis, kad būtų galima nustatyti ankstyvuosius ir vidutinės trukmės gyvenimo kokybės pokyčius. Tačiau ilgesnis stebėjimas (12 ir daugiau mėnesių) leistų dar geriau įvertinti ilgalaikį psichosocialinį prisitaikymą.

Gautus rezultatus taip pat gali įtakoti keletas galimų šališkumų: tikslus prisiminimas, paciento noras įsiteikti ar operatoriaus šališkumas.

Klinikinė reikšmė ir ateities kryptys

Nors chirurginis veido BLK gydymas veiksmingai pagerina pacientų gyvenimo kokybę, tam tikroms pacientų grupėms, ypač jaunesniems pacientams, moterims bei tiems, kurių navikai yra gerai matomose vietose, reikalinga papildoma pagalba.

Siekiant sumažinti pacientų patiriamą distresą, keletas lengvai įgyvendinamų praktinių priemonių gali būti įdiegtos gana greitai su minimaliomis sąnaudomis:

- Trumpa psichologinė patikra pradinės konsultacijos metu padėtų nustatyti pacientus, kuriems nerimas dėl išvaizdos gali pasireikšti labiau. Pavyzdžiui, pacientų būtų prašoma atsakyti į SCI, PSO-5 ar VAS klausimynus, ženkliai nepailginant apsilankymo trukmės.
- Psichologo konsultacijos dermatoonkologijos centre leistų pacientams gauti psichologinę pagalbą, ypač prieš operaciją, kai nerimas dažniausiai būna stipriausias.

- Priešoperacinės konsultacijos metu svarbu išsamiai aptarti ne tik nustatytą ligą bei siūlomą gydymą, bet ir realistiškus lūkesčius ir tikėtiną pooperacinių randų išvaizdą.
- Pooperaciniu laikotarpiu reikėtų taikyti savalaikę randų priežiūrą.

Siekiant tvariai pagerinti pacientų psichosocialinę būklę bei mažinti odos vėžio diagnostikos vėlavimą, reikalingos platesnio masto reformos bei sisteminiai pokyčiai:

- Odos vėžio gydymo klinikinės rekomendacijos turėtų apimti psichologinį vertinimą ir emocinę pagalbą kaip standartinę praktiką.
- Psichologo konsultacijos, pooperacinių randų korekcijos metodai turėtų būti įtraukti į valstybės finansuojamų asmens sveikatos priežiūros paslaugų sąrašus.
- Privalomojo sveikatos draudimo fondo ištekliai turėtų būti tinkamai paskirstyti, užtikrinant savalaikę odos vėžio diagnostiką ir gydymą, įskaitant pooperacinius patikrinimus, vadovaujantis tarptautinėmis gydymo rekomendacijomis.
- Siūloma taikyti specializuotas tęstinio profesinio mokymo programas bei teledermatologijos paslaugas šeimos gydytojams, kurios padėtų laiku diagnozuoti įtartinus odos pažeidimus ir nukreipti pacientus specialistų konsultacijai.
- Tikslinga rengti visuomenės informavimo kampanijos apie odos vėžį, orientuotas į ankstyvą ligos atpažinimą. Jos padėtų suprasti, kad negydomas odos vėžys gali tapti rimtu sveikatos sutrikimu.

5. IŠVADOS

Šis tyrimas išsamiai nagrinėja veido BLK psichologinį, funkcinį bei estetinį poveikį. Gauti rezultatai suteikia kliniškai reikšmingų įžvalgų pabrėždami gyvenimo kokybės, išvaizdos ir psichosocialinės adaptacijos tarpusavio sąsajas. Tai padeda geriau suprasti, kaip veido BLK veikia pacientus ne vien onkologiniu, bet ir platesniu – emociniu bei socialiniu – požiūriu.

Priešoperacinė ir pooperacinė gyvenimo kokybė

Chirurginis BLK gydymas reikšmingai pagerino pacientų gyvenimo kokybę. Nors emocinė savijauta pagerėjo jau pirmą mėnesį po operacijos, ryškiausias

skirtumas buvo stebimas praėjus 6 mėnesiams. Vis dėlto gyvenimo kokybės pagerėjimo mastas tarp pacientų buvo nevienodas. Jaunesni pacientai ir moterys patyrė didesnį nerimą dėl pooperacinės išvaizdos, ypač kai navikai buvo itin matomose veido srityse – ant nosies, vokų ar skruostų. Pacientai, kuriems buvo atliktos sudėtingesnės rekonstrukcijos (odos persodinimas, vietiniai lopai), buvo mažiau patenkinti pooperaciniais estetiniais rezultatais.

Perioperacinio nerimo įtaka

Pacientų gyvenimo kokybė buvo glaudžiai susijusi su nerimu, kuris stipriausiai pasireiškė priešoperaciniu laikotarpiu dėl baimių, susijusių su ligos diagnoze, chirurginio gydymo rezultatu ir galimu išvaizdos pasikeitimu. Po operacijos jis palaipsniui mažėjo. Nors pašalinus odos naviką daugelio emocinė savijauta pagerėjo, nerimas ilgiau išliko moterims bei jaunesniems pacientams, taip pat tiems, kuriems buvo atliktos sudėtingesnės procedūros.

Randų poveikis gyvenimo kokybei, savivertei ir psichologinei adaptacijai

Tyrimo rezultatai rodo, kad pooperaciniai randai reikšmingai įtakojo pacientų psichosocialinę būseną ir gyvenimo kokybę. Nors ilgainiui randų išvaizda objektyviai gerėjo, pacientų subjektyvus estetinis nepasitenkinimas dažnai išliko, ypač jaunesnio amžiaus pacientų grupėje, taip pat moterims, pacientams, turintiems didesnius nei 10 mm navikus ar turintiems randus labiausiai matomose veido vietose. Subjektyvus nepasitenkinimas išvaizda išliko svarbiausia sumažėjusios gyvenimo kokybės ir žemesnės savivertės priežastimi. Pacientai, kuriems buvo atlikta odos plastika vietiniais audiniais, vertino randus palankiau nei pacientai po odos transplantacijos. Pacientų savivertė laikui bėgant šiek tiek pagerėjo, tačiau pokyčių dydžiai buvo kliniškai nereikšmingi.

Simptomų įtaka gyvenimo kokybei bei laikui iki pirmosios konsultacijos

Simptomų įvairovė reikšmingai lėmė, kada pacientai kreipdavosi pagalbos. Pacientai, patiriantys skausmą, diskomfortą ar turintys labiau pastebimą naviką, į specialistus kreipdavosi anksčiau, tuo tarpu pacientai su mažiau pastebimais simptomais, tokiais kaip erozija ar niežulys, dažniausiai atidėdavo kreipimąsi—dažnai ilgiau nei vienerius metus. Delsimas ir

pavėluotas gydymas ne tik padidino chirurginio gydymo sudėtingumą, bet ir neigiamai veikė pacientų emocinę savijautą bei pasitenkinimą gydymo rezultatais. Šie duomenys atskleidžia poreikį didinti visuomenės informuotumą apie ankstyvuosius BLK požymius.

Lietuviškų SCI ir POSAS 2.0 klausimynų versijų validavimas

Lietuviškos SCI ir POSAS 2.0 versijos pasižymėjo puikiomis psichometrinėmis savybėmis. Statistinė analizė, įskaitant Cronbacho alfa koeficientą, patvirtinamąją faktorinę analizę ir pakartotinio testavimo patikimumo rodiklius, parodė aukštą vidinį suderinamumą, patikimumą bei konstrukto validumą. Šie validuoti klausimynai, skirti tiksliai įvertinti odos vėžiu sergančių pacientų gyvenimo kokybę ir randus, dabar yra prieinami klinikiniam naudojimui bei moksliniams tyrimams lietuviškai kalbančioje populiacijoje.

Apibendrinant galima tvirtinti, kad šis tyrimas pabrėžia biopsichosocialinio požiūrio į pacientą svarbą. Derinant onkologinį saugumą su psichologine gerove ir adekvačiais estetiniais lūkesčiais, galima pasiekti ne tik gerų klinikinių, bet ir ilgalaikių gyvenimo kokybės rezultatų. Tai svarbus žingsnis siekiant visapusiško paciento pasitenkinimo gydymu.

VIII. DESCRIPTION OF ACADEMIC AND RESEARCH ACTIVITIES

Dr. Domantas Stundys is a board-certified plastic and reconstructive surgeon specializing in dermato-oncology and aesthetic surgery. Since 2020, he has been pursuing doctoral studies at Vilnius University Faculty of Medicine, focusing on psychosocial, aesthetic, and quality-of-life outcomes in patients with facial basal cell carcinoma.

He graduated from Vilnius University Faculty of Medicine in 2003, completed a postgraduate internship, and finalized his residency in plastic and reconstructive surgery in 2009. He is a member of professional societies, including the Lithuanian Society of Plastic and Reconstructive Surgery, the Lithuanian Society of Dermatovenereologists, and the Lithuanian Telemedicine Association.

Dr. Stundys performs approximately 500 surgical procedures annually, primarily in facial skin cancer reconstruction and aesthetic surgery. He is particularly experienced in the use of local flaps for facial reconstruction, combining oncologic precision with aesthetic refinement and a strong patient-centered approach.

Dr. Stundys has expanded his clinical expertise internationally through advanced studies in Turkey, Hungary, Germany, Italy, France, Sweden, and Switzerland. His active involvement in European research initiatives—including FP7 and BSR-funded eHealth projects (eHealth for Regions, ICT for Health, PrimCareIT, CARRE)—reflects a strong interest in scientific and technological innovation in medicine.

Academically, Dr. Stundys has authored and co-authored several peer-reviewed articles in international journals, focusing on surgical outcomes, aesthetic evaluation, and quality of life. He has presented his findings at national and international scientific conferences and he actively mentors dermatology and plastic surgery residents in oncoplastic surgery at Vilnius University.

APPENDICES

Appendix A

Stundys D, Ulianskaitė G, Stundienė I, Grigaitienė J, Jančorienė L.

The Quality of Life in Surgically Treated Head and Neck Basal Cell Carcinoma Patients: A Comprehensive Review

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The Quality of Life in Surgically Treated Head and Neck Basal Cell Carcinoma Patients: A Comprehensive Review

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Simple Summary: Basal cell carcinoma is the most common skin cancer with increasing incidences every year. The face is considered to be the most affected body part and surgery the most often applied treatment method. Although this tumor rarely metastasizes and is generally considered to cause low morbidity, the established oncologic diagnosis and the existing impairment in facial area as well as the surgical treatment, which may leave postoperative scars and facial disfigurement of varied extent, affect the patient's quality of life. The aim of this article is to review and summarize current literature on the impact of craniofacial basal cell carcinoma surgical treatment on patients' quality of life and to compare it before and after the surgery. After conducting a comprehensive review, we conclude that there is a lack of studies assessing the impact of surgical treatment on quality of life exclusively in patients with head and neck basal cell carcinoma.

Abstract: In this review, we examine current literature analyzing the impact of surgical treatment on the QoL in patients with head and neck BCC. A comprehensive literature review was performed using the main databases. As many as six out of 322 articles were selected for the final analysis. The selected articles were published in the period between 2004 and 2021, most published within the last two years. All analyzed studies were prospective. Five out of six studies evaluated NMSC consisting of both BCC and SCC, and only one study selectively evaluated the impact of surgical treatment on QoL in patients with craniofacial BCC. Authors of the selected studies reported that QoL improves following the surgery; however, the effect on QoL varies. Patients' age, gender, marital status, education level, and employment status had a stronger correlation with QoL postoperatively, especially during the late follow-up period. Younger patients were more bothered by appearance-related issues. One study concluded that elderly patients did not experience a statistically significant improvement in QoL. This literature review demonstrated that there is no clear consensus on the use of a single disease-specific QoL measurement tool. Furthermore, there is a lack of studies assessing the impact of surgical treatment on QoL exclusively in patients with head and neck BCC and studies analyzing the multivariate correlation between QoL and tumor type, size, anatomic site, and treatment outcomes.

Keywords: basal cell carcinoma; non-melanoma skin cancer; head and neck; quality of life; surgery

1. Introduction

Basal cell carcinoma (BCC) is the most common type of non-melanoma skin cancer (NMSC) and one of the most common cancers in the white population [1–3]. The highest incidence rates have been reported in Australia (mean incidence of 1000/100,000 inhabitants), the USA (mean incidence of 212–407/100,000 inhabitants), and Europe (mean incidence of 76.21/100,000 inhabitants per year) [4]. The incidence of the disease is increasing significantly each year worldwide, by 4–8% in the USA [1] and 2% in Australia [5]. The disease is most common in the elderly, with the risk of developing BCC being 100 times higher in people aged 55–75 years than in those aged 20 years [5]. However, there is a worrying trend towards a rapidly increasing incidence of BCC in the age group of population under 40 years, especially in women [6].

The most important risk factors for the development of BCC are skin exposure to UV, Fitzpatrick skin types I and II, immunosuppression, exposure to arsenic, ionizing radiation, and genetic syndromes [1,2,5,7–10]. Around 70–80% of BCC occur on the sun-damaged areas of the face, head, and neck, and less often on the extremities [3,4]. Even though the chances of metastases of BCC are very low, this type of skin cancer could locally invade the surrounding tissues.

The aim of treatment of BCC is to remove the tumor, preserve the function of the affected area, and maintain a good aesthetic appearance. There are many options for both conservative and surgical treatments of BCC. The choice of the method is mainly determined by the risk of tumor recurrence, which is further divided into low-risk and high-risk BCC. Tumor criteria (location, size, histological findings, assessment of tumor margins, possible perineural spread, recurrent tumor) and patient criteria (age, immunosuppression, genetic syndromes, chronic scarring, ulceration, foci of inflammation, history of other malignancies) are considered [7].

The main treatment of BCC is surgical, which is usually chosen according to the risk of recurrence [4,7,9]. If a high risk of BCC recurrence is suspected, a more aggressive treatment approach is selected accordingly. Less aggressive BCC can be treated with minimally invasive surgical (electro destruction, curettage, cryotherapy) or non-surgical methods (radiotherapy, local immunotherapy, photodynamic therapy) [4,7].

Although BCC is usually not life-threatening, the disease affects the largest organ of the body, the skin, which is the most visually prominent and visible to oneself and the others. As the face, head, and neck are most affected, it can significantly affect person's body image, self-esteem, and quality of life (QoL) [11,12]. The impact on QoL may be due to the skin tumor itself, as well as to the treatment administered, such as symptoms, functional limitations, changes in aesthetic appearance, and additional considerations such as the cost of treatment and interference with activities of daily life [13].

Since the number of BCC patients is increasing every year, and surgery is still considered the main treatment method, more people must deal with emotional and physical consequences of the disease. The aim of this article is to review and summarize current literature on the impact of craniofacial BCC surgical treatment on patients' QoL.

2. Materials and Methods

2.1. Search Strategies

A scientific literature search was performed in PubMed, Cochrane, and Web of Science databases from inception to 1 September 2022. The keywords used for the search were groups of words "basal cell carcinoma", "non-melanoma skin cancer", and "NMSC" combined with the word "quality of life". Results were limited to the English language. In total, 322 articles were identified through database searches.

2.2. Study Selection Criteria

The chosen articles were evaluated against eligibility criteria:

1. Age: the study included patients over 18 years old
2. Location of tumor: craniofacial BCC
3. Intervention: surgical treatment of the face and neck BCC
4. Outcome: QoL was assessed before and after the surgical treatment
5. Article types: prospective studies were included

As many as 322 articles were identified through literature database search using the above-mentioned keywords. After a thorough abstract review, 268 articles were excluded. One article was excluded since there was no possibility to retrieve a free full text article. Following exclusion criteria, 47 articles were excluded after a full text review. Six articles were chosen for a final analysis (Figure 1).
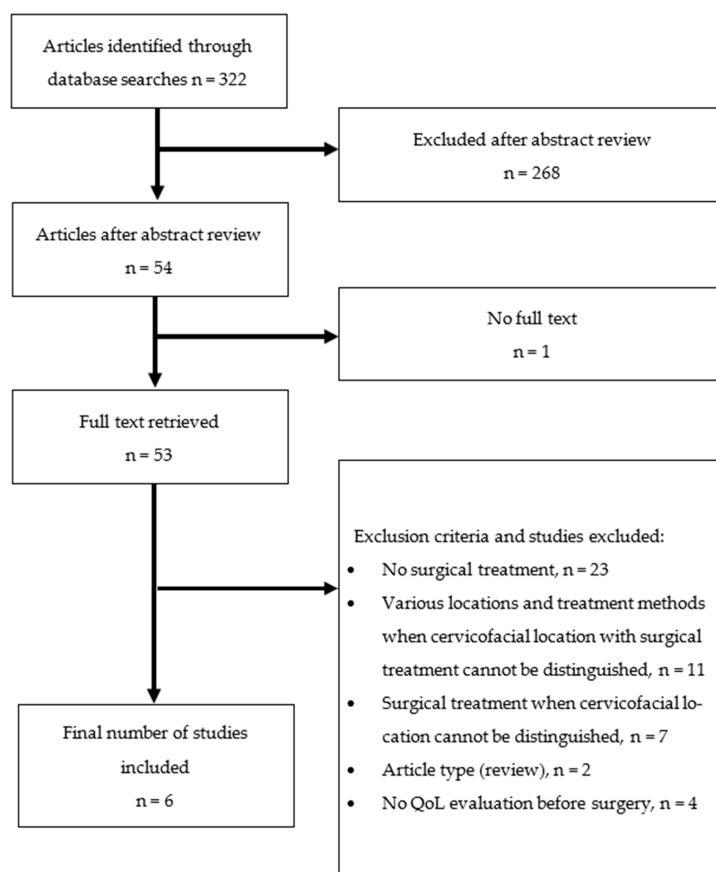
Figure 1. Article selection flow diagram.

Each of the 6 included papers was analyzed by two authors (DS, GU). The main data from the articles was collected and described in the table including authors, study type, description of study, sample size, description of the sample, tools used to evaluate QoL, and main conclusions. The findings were presented chronologically and brought into a review.

3. Results

The selected articles were published in the period between 2004 and 2021; most were published in the last two years. All analyzed studies were prospective. QoL indicators were assessed at various time points with the first assessment being before surgery and follow-up assessments carried out at the period from 1 week after surgery up to 5 years. Five out of six studies evaluated NMSC consisting of both BCC and squamous cell carcinoma (SCC), and only one study selectively evaluated the impact of surgical treatment of only craniofacial BCC on QoL. Various questionnaires such as Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36), Visual Analogue Scale (VAS), Functional Assessment of Cancer Therapy—General (FACT-G), the Rosenberg Self-Esteem Scale/UNIFESP-EPM, Dermatology Life Quality Index (DLQI), Skin Cancer Index (SCI), and FACE-Q were used to assess the QoL. A detailed summary of the six selected articles is presented in Table 1.

Table 1. Detailed summary of the selected articles.

Author	Study Type	Study Description	Sample	Sample Description	QoL Outcome Measures	Main Conclusions
Rhee et al., 2004 [14]	Longitudinal prospective research	QoL assessment of cervicofacial skin cancer treated with Mohs surgery. QoL data collected at baseline, 1 month and 4 months	n = 121—initial visit n = 105—first follow up n = 102—second follow up	Biopsy-proved NMSC cervicofacial skin cancer: n = 103—BCC, n = 16—SCC, n = 2—other	SF-36, 10-cm visual analog scale (VAS), Functional Assessment of Cancer Therapy-General (FACT-G)	Little change of QoL was noticed following the treatment of NMSC; the improvements in emotional, and mental health following treatment of NMSC were established (specifically <65 years and employed patients).
Maciel et al., 2014 [15]	Prospective, analytical clinical study	Assessment of late impact of surgical treatment of cervicofacial skin carcinomas on QoL and self-esteem. QoL data collected at baseline and 5 years after surgery	n = 55—initial visit n = 22—5-years after surgery follow up	Biopsy-proved NMSC cervicofacial skin cancer larger than 1 cm: n = 19—BCC, n = 3—SCC	SF-36, the Rosenberg Self-Esteem Scale/UNIFESP-EPM	Improvement in mental health and self-esteem was observed in the late postoperative period after surgical treatment of NMSC.
Çetinarslan et al., 2020 [16]	Prospective study	Determination of the factors affecting QoL and the effect of surgical treatment on QoL of patients with facial NMSC. QoL data collected at baseline and 3 months after surgery	n = 255—initial visit	Histologically or clinically diagnosed facial BCC or SCC: n = 174—BCC, n = 81—SCC	DLQI	The QoL is minimally affected in patients with NMSC using DLQI; the QoL 3 months after surgery showed a significant improvement in patients with facial NMSC.
García-Montero et al., 2021 [17]	Prospective cohort study	Identification of the factors related to the favorable evaluation of QoL during follow-up after treatment of cervicofacial NMSC. QoL data collected at the time of diagnosis, 7 days, 1 month and 6 months after treatment	n = 229—initially included n = 220—completed questionnaires	Cervicofacial NMSC, confirmed by skin biopsy: n = 179—BCC, n= 41—SCC Type of treatment: n = 190—surgery n = 19—photodynamic therapy n = 3 imiquimod 5% n = 8 cryotherapy or electrosurgery	SCI, VAS, clinical interview	Scores of the SCI improve after the treatment of cervicofacial NMSC.

Table 1. *Cont.*

Author	Study Type	Study Description	Sample	Sample Description	QoL Outcome Measures	Main Conclusions
Kinde et al., 2021 [18]	Prospective study	Measurement of QoL of individuals with surgically treated periocular NMSC. QoL data collected at baseline, 1 week and 3 months after surgery	n = 57—enrolled patients n = 45 completed questionnaires	Patients diagnosed for the first time with periocular NMSC who underwent Mohs micrographic surgery and reconstruction: n= 37—BCC n= 8—SCC	SCI, FACE-Q	Mohs resection of periocular NMSC patients demonstrated reduced QoL as measured by the SCI and FACE-Q surveys; the significant improvement of Qol after this surgery was reported. The highest improvements were in the late postoperative period.
Sanz Aranda et al., 2021 [19]	Prospective observational study	QoL in histologically confirmed BCC patients older than 85 years treated with surgery. QoL data collected before and 3 months after surgery	n = 48—presurgery questionnaire n = 25—postoperative survey	Histologically confirmed BCC patients older than 85 years	Spanish SF-36	A significant improvement of QoL after surgery was not detected; the authors believe that surgery as a first-line treatment for BCC should be discussed with patients and their caregivers or relatives, along with alternative options.

Rhee et al., in his longitudinal prospective study of 121 NMSC of the head and neck patients, assessed QoL, smoking habits, and sun-protective behavior before and after the surgical treatment. SF-36 and FACT-G were used as QoL evaluation tools. Authors observed only slight changes in QoL measures. The postoperative scar following the treatment was less bothersome than the lesion itself. The location and size of the tumor was not associated with QoL in this cohort of patients. However mental (SF-36) and emotional (FACT-G) domains of QoL showed statistically significant changes. Notably, study participants younger than 65 years and employed demonstrated improvements in emotional and mental health and well-being following the treatment of NMSC, especially between the surgical treatment and the 1-month postoperative visit ($p < 0.04$). In addition, many of those included in the study were more likely to use sunscreen or protective clothing or limit their outdoor presence during peak UV light exposure following the treatment ($p = 0.001$). However, no change in smoking habits was observed. Authors also expressed their doubt in general QoL instruments not being able to capture the specific QoL issues in patients with NMSC. They also presented an idea to develop a disease specific QoL instruments and carry out an additional study in order to investigate anxiety, distress, and disease management strategies in such patients [14].

Another prospective study by Maciel et al. evaluated the QoL and self-esteem in patients with head and/or neck skin cancers. Fifty patients between the ages of 30 and 75 years were enrolled in the study, and their QoL and self-esteem were evaluated preoperatively and 5 years following the surgery. QoL was assessed using the Brazilian version of SF-36, and self-esteem was evaluated using the Rosenberg Self-Esteem Scale. Patients with lesions less than 1 cm in diameter were excluded. Authors observed improvement in mental health ($p = 0.011$) and self-esteem ($p = 0.002$) in patients who underwent surgical treatment in the five-year postoperative period. However, there were no significant differences in relation to other domains of the SF-36 or the self-esteem scale. Five-year follow up resulted in a considerable loss to follow-up of the patients (56%). Authors believe this was due to an adequate treatment performed, the minimally invasive nature of skin cancer, and a less bothersome attitude of patients not willing to return for follow-up visits [15].

A prospective study by Çetinarslan et al. evaluated 255 patients with facial NMSC using the Turkish version of DLQI preoperatively and 3 months after the surgical treatment. Authors also collected and analyzed data on demographic factors that could presumably affect the QoL of the patients, such as gender, educational level, duration of the disease, type of skin lesion, affected anatomical area, and primary or recurrent tumor. At baseline, the most affected subscale was symptoms and feelings in both BCC and SCC groups ($p < 0.001$). The least affected subscale was work and school in patients with BCC. In patients with SCC, treatment was the least affected subscale preoperatively ($p < 0.001$). In regard to tumor localization, the worst lesion site was auricular and preauricular localization. Following 3 months after the surgery, authors reported a significant improvement in QoL in both BCC (3.96 ± 5.14) and SCC (4.49 ± 5.24) patients after the surgery ($p < 0.001$), when compared with the baseline DLQI scores (6.37 ± 6.28 in BCC and 6.35 ± 6.16 in SCC group, respectively). There was no significant difference observed between the QoL of male and female patients both preoperatively and postoperatively, mainly due to DLQI lacking the domain-capturing aesthetic outcomes. Authors also reported the worst DLQI scores in patients with university degrees, due to increased awareness of the disease, and in those with the graft reconstruction, due to increased risk of complications and worse cosmetic results at both the baseline and 3 months postoperatively [16].

García-Montero et al. carried out a prospective cohort study including 229 patients with cervicofacial NMSC patients. A Spanish version of the SCI questionnaire was used to evaluate QoL at the time patients received a diagnosis of NMSC and subsequently at 1 week, 1 month, and 6 months postoperatively. Authors observed statistically significant ($p < 0.05$) differences between the mean scores of the SCI (both overall and for each of the subscales) at the time of diagnosis and at 6 months after surgery. In the overall SCI scores, statistically significant differences were observed by gender ($p = 0.047$), educational level ($p = 0.019$),

tumor type ($p = 0.044$), treatment type ($p = 0.042$), and VAS score ($p = 0.014$). The social-aesthetic scale revealed statistically significant changes in gender ($p = 0.01$), marital status ($p = 0.012$), and history of depression and/or anxiety ($p = 0.002$) parameters. Meanwhile, the emotional scale educational level ($p = 0.002$), tumor type ($p = 0.027$), treatment type ($p = 0.018$), and VAS score ($p = 0.011$) demonstrated statistically significant differences. Authors noted that women in this cohort of patients experienced greater improvement in aesthetic appearance domain. However, this may be due to the fact that women may pay more attention to issues related to facial attractiveness than men or are capable of masking the facial imperfections with make-up. Those with primary education reported a higher degree of improvement in the emotional domain; meanwhile, married patients presented the greatest improvement in the social-aesthetic domain. As one of the study limitations, authors admitted the need to perform a larger study and include patients undergoing non-surgical interventions, as this type of treatment is becoming more and more attention in the management of NMSC [17].

A prospective study by Kinde et al. included 45 consecutive periocular NMSC patients who underwent MOHS micrographic surgery and reconstruction. SCI and FACE-Q questionnaires were given to patients preoperatively and subsequently at 1 week and 3 months as QoL measurement tools. Specific demographic and clinical characteristics, which presumably could have influenced patients' QoL, were also collected (gender, smoking status, history of skin cancer, tumor location and type, and reconstruction method). The study revealed that the total SCI score and all three of the subscales were significantly higher after surgical treatment than preoperatively, especially at the 3-month follow-up evaluation. The FACE-Q scale also demonstrated similar findings. Using SCI scores, older age was associated with improved QoL, while for tumor location at medial canthus and reconstruction by a myocutaneous flap or full-thickness skin graft, female gender and history of NMSC were the predictors of reduced QoL. Authors also reported that higher baseline QoL scores predicted higher postoperative QoL. Limited ethnic diversity and sample size of the cohort as well as a rather short follow-up were the main limitations of the study [18].

A prospective observational study by Sanz Aranda et al. included patients older than 85 years with histologically confirmed head and neck BCC who were asked to answer the Spanish version of the SF-36 before and 3 months after the surgery. 25 patients filled in both preoperative and postoperative SF-36 questionnaires. Authors reported that the only significant change observed in the study cohort was for physical role ($p = 0.026$), and it became worse. Physical role subscale evaluation decreased significantly in patients with multiple comorbidities: physical role and mental health in those with facial BCC, and general health and social function in those with a tumor larger than 1 cm. Based on study findings, elderly patients who underwent surgery for BCC did not experience a statistically significant improvement in QoL. Therefore, surgical treatment of BCC, as a first line treatment, should be thoroughly discussed with patients and relatives, and alternative treatment options should be provided. However, the authors admit that their results should be interpreted with caution due to existing comorbidities in this cohort of patients and their advanced age [19].

As states the Constitution of The World Health Organization, health is described as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" [20]. QoL is highly dependent on the beforementioned health state since it is highly influenced by physical, mental, and social aspects of well-being.

Most of the reviewed articles demonstrate that BCC mainly affects patients' mental health, which usually is ameliorated after surgical treatment. Rhee et al. confirmed that changes in mental and emotional domains of QoL are statistically important, especially in the younger-than-65-years-old, employed patient group. The impact on mental health was also proved by Maciel et. al., emphasizing the improvement of patients' self-esteem. Furthermore, Çetinarslan et al. showed that all DLQI subscales improved after surgical BCC treatment, with symptoms and feelings being the most affected subscale.

In regards to social wellbeing, García-Montero et al. claimed that emotional and social-aesthetic subscales of QoL questionnaires improve 6 months after surgery with the exception of divorced patients and a history of recurrent tumors in emotional subscale. The difference in the social-aesthetic group was noted between sex and people with a history of depression/anxiety with a higher post-treatment improvement in women and people with a history of depression/anxiety. In comparison, Kinde et al. reported an increase in all three subscales of QoL evaluated by SCI 3 months after surgery.

On the other hand, Sanz Aranda et al. presented slightly different study findings in a senior patient group. They were the only authors to reveal that the physical subscale of QoL, mental and social health, decreased after surgery in BCC patients older than 85 years.

A formal meta-analysis was not performed due to the differences in the methodologies of the analyzed studies, various QoL measurement tools used by the authors, different follow-up times after surgery, and rather heterogenous study groups. However, we used forest plots to illustrate the effect sizes of the different studies on the change in QoL after surgery, expressed as standardized mean difference with 95% confidence interval (SMD with 95% CI). One study is not depicted in the plots due to insufficient data.

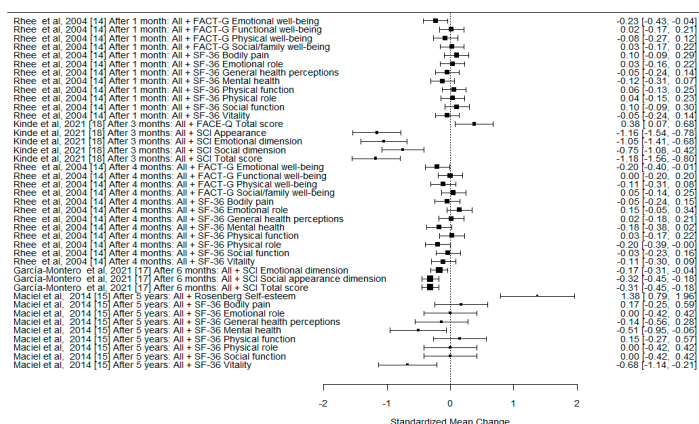The effect sizes on the change in QoL are presented in Figures 2–4.

Figure 2. The forest plot for differences in the preoperative and postoperative QoL measures for the overall group (not stratified by histological type). SMD with 95% CI.
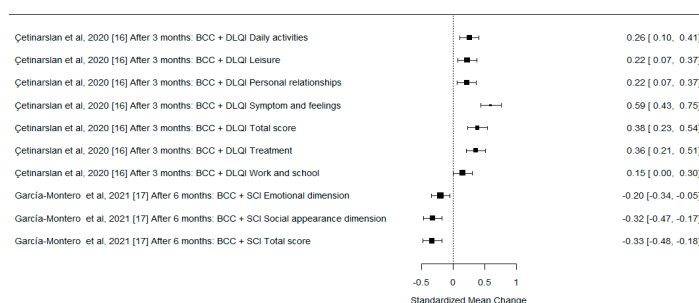

Figure 3. The forest plot for differences in the preoperative and postoperative QoL measures for the BCC group. SMD with 95% CI.
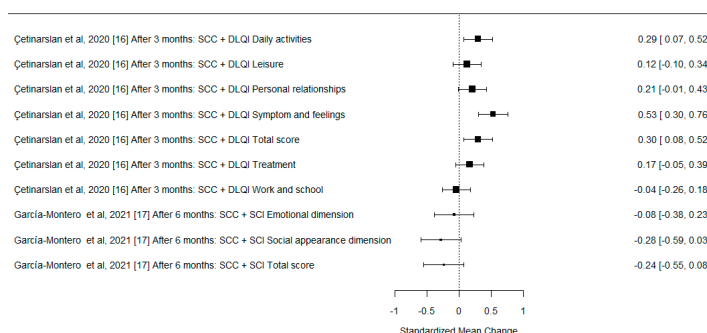
Figure 4. The forest plot for differences in the preoperative and postoperative QoL measures for the SCC group. SMD with 95% CI.

4. Discussion

The analysis of the selected articles demonstrated that there is no clear consensus on the use of a single disease-specific QoL measurement tool that would allow assessment of the impact of surgical treatment on QoL in patients with BCC. As various instruments are used, parallel comparison of the results obtained within different studies is seldom possible. Moreover, existing QoL measurement instruments are not suited to distinguish and evaluate the impact on QoL specifically in patients with BCC after surgical treatment. However, even if general QoL measurement tools may not be able to assess the specific QoL issues in patients with NMSC, a particular advantage of these instruments is that the scores can be compared with other diseases [14].

The most commonly used questionnaires were 36-SF, FACT-G, DLQI, and SCI. SF-36 was validated in 1992 and is widely used in different medical spheres to evaluate the impact of the disease as well as the different treatment methods on the QoL [21–23]. This questionnaire in greater detail evaluates eight different domains: physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role, and mental health. However, it is not disease specific. FACT-G was developed and validated in 1993 to evaluate health-related QoL in oncology clinical trials and nowadays is commonly used in cancer patients undergoing treatment. It consists of four main domains evaluating physical, social-family, emotional, and functional aspects that may influence patients' QoL [24]. DLQI was validated and specifically created in 1994 to evaluate the QoL in patients with skin disease. This questionnaire consists of 10 questions that cover symptoms and feelings, daily activities, leisure, work and school, personal relationships, and treatment [25]. SCI is an NMSC-specific questionnaire that was developed to evaluate the impact of skin cancer on QoL. The questionnaire was validated in 2004 and is considered to be face valid as well. It consists of 15 questions that are related to emotional, social, and appearance subscales [11].

All the above-mentioned instruments evaluate the QoL, but they differ in their range of application. The most versatile and applicable to various kinds of health conditions is SF-36. Although such a wide application provides universality, the questionnaire does not allow a specific assessment of the impact of skin cancer on the QoL. Furthermore, the FACT-G questionnaire is specific to oncological diseases, but it is not adapted to measure the impact of skin cancer, which differs from other oncological diseases. Another questionnaire widely known in dermatology is the DLQI, which is specific to skin diseases but is more suitable to be used in patients suffering from chronic skin diseases than in those with skin cancer. The most recent of all described questionnaires is the SCI, which is the most specific of all the aforementioned tools, as it assesses the impact on QoL of skin oncological diseases.

Chernyshov et al. in 2019 acknowledged the problem of QoL measurement in skin cancer patients and stated the position of the European Academy of Dermatology and Venereology Task Forces. After conducting research on the most used QoL assessment tools,

they have stated that EORTC QLQ-C30, the Functional Assessment of Cancer Therapy-Melanoma (FACT-M), SCI, SF-36, and the DLQI were the most-used questionnaires. The task forces recommend the use of cancer-specific questionnaires in the late stages of cancer (EORTC QLQ-C30) and more skin-cancer-specific questionnaires: the melanoma-specific FACT-M and skin-cancer-specific SCI questionnaires. According to the task forces, the other questionnaires are not currently recommended in this context [26].

5. Conclusions

The authors of aforementioned studies reported that following the surgical treatment the patients with cervicofacial NMSC experience an improvement in QoL, especially in regards to their emotional status and mental health. Interestingly, this QoL improvement varies from slight to significant. Patients' age, gender, marital status, education level, and employment status were those variables that had a stronger correlation with QoL postoperatively, especially during the late follow-up period. Younger patients were more bothered by appearance-related issues, such as postoperative scars, facial disfigurement, and self-image. However, elderly patients reported a negative association of surgical treatment and their QoL, as their general health, physical role, mental health, and social subscale evaluation decreased postoperatively, based on comorbidities, tumor site, and diameter, respectively.

This literature review demonstrated that there is a lack of studies assessing the impact of surgical treatment on QoL exclusively in patients with head and neck BCC. Most reviewed studies collectively include NMSC, which include SCC, BCC, and sometimes also include actinic keratosis and Bowen's disease. Although BCC represents most of the sample in the selected studies, even a small number of other types of NMSC may have an influence on the results of the study, due to the tangible differences in the investigation and treatment tactics of each of these diseases, e.g., extensive surgical modalities, recommended safety margins, probability of recurrence, and/or metastases.

It was also observed that there are no conducted studies that evaluate the association of specific tumor type, size, anatomic site, cure type, and treatment outcomes with the change occurred in the QoL and self-esteem in patients with head and neck BCC, both in terms of the conspicuous nature of the disease, its rapidly increasing incidence rates worldwide, and appearance changes related to surgical treatment.

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Appendix B

Kučinskaitė A, Stundys D, Gervickaitė S, Tarutytė G, Grigaitienė J, Tutkuvienė J, Jančorienė L.

Aesthetic Evaluation of Facial Scars in Patients Undergoing Surgery for Basal Cell Carcinoma: A Prospective Longitudinal Pilot Study and Validation of POSAS 2.0 in the Lithuanian Language

Aesthetic Evaluation of Facial Scars in Patients Undergoing Surgery for Basal Cell Carcinoma: A Prospective Longitudinal Pilot Study and Validation of POSAS 2.0 in the Lithuanian Language

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Simple Summary: The quality of life of patients with facial basal cell carcinoma significantly improves after surgery. Nevertheless, it remains inferior to those without the disease. Facial scarring has been identified as a contributing factor to adverse psychosocial changes. In this study, we explore the aesthetic assessment of facial scars within this specific patient group, aiming to uncover potential correlations between the severity of scars and the quality of life. This study comprises two phases as follows: scale validation and pilot with a sample size of 100 patients. The Lithuanian version of the POSAS 2.0 was established after a thorough psychometric evaluation, surpassing acceptable validity thresholds. The pilot phase findings show a notable improvement in scars during the later stages of postoperative recovery, with the initial identification of specific groups that perceive their scars more negatively. Given the observed correlations between the scar assessment and the quality of life, this study highlights the crucial role of addressing the aesthetic satisfaction of patients with surgically treated basal cell carcinoma.

Abstract: Facial basal cell carcinoma (BCC) surgery enhances the quality of life (QoL) but leaves patients with inferior QoL, presumably caused by scarring, emphasizing the need to understand post-surgery aesthetic satisfaction. This study aimed to validate the Lithuanian version of the Patient and Observer Scar Assessment Scale (POSAS) 2.0 and utilise it to identify scar evaluation differences and correlations among POSAS scores and specific aesthetic facial regions, age, gender, surgery types, and short- and long-term QoL. Employing a prospective longitudinal design, 100 patients with facial scars after surgical BCC removal were enrolled. The validation phase confirmed the translated POSAS 2.0 psychometric properties, while the pilot phase used statistical analyses to compare scores among demographic and clinical groups and evaluate correlations between scar assessment and QoL. The findings indicate that the translated Lithuanian version of POSAS 2.0 exhibits good psychometric properties, revealing insights into aesthetic satisfaction with post-surgical facial scars and their impact on QoL. The Lithuanian version of the POSAS 2.0 was established as a valid instrument for measuring post-surgical linear scars. QoL with scar assessment statistically significantly correlates, 6 months after surgery, with worse scores, particularly notable among women, younger patients, and those with tumours in the cheek region.

1. Introduction

Non-melanoma skin cancer (NMSC) remains the most prevalent form of neoplasm, with facial BCC accounting for the majority of NMSC cases [1,2]. The typical approach for treating most BCC is surgery [3]. Despite advanced methods, surgical interventions have not achieved complete scarless healing.

Facial scars tend to elicit the greatest distress among patients, frequently leading to negative psychosocial effects [4–6]. Patient-reported outcomes (PROs) are significant measures for evaluating the effectiveness of skin cancer treatment [7]. Various scar characteristics, including the location, morphology [8], and interaction with facial features [9] contribute to its perception. Despite prior efforts to examine scar assessment within exact facial areas, different surgery types [10], and impact on QoL [11], the intricate relationships among these factors remain unclear.

The Patient and Observer Scar Assessment Scale (POSAS 2.0) is a specialised outcome measure instrument for the evaluation of both burn and surgical scars [12,13]. It comprises two distinct parts including the Patient Scar Assessment Scale (PSAS) and the Observer Scar Assessment Scale (OSAS). The PSAS is used to evaluate the perspective of patients and the OSAS is similarly used for professionals. This dual approach allows for comparative analysis regarding opinions on scar quality. The scale has demonstrated superior effectiveness compared with commonly employed measures like the Vancouver Scar Scale (VSS) or the Manchester Scar Scale (MSS). Both the patient and observer scales of the POSAS have been shown to possess greater reliability, objectivity, consistency, and comprehensiveness in evaluating linear scars [12,14–16]. To this day, the POSAS has been translated and validated in multiple languages [12,14,17–22]. To utilise this instrument for Lithuanian patients, it is imperative to assess its validity within the Lithuanian patient cohort.

The objectives of this study were to (1) translate, culturally adapt, and validate the Lithuanian version of the POSAS 2.0, subsequently utilising this questionnaire in the secondary pilot phase to achieve the following: (2) identify the differences in scar assessment within specific aesthetic facial regions, age, gender, and tumour size groups, and surgery types, and (3) establish empirical correlations between PSAS and short- as well as long-term QoL by employing a prospective-longitudinal study design.

2. Patients and Methods

2.1. Procedures and Ethics Statement

Permission to translate and validate the POSAS 2.0 into the Lithuanian language was granted by the scale developers in 2022. This study was carried out under the approval of the Vilnius Regional Biomedical Research Ethics Committee (Approval No. 2022/11-1476-943, issued 18th November 2022). In alignment with the Declaration of Helsinki, all study participants provided written informed consent.

Data were collected from 23 November 2022 to 22 November 2023 at the Vilnius University Hospital Santaros Klinikos Centre of Dermatovenereology (VUH), Lithuania.

2.2. Patients

Following the recommended sample size for statistical patient-reported outcome measure (PROM) analysis [23,24], a total of 100 consecutive patients were included in this study. Patients with highly suspected or histopathologically confirmed facial BCC diagnosis underwent surgical skin cancer treatment in accordance with the European Association of Dermato-Oncology (EADO), National Comprehensive Cancer Network (NCCN) treatment guidelines, and standardised VUL treatment protocols, resulting in linear postoperative

scars. The data were collected at 3 specific time points as follows: 1st visit corresponding to the day of surgery, 2nd visit—1 month post-surgery, and 3rd visit—6 months post-surgery.

Patients who had developed any facial scars as a result of surgical treatment 1 year prior to enrolment, individuals with significant cognitive dysfunction, and those lacking a deep comprehension of the Lithuanian language were excluded from this study.

During the 1st visit, information on socio-demographic and clinical characteristics was gathered. Demographic factors included age, gender, marital status, education, place of residence, employment status, and the presence and frequency of interactions with family members. Clinical details encompassed tumour size, precise tumour location, and the type of surgery performed. The presurgical tumour location was classified into specific regions based on the Facial Aesthetic unit Classification proposed by TT Fattahi [25]. Patients were subsequently grouped into three categories based on the surgery type as follows: (E) excision, (P) skin plasty reconstruction by local flaps, and (T) skin graft transplantation. The participants were provided with paper-based or digital Skin Cancer Index (SCI) and the Dermatology Life Quality Index (DLQI).

At the 2nd and 3rd visits, the patients repeated the SCI and DLQI scales and were asked to evaluate their scars with the PSAS. The same scar was additionally assessed by two observers (AK, DS), a medical student and a plastic surgeon.

2.3. Administered Outcome Measures

2.3.1. The Patient and Observer Scar Assessment Scale

The POSAS is used to assess scar quality. A scar is evaluated from 2 perspectives including the patient's (PSAS) and the observer's (OSAS).

The PSAS consists of 6 parameters (pain, itchiness, colour, stiffness, thickness, and irregularity). The OSAS consists of 6 parameters (vascularity, pigmentation, thickness, relief, pliability, and surface area). Each parameter is assessed by comparing the scar to the surrounding skin. The score ranges from 1 to 10, where 1 is normal skin and 10 is the worst imaginable scar or sensation. The total score is calculated by summing the scores, with 60 being equivalent to the worst imaginable scar and 6 to normal skin. An additional 7th question concerns the patient's or observer's (PSAS and OSAS respectively) overall opinion about the scar (1—normal skin, 10—worst imaginable scar). The score of the Q7 is not added to the total but can be considered as a separate parameter.

2.3.2. The Skin Cancer Index

The SCI is a skin cancer-specific PROM instrument with a focus on emotional, social, and appearance aspects. It consists of 15 Likert scale questions, with scores ranging from 1 (very much—indicating a significant impact on QoL) to 5 (not at all—suggesting no impact on QoL). The total score falls within the range of 15 to 75 points, with a higher score signifying an improved QoL.

2.3.3. The Dermatology Life Quality Index

The DLQI assesses the impact of a skin condition on the patient's life in the past week. It consists of 10 questions, each rated from 0 to 3. The cumulative score, ranging from 0 to 30, reflects the overall impact on QoL. A higher score signifies an increased impact of the skin problem on the patient's life, leading to accordingly poorer QoL.

2.4. Validation Phase

2.4.1. Translation and Cultural Adaptation

- Forward translation.

The POSAS 2.0 underwent translation from English to Lithuanian, following ISPOR TCA [26] guidelines and the COSMIN Study Design Checklist [23,24]. Collaboration among medical staff proficient in both languages ensured accuracy. The forward translation was conducted by an experienced plastic surgeon, followed by a review by a Lithuanian group

comprising resident doctors, nurses, and dermatovenereologists. A consensus was reached on the initial Lithuanian PSAS and OSAS versions.

- Backward translation.

To verify accuracy, the POSAS 2.0 was backtranslated into English by two independent dermatologists unaware of the original English questionnaire version. Minor linguistic adjustments were made after comparing the back translations with the original text.

- Testing.

Cognitive debriefing involved 15 patients with linear facial scars and 15 staff members at VUH. They were asked about comprehension, potential misinterpretations, and relevance of each scale item in scar assessment.

- Finalisation.

After reviewing cognitive debriefing results, a consensus was reached on the final version of the POSAS 2.0 in the Lithuanian language.

2.4.2. Statistical Analysis

The statistical analysis was performed using R Statistical Software (version 4.2.2; R Foundation for Statistical Computing, Vienna, Austria) and MedCalc Software Ltd. (version 20.305, Ostend, Belgium; accessed on 1st April 2024). The existence of floor/ceiling effects was acknowledged when >15% of subjects scored at the lowest or highest extremes. A $p < 0.05$ was considered as statistically significant.

- Internal consistency.

Cronbach's alpha coefficient was calculated for PSAS and OSAS at 2 time points. Coefficient values between 0.70 and 0.95 were considered to be adequate [27,28].

- Structural validity.

As the POSAS operates on a reflective model, a one-factor confirmatory factor analysis (CFA) was conducted. The criteria for a satisfactory CFA fit were as follows: comparative fit index (CFI) > 0.90 adequate and >0.95 good; Tucker Lewis Index (TLI) (>0.90 adequate and >0.95 good; Root Mean Square Error of Approximation (RMSEA) < 0.08; Standardised Root Mean Squared Residual (SRMR) < 0.08; and chi-squared (χ^2)/degrees of freedom (df) with the desired range of 2–5 [29].

- Construct validity.

Spearman's rank correlation coefficient (ρ) was calculated for each PSAS/OSAS question in relation to the total score. The resulting coefficient values were interpreted as very strong (0.80–1), strong (0.6–0.799), medium (0.4–0.599), weak (0.2–0.399), and very weak (0–0.199).

- Criterion validity.

The PSAS's convergent validity was assessed using the DLQI questionnaire because of the absence of comparable instruments in the Lithuanian language for wounds or scars. Linguistically, only the first question (Q1) of the DLQI directly relates to the skin discomfort (pain and itching). Spearman's rank correlation coefficient was employed to analyse the relationship between PSAS and DLQI after the 2nd visit (PSAS-II and DLQI-II). The following three hypotheses were predefined, and construct validity was considered acceptable if all of them (>75%) were validated [30]:

1. Positive correlation between PSAS-II and DLQI-II overall scores.
2. Positive correlation between PSAS-II-Q1 and DLQI-II-Q1.
3. Positive correlation between PSAS-II-Q2 and DLQI-II-Q2.

The convergent construct validity of OSAS could not be evaluated because there are no other scar evaluation instruments for observers validated in the Lithuanian language.

- Measurement error and reliability.

PSAS: A subgroup of 50 patients completed the questionnaire twice within 5–7 days. Paper or digital PSAS questionnaires with identical instructions were provided to patients during both the initial and second administration. The first completion of the PSAS occurred at home, while the second took place in the hospital (during the 2nd or 3rd visit) as the only distinguishing factor. Additionally, the subgroup was asked about the potential factors or changes that could influence answers during the interim period.

OSAS: The scars of 100 study participants were photographed during the 2nd or 3rd visit. The photographs were taken with a Canon EOS 600D, its settings being automatically adjusted to the lightning. The photographs were then reanalysed 1 week after the initial in-person OSAS evaluation by the same observers (AK, DS). This analysis did not incorporate the pliability (Q5) parameter because it could not be evaluated in the photographs.

Inter-tester as well as intra-tester reliability was evaluated by calculating the Intra-class Correlation Coefficient (ICC) using a two-way mixed effects model with absolute agreement (95% CI). ICC values exceeding 0.70 were considered acceptable [30]. The standard deviation of differences (SDdif) was computed to assess the dispersion of differences between test and retest (TR) scores, where a smaller SDdif suggested good agreement between TR scores. The standard error of measurement (SEM) was determined using the following formula: $SEM = SDdif\sqrt{(1-ICC)}$. The smallest detectable change in an individual (SDCind) was calculated as follows: $SDCind = 1.96 \times \sqrt{2} \times SEM$. SDCgroup was derived by dividing SDCind by $\sqrt{n}$, where n represents the sample size. The mean of the differences between test and retest scores was computed as the mean difference score (MD). Limits of Agreement (LoA) were calculated using the following formula: $MD \pm 1.96 \times SDdiff$.

- Responsiveness.

The standardised response mean (SRM) was calculated between the 2nd and 3rd visits. It was hypothesised that both the PSAS and the OSAS would show a significant decrease in scores when comparing short- and long-term postoperative results, indicating its responsiveness to healing-induced variations. The null hypothesis assumed no significant difference, while the alternative hypothesis predicted a meaningful change in scores, affirming the questionnaire's sensitivity to the effects of scar changes.

The questionnaire's responsiveness was evaluated by conducting statistical comparisons, including *t*-tests and analysis of variance (ANOVA) followed by post hoc tests, to compare scores across various groups.

2.5. Pilot Phase
2.5.1. PSAS Score Correlations with QoL

Preliminary correlations between disease-specific QoL and scar assessments at the 2nd and 3rd visits were evaluated using Spearman's correlation coefficient.

2.5.2. Segment Analysis and the POSAS Score Differences across Anatomic Units

Potential differences in the POSAS scores based on age, gender, tumour size, aesthetic facial units, and surgery groups (E, P, T) were examined at the 2nd and 3rd visits. Student's *t*-test was employed for binary variables, while ANOVA was utilised for categorical variables with three or more groups. Post hoc tests were conducted to identify specific groups with significantly different means whenever ANOVA yielded statistical significance.

3. Results
3.1. Descriptive Statistics

In total 100 consecutive patients were included in this study. The PSAS, SCI, and DLQI questionnaires were completed by all study participants during the second and third postoperative visit, along with the OSAS, which was filled out by the observers. One hundred patients for OSAS and a subgroup of fifty for PSAS were reassessed for measurement error calculations. Only one missing value was detected. It was replaced by

applying the Mode Imputation method. The instances of floor/ceiling effects were observed as follows: the SCI-II exhibited a negative floor/ceiling effect; the DLQI-II displayed a positive floor effect, with 28 patients achieving the minimum (28% > 15%), while the ceiling effect was negative; the PSAS II showed a negative floor/ceiling effect; and the PSAS III indicated a positive floor effect (23% > 15%), yet the ceiling effect was negative. Both AK and DS in the OSAS II/III exhibited negative floor and ceiling effects. Demographic and clinical information are presented in Tables 1 and 2.

Table 1. Patient sociodemographic characteristics.

Sociodemographic Characteristics, *n* = 100	
Age	68.31 ± 12.979
34–56 years	20
57–69 years	27
70–79 years	32
80–91 years	21
Gender, *n* (%)	
Female	72 (72%)
Male	28 (28%)
Marital status, *n* (%)	
Divorced	9 (9%)
Widow/widower	22 (22%)
Living together with a partner	4 (4%)
Dating but living separately	1 (1%)
Married	59 (59%)
Single	5 (5%)
Education, *n* (%)	
Non-university higher education	22 (22%)
Other (professional schools)	8 (8%)
Basic (8–10 grades)	5 (5%)
Primary	2 (2%)
University degree	51 (51%)
Secondary (11–12 grades)	12 (12%)
Residence, *n* (%)	
Village (<500 inhabitants)	4 (4%)
City (>3000 inhabitants)	90 (90%)
Town (500–3000 inhabitants)	6 (6%)
Employment, *n* (%)	
Employed	31 (31%)
Employed but retired	1 (1%)
Employed (home office)	2 (2%)
Unemployed	6 (6%)
Retired	60 (60%)
Do you have children/close relatives? *n* (%)	
No	4 (4%)
Yes	96 (96%)
Do you often meet them? *n* (%)	
No	7 (7%)
Yes	93 (93%)

Table 2. Patient clinical characteristics.

Clinical Characteristics, *n* = 100	
Largest tumour diameter, mm	9.44 ± (4.948); range: 3–30
Tumour size group, *n* (%)	
0–5 mm	16 (16%)
6–10 mm	57 (57%)
11–15 mm	16 (16%)
>15 mm	11 (11%)
Tumour location by TT Fattahi, *n* (%)	
1—Forehead unit	32 (32%)
1a—central subunit	14
1b—lateral subunit	18
2—Nasal unit	26 (26%)
2.1—tip subunit	8
2.3,6—right and left alar base subunits	9
2.4,5—right and left alar side wall subunits	4
2.7—dorsal subunit	5
2.8,9—right and left dorsal side wall subunits	5
3—Eyelid unit	8 (8%)
3a—lower lid subunit	4
3b—upper lid subunit	1
3c—lateral canthal subunit	1
3d—medial canthal subunit	2
4—Cheek unit	28 (28%)
4a—medial subunit	14
4b—zygomatic subunit	3
4c—lateral subunit	4
4d—buccal subunit	7
5—Upper lip unit	3 (3%)
5b—lateral subunit	3
Surgery groups, *n* (%)	
E	49 (49%)
P	38 (38%)
T	13 (13%)

3.2. Translation and Cultural Adaptation

Creating the Lithuanian version of the POSAS 2.0 involved a sequence of steps, including forward translation, backward translation, and a cognitive debriefing process. Together, these methods ensured linguistic precision and cultural relevance, ultimately affirming the face and content validity of the PSAS and OSAS.

3.3. Internal Consistency

Cronbach's alpha values were found to be highly acceptable for both the OSAS-II/III and PSAS-II/III (Table 3). The findings indicate robust internal consistency among the

questionnaire items, confirming the instrument's reliability in evaluating scars. It enhances the reliability of the gathered data for future analyses and interpretation within our study.

Table 3. Cronbach's alpha values for the OSAS and PSAS questionnaires at the 2nd and 3rd visit.

	II	III
OSAS, AK	0.855	0.822
OSAS, DS	0.845	0.793
PSAS	0.828	0.836

3.4. Structural Validity

The confirmatory factor analysis for both the OSAS and PSAS confirmed that there is only one main factor for the scales. The modification indices could not suggest any modification that would improve the model results. These results are supported theoretically as questionnaires do not have any subscales. Based on the fit results (CFI, TLI, and SRMR), the model falls within the range of acceptable to good. Nevertheless, there is potential for improvement in reducing the RMSEA (Figures 1 and 2, Table 4).
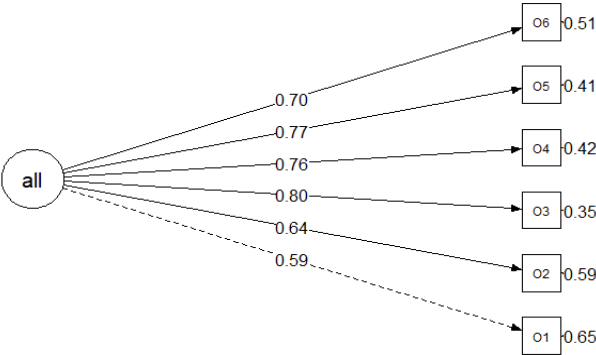

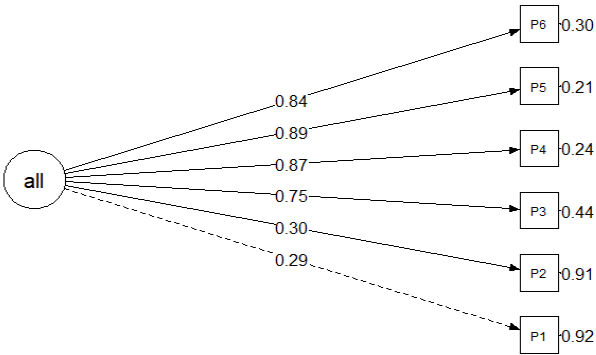**Figure 1.** Graphical representation of the refined model (Model 1), with standardised values.

Figure 2. Graphical representation of the refined model (Model 2), with standardised values.

Table 4. Fit results of the models tested (*n* = 100).

	Description	χ^2	df	RMSEA (95% CI)	CFI	TLI	SRMR
Model 1	The original model of the OSAS questionnaire with one factor	19.691	9	0.109 (0.019; 0.186)	0.956	0.926	0.052
Model 2	The original model of the PSAS questionnaire with one factor	21.201	9	0.116 (0.035; 0.193)	0.956	0.927	0.049

3.5. Construct Validity

The Spearman's correlations between individual PSAS questions and the total score are displayed in Table 5. The values vary from 0.324 to 0.836, suggesting a weak to very strong positive association. Notably, the weakest correlation was found with Q1 and Q2. However, the remaining correlations surpass 0.8, indicating a very strong coherence among these factors.

Table 5. Spearman's correlation coefficients between PSAS scores.

	P1	P2	P3	P4	P5	P6	P7
PSAS-II Total score	0.324 **	0.377 ***	0.807 ***	0.814 ***	0.841 ***	0.785 ***	0.836 ***

Significance: **—*p*-value < 0.01, ***—*p*-value < 0.001.

Table 6 presents the results for the OSAS with correlations ranging from 0.733 to 0.813. These values signify strong to very strong positive correlations.

Table 6. Spearman's correlation coefficients between OSAS scores.

	O1	O2	O3	O4	O5	O6	O7
OSAS-II Total score	0.733 ***	0.736 ***	0.754 ***	0.734 ***	0.786 ***	0.756 ***	0.813 ***

Significance: ***—*p*-value < 0.001.

3.6. Criterion validity

The results reveal a medium positive correlation between the overall scores of PSAS-II and DLQI-II. The strongest correlation was identified between PSAS-II-Q1, Q2 and DLQI-II-Q1, highlighting the questions' focus on symptom evaluation (Table 7).

Table 7. Spearman's correlation coefficients between PSAS-II and DLQI-II.

	DLQI-II-Q1	DLQI-II Total Score
PSAS-II-Q1	0.428 ***	0.44 ***
PSAS-II-Q2	0.724 ***	0.583 ***
PSAS-II-Q3	0.253 *	0.36 ***
PSAS-II-Q4	0.156	0.197 *
PSAS-II-Q5	0.129	0.194
PSAS-II-Q6	0.127	0.232 *
PSAS-II-Q7	0.158	0.276 **
PSAS-II Total score	0.358 ***	0.423 ***

Significance: *—*p*-value < 0.05, **—*p*-value < 0.01, ***—*p*-value < 0.001.

3.7. Measurement Error and Reliability

3.7.1. PSAS

Fifty patients underwent scar reassessment to evaluate the test–retest reliability of the PSAS. The ICC value obtained for the total score was 0.729 (95% CI = 0.568–0.837). Most ICC values for single questions exceeded the threshold of 0.7, with the exceptions being PSAS-I-Q5 and PSAS-I-Q6, which pertain to scar thickness and irregularity, respectively (Table 8).

Table 8. Test–retest reliability of the PSAS.

	Test	Retest	ICC (95% CI)	MD (95% CI)	SDdiff	SEM	SDCind	SDCgroup	95% LoA
Pain PSAS-Q1	2.02 ± 1.363	2.02 ± 1.478	0.721 (0.555; 0.832)	0 (−0.296; 0.296)	1.069	0.565	1.565	0.221	−2.095; 2.095
Itchiness PSAS-Q2	2.54 ± 1.764	2.56 ± 1.74	0.827 (0.713; 0.898)	−0.02 (−0.308; 0.268)	1.04	0.433	1.199	0.17	−2.058; 2.018
Colour PSAS-Q3	3.36 ± 1.758	3.02 ± 1.79	0.74 (0.581; 0.844)	0.34 (−0.08; 0.688)	1.255	0.640	1.774	0.251	−2.12; 2.8
Stiffness PSAS-Q4	3.4 ± 1.906	3.32 ± 1.845	0.72 (0.544; 0.831)	0.08 (−0.311; 0.471)	1.412	0.747	2.071	0.293	−2.687; 2.847
Thickness PSAS-Q5	3.2 ± 1.895	3.02 ± 1.755	0.618 (0.413; 0.764)	0.18 (−0.263; 0.623)	1.6	0.989	2.741	0.388	−2.955; 3.315
Irregularity PSAS-Q6	3.02 ± 1.801	3.1 ± 1.776	0.679 (0.496; 0.805)	−0.08 (−0.479; 0.319)	1.441	0.816	2.263	0.32	−2.903; 2.743
Overall opinion PSAS-Q7	2.88 ± 1.612	2.94 ± 1.621	0.727 (0.564; 0.835)	−0.06 (−0.393; 0.273)	1.202	0.628	1.741	0.246	−2.416; 2.296
Total score	17.54 ± 8.311	17.04 ± 7.918	0.729 (0.568; 0.837)	0.5 (−1.163; 2.163)	6.001	3.124	8.659	1.225	−11.262; 12.262

3.7.2. OSAS

One hundred patients' scars were re-evaluated by two observers (AK, DS) for the assessment of intra- and inter-tester reliability of the OSAS. The findings reveal that the ICC values for AK are below 0.7, indicating poor consistency and reliability between AK's observations. However, the results demonstrate that the ICC values for the DS observer were satisfactory for all questions, exceeding 0.7 and indicating reliable consistency between DS's observations (Table 9).

Table 9. Intra-tester reliability of the PSAS.

		Test	Retest	ICC (95% CI)	MD (95% CI)	SDdiff	SEM	SDCind	SDCgroup	95% LoA
Vascularity OSAS-II-Q1	DS	2.59 ± 1.19	2.54 ± 1.039	0.844 (0.766; 0.892)	0.05 (−0.073; 0.173)	0.626	0.247	0.685	0.069	−1.177; 1.277
	AK	2.53 ± 1.201	2.53 ± 0.904	0.627 (0.491; 0.733)	0 (−0.181; 0.181)	0.921	0.562	1.559	0.156	−1.805; 1.805
Pigmentation OSAS-II-Q2	DS	2.26 ± 0.906	2.3 ± 0.759	0.785 (0.696; 0.85)	−0.04 (−0.148; 0.068)	0.549	0.255	0.706	0.071	−1.116; 1.036
	AK	2.82 ± 0.892	2.69 ± 0.734	0.532 (0.376; 0.658)	0.13 (−0.024; 0.284)	0.787	0.538	1.492	0.149	−1.412; 1.672
Thickness OSAS-II-Q3	DS	2.45 ± 1.077	2.32 ± 0.942	0.82 (0.742; 0.876)	0.13 (0.013; 0.247)	0.597	0.253	0.702	0.07	−1.041; 1.301
	AK	2.79 ± 0.769	2.68 ± 0.75	0.457 (0.289; 0.599)	0.11 (−0.045; 0.265)	0.79	0.582	1.614	0.161	−1.438; 1.658
Relief OSAS-II-Q4	DS	2.36 ± 1.142	2.29 ± 0.957	0.743 (0.641; 0.819)	0.07 (−0.078; 0.218)	0.756	0.383	1.062	0.106	−1.411; 1.551
	AK	2.67 ± 0.943	2.51 ± 0.87	0.544 (0.391; 0.668)	0.16 (−0.009; 0.329)	0.861	0.581	1.612	0.161	−1.528; 1.848
Pliability OSAS-II-Q5					-					

Table 9. *Cont.*

		Test	Retest	ICC (95% CI)	MD (95% CI)	SDdiff	SEM	SDCind	SDCgroup	95% LoA
Surface Area OSAS-II-Q6	DS	1.82 ± 0.796	1.83 ± 0.766	0.762 (0.665; 0.833)	−0.01 (−0.116; 0.096)	0.541	0.264	0.732	0.073	−1.071; 1.051
	AK	2.66 ± 0.807	2.43 ± 0.868	0.483 (0.315; 0.621)	0.23 (0.066; 0.394)	0.839	0.603	1.672	0.167	−1.415; 1.875
Overall opinion OSAS-II-Q7	DS	2.64 ± 1.02	2.49 ± 0.916	0.805 (0.719; 0.866)	0.15 (0.034; 0.266)	0.592	0.289	0.801	0.08	−1.011; 1.311
	AK	2.96 ± 0.909	2.79 ± 0.856	0.665 (0.537; 0.763)	0.17 (0.031; 0.309)	0.711	0.412	1.141	0.114	−1.224; 1.564
Total score	DS	13.87 ± 5.15	13.4 ± 4.422	0.887 (0.836; 0.923)	0.47 (0.03; 0.91)	2.245	0.755	2.092	0.209	−3.93; 4.87
	AK	13.47 ± 3.597	12.84 ± 2.943	0.61 (0.47; 0.72)	0.63 (0.068; 1.193)	2.87	1.792	4.968	0.497	−4.995; 6.255

In the comparison of AK's and DS's assessments, the observers generally show consistent agreement on vascularity (Q1) and overall opinion (Q7) parameters. Additionally, there is acceptable consistency in the overall scores provided by both observers. Across the first and second evaluations, the ICC values between DS and AK tend to hover around borderline acceptability, indicating minor discrepancies between the observers. This suggests that one observer might rate a scar as worse for one aspect and better for another, yet ultimately resulting in a final score that is reliably consistent between both evaluators (Table 10).

Table 10. Inter-tester reliability for the 1st and 2nd evaluation.

		Vascularity	Pigmentation	Thickness	Relief	Pliability	Surface Area	Overall Opinion	Total Score
ICC (95% CI)	First evaluation	0.798 (0.699; 0.864)	0.658 (0.216; 0.824)	0.681 (0.487; 0.796)	0.693 (0.529; 0.798)	-	0.43 (−0.254; 0.716)	0.783 (0.631; 0.866)	0.79 (0.688; 0.859)
	Second evaluation	0.769 (0.656; 0.844)	0.608 (0.297; 0.767)	0.547 (0.291; 0.705)	0.622 (0.437; 0.746)	-	0.544 (0.033; 0.757)	0.732 (0.564; 0.83)	0.742 (0.617; 0.826)

3.8. Responsiveness and Agreement between the PSAS and OSAS

When comparing the scores between the second and third visit, statistically significant changes were observed in both the PSAS ($p < 0.001$, mean difference −8.44 points) and the OSAS ($p < 0.001$, mean difference −8.18 points). The results indicate significant improvement in scar evaluation both by patients and observers, emphasizing the profound impact time has on scar healing and its eventual assessment (Table 11).

Table 11. Standardised response mean (SRM) and meaningful changes between the 2nd and 3rd visits.

						PSAS-II vs. OSAS-II		PSAS-III vs. OSAS-III	
		p-Value	Mean Difference	SRM Value	95% CI	*p*-Value	Spearman's Correlation	*p*-Value	Spearman's Correlation
Second visit vs. third visit	PSAS	0.000	−8.44	−1.06	−1.30 to −0.80	$p = 0.001$	0.32	$p = 0.000$	0.51
	OSAS	0.000	−8.18	−2.10	−2.43 to −1.75				

Significance: *p*-value < 0.05.

Large responsiveness levels for both the PSAS and OSAS were observed when comparing the scores of the second and third visits (SRM > ± 0.8). The results confirm that the Lithuanian POSAS effectively detects changes in scars over time. The patient and observer ratings of scars significantly correlated both during the second and third postoperative visits. A low correlation between the PSAS and OSAS scores was observed 1 month after surgery and a medium correlation 6 months after surgery.

3.9. Correlations between the Scar Assessment and QoL

One month post-surgery, the PSAS scores showed no significant correlation ($p > 0.05$) with the SCI, indicating a lack of association between scar assessment of QoL at this early stage of recovery. Nevertheless, 6 months after surgery, the connections between scar assessment and QoL became apparent. The findings revealed medium negative correlations with SCI Total and its components (Social, Emotional, and Appearance subscales). This suggests that as PSAS scores increase, SCI scores decrease, signifying poorer QoL for patients who perceive their scars more negatively (Table 12).

Table 12. Correlations between the PSAS and SCI.

		PSAS-II	**PSAS-III**
SCI Total	*p*-value	>0.05	<0.001
	Spearman's correlation	−0.17	−0.47
SCI Emotional	*p*-value	>0.05	<0.001
	Spearman's correlation	−0.19	−0.38
SCI Social	*p*-value	>0.05	<0.001
	Spearman's correlation	0.00	−0.39
SCI Appearance	*p*-value	>0.05	<0.001
	Spearman's correlation	−0.19	−0.51

Significance: *p*-value < 0.05.

3.10. Segment Analysis and the POSAS Score Differences across Anatomic Units

To ensure the ability to use the statistical tests during the pilot phase, the examination of score distributions across anatomical units did not include finer subunits, as there were not enough cases. Table 13 presents the segment analysis for the PSAS and OSAS scores. Because the following groups consisted of one patient, they were excluded from the statistical analysis:

- Eyelid 80–91 age group, $n = 1$;
- Upper lip 57–69 age group, $n = 1$;
- Eyelid T group, $n = 1$;
- Upper lip P group −1, $n = 1$;
- Upper lip T group, $n = 1$;
- Nose > 15 mm tumour group, $n = 1$;
- Eyelid > 15 mm tumour group, $n = 1$;
- Upper lip > 15 mm tumour group, $n = 1$.

Table 13. Segment analysis and the POSAS score differences across anatomic units.

	Second Visit		**Third Visit**	
	PSAS-II	**OSAS-II**	**PSAS-III**	**OSAS-III**
Anatomic Unit	No, $p > 0.05$	No, $p > 0.05$	No, $p > 0.05$	No, $p > 0.05$
Gender	No, $p > 0.05$	No, $p > 0.05$	Yes, $p = 0.034$	No, $p > 0.05$
- Score differences between men and women by anatomic units.	No	No	Yes	Yes
Age group	No, $p > 0.05$	Yes, $p = 0.031$	Yes, $p = 0.000$	No, $p > 0.05$
- Score differences between age groups by anatomic units.	Yes	Yes	Yes	No
Surgery group (E, P, T)	No, $p > 0.05$	No, $p > 0.05$	No, $p > 0.05$	No, $p > 0.05$
- Score differences between surgery groups by anatomic units.	No	No	No	No
Size group	No, $p > 0.05$	No, $p > 0.05$	No, $p > 0.05$	No, $p > 0.05$
- Score differences between size groups by anatomic units.	No	Yes	No	No

Significance: *p*-value < 0.05.

3.10.1. Scar Assessment 1 Month Post-Surgery

PSAS-II: Statistically significant differences are evident in scar assessment among the age groups in the forehead anatomic unit. Post hoc analysis revealed that the 70–79 year group rates forehead scars statistically significantly worse than the 80–90 year group.

OSAS-II: Statistically significant differences emerge in nasal scar assessments by observers for patients in the 34–56 year group vs. the 80–91 year group. The results suggest that the observers rated nasal scars statistically significantly worse for the patients in the 34–56 year group. After surgical excision of larger tumours (6–10 mm), the observers rated the scars worse in the eyelid region than those that were smaller ($\leq$5 mm). This suggests that larger tumours result in bigger scars, which become an influencing factor in their evaluation. These findings underscore the influence of age and size on scar perception and the nuanced assessments made by observers across the different anatomical regions.

3.10.2. Scar Assessment 6 Months Post-Surgery

PSAS-III: Gender disparities in scar assessment became apparent, with women consistently rating scars in the late postoperative phase significantly worse than men. When considering the specific anatomical units, the discrepancies were most pronounced and statistically significant in the cheek region. Furthermore, variations among age groups were noticed, notably with the 34–56 age group evaluating scars significantly worse than both the 70–79 and 80–91 age groups. These distinctions were statistically significant in the cheek and upper lip anatomical regions.

OSAS-III: Observers rated scars statistically significantly worse for men in the forehead region.

4. Discussion

The first phase of this study resulted in the successful translation and validation of the Lithuanian version of the POSAS 2.0 for linear scars. A comprehensive assessment of the psychometric properties of both the PSAS and OSAS demonstrated that they exceeded acceptable thresholds for internal consistency, structural validity, criterion validity, construct validity, reliability, and responsiveness. Both PSAS 2.0 and OSAS 2.0 demonstrated strong internal consistency values during the second and third visits (Cronbach's alpha > 0.7).

The floor effect was observed to be present in PSAS-III, with 23% of patients attaining the minimum scores. These results are consistent with those of a Finnish validation study [20], which linked the floor effect to the evolving dynamics following the acute healing phase post-surgery. CFA findings confirmed the scale analysis by van de Kar et al. [12], showing that both scales comprised a single factor. Most PSAS 2.0 questions showed significant alignment with the scale's intended construct. However, Q1 and Q2, concerning itching and colour, respectively, did not exhibit a strong correlation with the overall score. The reason related to linguistic phrasing was ruled out as patients reported no comprehension difficulties. It is plausible that these questions tap into different facets of the construct that are not adequately reflected in the total scale score, making them comparatively less relevant than other questions. From the observer's perspective, all questions showed robust correlations with the overall score. This suggests that each question of OSAS 2.0 contributes meaningfully to the scar assessment by the observers.

Because of limited PROM resources in the Lithuanian language, only the PSAS was assessed for criterion validity, establishing the correlations with the DLQI. Statistically significant correlations were found between both questionnaires, confirming, that the scale accurately captures the characteristics of the symptoms related to skin discomfort.

The results suggest that PSAS generally maintains reliability in repeated measurements over time, as most questions exhibit strong consistency between assessments. However, challenges with scar thickness (Q5) and irregularity (Q6) assessments underscore potential areas for enhancing the scale's reliability. In contrast to the calculations for the Norwegian OSAS conducted by Hjellestad et al. [19], only one evaluator achieved acceptable intra-observer reliability scores for the Lithuanian version. Similar discrepancies were reported

for the Italian version of the OSAS [31]. Moreover, these differences may stem from using photographic evaluations. While some studies confirm photographic equivalence [32], others, including the scale authors themselves [12], suggest the POSAS cannot be accurately assessed via photographs. Given that many patients lived far away, asking for additional in-office scar evaluations was impractical, justifying the use of photographic assessments in clinical practice. The less consistent intra-tester results for OSAS 2.0 emphasise the necessity for further investigation to ensure dependable and consistent observations from the same rater.

Confirming the findings of the existing research [33], we identified disparities in OSAS 2.0 scores among different observers. The inter-tester calculations suggest that while evaluators rate the scars differently by a single parameter, they tend to agree on the criteria for vascularity (Q1), overall opinion (Q7), and the total score, suggesting that these parameters are less subjective and more reliably interpreted across different raters.

Although the POSAS has been shown to demonstrate good reliability in evaluating various scar types (e.g., zigzag, circular, burn, linear) [34,35], we observed a lack of criteria for assessing lymphostasis, which may arise from the lymph-disrupting nature of scars, particularly those on the face. This issue is especially prominent in skin plasty (P) and transplantation (T) groups, where the surgical procedure itself poses a heightened risk of such complications. This phenomenon was observed when patients displayed satisfactory single scar characteristics, yet experienced significant facial disfigurement because of lymphostasis, which was reflected in their overall PSAS scores. The POSAS currently lacks criteria for evaluating such instances because parameters like relief, thickness, and surface area primarily pertain to the scar itself rather than the surrounding tissues. In addition to that, a small percentage of our cohort expressed confusion regarding their overall scar assessments, graded on a scale from 1 to 10, where 10 indicated the poorest scar quality. This confusion might stem from the evaluation practices in Baltic countries, where higher scores typically signify superior quality. This discrepancy was not mentioned in any previous validation studies.

Our study results validate the effectiveness of the Lithuanian POSAS 2.0 in detecting changes in scars over time and highlight the statistically significant improvement seen between the short and late postoperative periods. Patient and observer evaluations show a statistically significant correlation in scar quality at two different time points, further supporting the reliability of the PSAS and OSAS.

Although differences in POSAS scores across anatomical regions were highly expected, statistically significant variations in scar assessment were only evident when patients were grouped by gender, age, surgery type, and tumour size. During the early postoperative period, it was noted that relatively younger patients evaluated scars on their foreheads more critically. However, for this specific group, the observers focused their attention more on the nose anatomic region. For the patients who had larger primary tumours and, consequently, longer scars, the observers distinguished the eyelid anatomic unit within which the scars were evaluated worse. Six months post-surgery, statistically significant gender disparities became apparent, with several anatomical units, such as the cheek and upper lip, predicting worse scores for younger women. Conversely, observers reported worse scars for men on the forehead. Despite limited feasibility for post hoc tests, identifying significant distinctions laid the groundwork for future research with a larger sample size.

In our prior examination of QoL among patients with facial BCC, we noted a statistically significant improvement at the 6-month mark following surgery. In this study, we investigated whether scar quality might be linked to QoL during both the early and late postoperative phases. Significant correlations were identified between PSAS and SCI scores, particularly with the Appearance subscale, at the 6-month post-surgery mark. This indicates a direct association between scar appearance and patient QoL during the later stages of recovery. These findings offer valuable insights into how patients perceive the aesthetic aspects of scars following skin cancer surgery and its impact on their overall QoL. Preliminary findings from post hoc analysis provide a basis for future investigations,

including the addition of advanced statistical techniques such as linear regression and the consideration of various factors like anthropometric variables and socio-demographic characteristics.

This study is one of the few to evaluate the psychometric properties of both PSAS 2.0 and OSAS 2.0, following a rigorous guideline-based methodology by COSMIN. The additional pilot phase of this study represents the first analysis of the intricate connections between post-interventional patient satisfaction with aesthetic outcomes in specific facial anatomical regions and its correlation with disease-specific QoL, utilizing a prospective longitudinal study design. This allowed for the refinement of research protocols and assessment tools, ultimately improving the quality and efficiency of future investigations on this topic.

Acknowledging its limitations, the pilot phase of this study had an insufficient sample size for complete factor analysis, which may limit the findings that can be applied to broader populations. Moreover, this study's focus on the Lithuanian patient population may limit the applicability of results to cultural contexts beyond the Baltic region. These limitations underscore the need for ongoing longitudinal study and suggest incorporating strategies to overcome them.

5. Conclusions

The Lithuanian version of the POSAS 2.0 can be confidently used for assessing scar quality in both clinical and research settings, offering comprehensive insights from both patient and observer perspectives. Notably, there is a statistically significant improvement in scar quality observed 6 months post-surgery, correlating with enhanced QoL. Analysis of PSAS scores revealed certain demographic groups, particularly younger women, which tend to evaluate scars more critically. Additionally, specific facial areas—forehead, upper lip, and cheek—were identified as aesthetically sensitive. Conversely, observers show sensitivity towards the male gender and their scars on the forehead, nose, and eyelid, with larger presurgical tumour size correlating with poorer OSAS scores.

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Appendix C

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Quality of Life in Patients Affected by Facial Basal Cell Carcinoma: Prospective Longitudinal Pilot Study and Validation of Skin Cancer Index in Lithuanian Language

ORIGINAL RESEARCH

Quality of Life in Patients Affected by Facial Basal Cell Carcinoma: Prospective Longitudinal Pilot Study and Validation of Skin Cancer Index in Lithuanian Language

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Purpose: Facial basal cell carcinoma (BCC) poses significant challenges due to its potential for local destruction and impact on quality of life (QoL). Continuous research is necessary to identify novel factors influencing the quality of life within this demographic across diverse cultural settings. The aims of this study were to translate, culturally adapt, and validate the Lithuanian version of Skin Cancer Index, subsequently utilizing this questionnaire in the pilot phase of the study to achieve the following: (1) identify the differences in short- and long-term QoL, (2) establish empirical correlations between SCI scores and aesthetic facial regions, evaluate the potential differences between age, gender, and tumor size groups.

Patients and Methods: A prospective longitudinal study was conducted with 100 consecutive patients. The SCI was translated into Lithuanian language, with a rigorous assessment of its psychometric properties to confirm validity. Alongside hypothesis testing, a detailed analysis of variables was conducted. Statistical techniques, including t-tests and ANOVA, were employed to compare scores across demographic and clinical groups, with effect size calculations for further interpretation.

Results: Our findings demonstrate that the Lithuanian SCI successfully fulfills the criteria established by the COSMIN checklist. Surgical treatment for facial BCC notably enhances QoL, particularly evident six months post-surgery. Analysis of SCI scores identified demographic and clinical factors associated with lower QoL, including female gender, treatment with skin plasty, and tumor sites in aesthetically sensitive areas like the cheek, nose, and eyelid.

Conclusion: The Lithuanian version of the SCI is a reliable and valid tool for assessing QoL in facial BCC patients. Our findings underscore the global relevance of understanding the multifactorial influences on QoL in BCC patients. Early diagnosis, less invasive treatment approaches, and tailored post-operative care are crucial in minimizing the psychological, social, and appearance-related burdens of facial BCC.

Keywords: skin cancer, face surgery, outcomes, skin cancer surgery, health-related quality of life, PROM

Introduction

Non-melanoma skin cancer (NMSC) continues to be the most common neoplasm, with the majority of NMSC cases attributed to facial basal cell carcinoma (BCC).[1,2] The frequency of this widespread malignancy has significantly risen over the recent decades[3–5] with a projected continued increase until 2040.[6,7] Understanding predictors of treatment success is crucial for improving clinical outcomes worldwide.

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Despite its rare metastatic potential,[8] BCC can cause substantial local destruction, leading to disfigurement and potentially impacting large areas of soft tissue, cartilage, and bone. Not only does it result in premature morbidity and mortality,[9] but also greatly affects the Quality of Life (QoL).[10,11] Our previous investigation into QoL studies of individuals, affected by head and neck BCC, revealed a significant research gap in analyzing the multifaceted relationships between QoL and factors such as tumor size, specific facial regions, and surgery types.[12]

While the distribution of BCC in particular facial regions has been previously described,[13,14] it has never been associated with Health-Related Quality of Life (HRQoL). It is plausible to suggest that the prevalence of aesthetically sensitive face areas may have a more pronounced impact on QoL than other locations. While the lesion itself is likely to cause significant distress, the need for facial surgery due to malignancy poses a different level of unease. Surgical treatment can range from minimally invasive procedures[15] to major tumor excisions, requiring extensive reconstructions.[16] Nevertheless, it is crucial to take into consideration the largest group of patients treated in skin cancer departments - those undergoing conventional excision[17] with options such as primary closure, local flap, or full-skin graft reconstruction. The interventions entail a different level of discomfort and affect various life aspects, potentially leading to certain alterations in QoL.

The Skin Cancer Index (SCI) is the first specific patient-reported outcome measure (PROM) evaluating the QoL in patients with cervicofacial NMSC.[18] In contrast to the widely used Dermatology Life Quality Index (DLQI) or FACE-Q questionnaire, the SCI capturing the emotional and appearance-related domains has been reported to exhibit the highest level of support for its efficacy, sensitivity, and applicability.[19–21] To date, SCI has been translated and validated from its original (English)[22] into Portuguese,[23] Brazilian Portuguese,[24] Italian,[25] and Spanish[23] languages. To use the assessment tool on Lithuanian patients, it is crucial to examine different aspects of the scale's validity within the Lithuanian patient sample.

The aims of this prospective longitudinal pilot study were to (1) translate, culturally adapt, and validate the Lithuanian version of SCI, (2) identify the differences in short- and long-term QoL, (3) establish empirical correlations between SCI scores and aesthetic facial regions, and evaluate the potential differences between age, gender, and tumor size groups.

Patients and Methods

Procedures and Ethics Statement

The permission to translate and validate the SCI in the Lithuanian language was granted by the scale developers in 2022. The study was carried out under the Lithuanian Bioethics Committee Approval (Approval No. 2022/11-1476-943). In alignment with the Declaration of Helsinki, all study participants provided written informed consent.

Data was collected from 23rd November 2022, to 16th October 2023 at the Vilnius University Hospital Santaros Klinikos Centre of Dermatology (VUH).

Patients

Adhering to the suggested sample size for robust PROM statistical analysis,[26,27] we enrolled a total of 100 consecutive patients in the study. Participants were included based on the following criteria:

- Age ≥18 years.
- Individuals presenting for surgical treatment of clinically suspected or histologically confirmed facial BCC.
- Ability to comprehend Lithuanian language.

Participants with substantial cognitive impairment or a limited understanding of the Lithuanian language were excluded from the study.

Data on patient socio-demographic and clinical details were collected. Demographic variables comprised age, gender, marital status, education, place of residence, employment status, and frequency of interactions with family members. Clinical aspects involved the largest tumor diameter, its precise location, and surgery type. Tumors were categorized into specific regions based on their localization using the Facial Aesthetic unit Classification proposed by TT Fattahi.[28] Patients were further classified into three distinct groups based on the type of surgery: (E) excision, (P) skin plasty

reconstruction by local flaps, and (T) skin graft transplantation. The surgeries were performed following a standardized protocol as day care procedures by a plastic and reconstructive surgeon with and extensive experience in the field.

Administered Outcome Measures
Skin Cancer Index (SCI)
SCI is a skin-cancer-specific QoL measurement instrument with a focus on emotional, social, and appearance aspects. It consists of 15 Likert scale questions, with scores ranging from 1 (very much – indicating a significant impact on quality of life) to 5 (not at all – suggesting no impact on quality of life). The total ranges from 15 to 75 points, with a higher score indicating a better quality of life.

Dermatology Life Quality Index (DLQI)
DLQI is designed to assess the impact of a skin condition on a patient's life over the past week. Comprising 10 questions, respondents rate their experiences on a scale of 0 to 3 (0 indicating no impact, 1 for a slight impact, 2 for a significant impact, and 3 for a substantial impact). The cumulative score, ranging from 0 to 30, provides an overall measure of the impact of the skin problem on the QoL. The higher total score signifies a greater effect of the dermatological disease on the patient's life.

The World Health Organization- Five Well-Being Index (WHO-5)
The WHO-5 questionnaire consists of 5 Likert scale questions that capture the respondent's subjective experience of well-being over the preceding two weeks. The total score ranges from 0 to 100, with a higher indicating a better sense of well-being. The WHO-5 does not encompass all elements of QoL. However, it is often used as a screening tool providing valuable insights into overall quality of life, especially in terms of mental and emotional aspects.

PROM Administration
The paper-based or digital SCI, DLQI, and WHO-5 questionnaires were completed by 100 patients at different time points: (1) the day of surgery, (2) 4 weeks, and (3) 6 months post-operatively. A subgroup of 50 participants additionally filled out the SCI a week before their second appointment.

Translation and Cultural Adaptation
The translation and cultural adaptation process of SCI followed the guidelines outlined by the ISPOR Task Force for Translation and Cultural Adaptation (ISPOR TCA)[29] and the COSMIN Study Design checklist.[26,27] Initially, the scale was translated from its original English version into Lithuanian by several members of the VUH, fluent in both Lithuanian and English. The forward translation was also conducted by an experienced plastic surgeon. The preliminary samples were then reviewed by a Lithuanian team of 5 resident doctors, 5 nurses, and 5 dermatovenereologists. After a comprehensive examination and discussion, a consensus was reached, resulting in the most suitable version of the forward translation. Backward translation into the English language was performed by two dermatologists who were not familiar with the original version. Minor language adjustments were made after comparing the two versions with the original.

The cognitive debriefing process was carried out on a subgroup of 15 patients presenting to VUH with NMSC. The patients were given the SCI scales and asked about any words that might be hard to comprehend, be susceptible to misinterpretation, or have the potential to be offensive. Additionally, the questions were evaluated regarding their relevance to each subscale. Following a thorough review and refinement based on the cognitive debriefing feedback, a consensus was achieved, leading to the final Lithuanian version of SCI.

Statistical Analysis
The statistical analysis was performed using R Statistical Software (version 4.2.2; R Foundation for Statistical Computing, Vienna, Austria) and MedCalc Software Ltd (Ostend, Belgium; https://www.medcalc.org; 2024). The existence of floor/ceiling effects was acknowledged when >15% of subjects scored at the lowest or highest extremes. A $p<0.05$ was considered as statistically significant.

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Internal Consistency

Cronbach's alpha coefficient was calculated to assess the internal consistency among items on the Emotional, Social, and Appearance subscales at 3 time points. Coefficient values between 0.70 and 0.95 were considered to be adequate.[30,31]

Structural Validity

Due to the scale being based on a reflective model, the three-factor confirmatory factor analysis (CFA) was performed. The thresholds for the good CFA fit were as follows: Comparative Fit Index (CFI) >0.90 adequate and >0.95 good; Tucker Lewis Index (TLI) (>0.90 adequate and >0.95 good; Root Mean Square Error of Approximation (RMSEA) <0.08; Standardized Root Mean Squared Residual (SRMR) <0.08, and chi squared (χ2)/degrees of freedom (df) with the desired range of 2–5.[32]

Criterion Validity

Spearman's rank correlation coefficient (ρ) was calculated between each subscale and total scores. The coefficient values were considered as follows: very strong 0.80–1, strong 0.6–0.799, medium 0.4–0.599, weak 0.2–0.399, very weak 0–0.199.

Construct Validity

To assess convergent validity, Spearman's rank correlation coefficient was analyzed between SCI-I, DLQI-I, and WHO-5-I scales. The hypotheses were established a priori:

1. Positive correlation between SCI-I emotional subscale and WHO-5-I.
2. Negative correlation between SCI-I emotional subscale and DLQI-I.
3. Positive correlation between SCI-I social subscale and WHO-5-I.
4. Negative correlation between SCI-I social subscale and DLQI-I.
5. Positive correlation between SCI-I appearance subscale and WHO-5-I.
6. Negative correlation between SCI-I appearance subscale and DLQI-I.

Convergent construct validity was considered appropriate when at least 75% of the expected correlations with other related measures were confirmed.[33]

Measurement Error and Reliability

The questionnaire was filled out twice by a subgroup of 50 patients in an interval of 5–7 days. Patients were given either paper or digital SCI questionnaires with identical instructions during both the initial and second administrations of the scale. The initial completion of the SCI took place at home, while the second occurred in the hospital—this being the sole point of distinction. The subgroup was additionally questioned about the possible factors that could influence the change of answers in the interim period.

Test–retest reliability (TRR) was assessed by calculating the Intraclass Correlation Coefficient (ICC, two-way mixed-effects model, absolute agreement, 95% CI). ICC values of >0.70 were considered acceptable.[33]

The standard deviation of differences (SDdif) was calculated to evaluate the dispersion of the differences between test and retest (TR) scores. A smaller SDdif was considered suggestive of good agreement between TR scores. The standard error of measurement (SEM) was calculated with the following formula: SEM = SDdif$\sqrt{(1\text{-ICC})}$. The formula used to determine the smallest detectable change in an individual (SDCind) is expressed as follows: SDCind = 1.96 × $\sqrt{2}$ × SEM. The smallest detectable change measurable in a group of people (SDCgroup) was calculated by dividing SDCind by $\sqrt{n}$, where n represents the sample size.[33] The mean of the differences between test–retest scores was computed by the mean difference score (MD). Limits of Agreement (LoA) were calculated by the following formula: MD ± 1.96 * SDdif.

Sensitivity to Change and Responsiveness

The sensitivity to change was assessed by calculating the effect size (ES), consecutively interpreting the results using Cohen's standard values: 0.2-<0.5 low, 0.5–0.8 moderate, and ≥0.8 large effect size. Additionally, the standardized response mean (SRM) was calculated between the 1st and 2nd, 1st and 3rd, as well as 2nd and 3rd visits. P values of <0.05 were considered significant. It was hypothesized that the SCI will show a significant increase in scores from pre- to post-intervention, indicating its responsiveness to intervention-induced variations. The null hypothesis assumed no significant

difference, while the alternative hypothesis predicted a meaningful change in scores post-intervention, affirming the questionnaire's sensitivity to the effects of the intervention.

The questionnaire's responsiveness was evaluated by conducting statistical comparisons, including *t*-tests and analysis of variance (ANOVA) followed by post hoc tests, to compare scores across various groups.

Segment Analysis and SCI Score Differences Across Anatomic Units

Possible SCI score differences by age, gender, tumor size, aesthetic facial units, and surgery groups (E, P, T) at 1st, 2nd, and 3rd visits were analyzed. The Student's *t*-test was used for dichotomous variables and Analysis of Variance for categorical variables with three or more groups. Where ANOVA was statistically significant, post hoc tests were used to find which groups had reliably different means. Additionally, Cohen's effect size was calculated to quantify the magnitude of group differences.

Results

One hundred consecutive patients were included in the study. The questionnaires were completed by all study participants at 3 time points. A subgroup of 50 underwent the re-assessment of the reliability evaluation for SCI. A very small percentage of missing values (0.003%) was noted. They were replaced by applying the Mode Imputation method. The Floor and ceiling effects were negative in SCI and WHO-5 questionnaires, with 28 patients reaching floor effect for DLQI. Demographic and clinical information is presented in Tables 1 and 2.

Table 1 Patient Sociodemographic Characteristics

Sociodemographic characteristics, n=100	
Age	68.35 ± (12.56)
Gender, n (%)	
Male	29 (29%)
Female	71 (71%)
Marital status, n (%)	
Single	4 (4%)
Dating but living separately	1 (1%)
Married	57 (57%)
Living together with a partner	3 (3%)
Divorced	10 (10%)
Widow/widower	25 (25%)
Education, n (%)	
Primary	2 (2%)
Basic (8–10 grades)	6 (6%)
Secondary (11–12 grades)	11 (11%)
Non-university higher education	28 (28%)
University degree	47 (47%)
Other (professional schools)	6 (6%)

(*Continued*)

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Table 1 (Continued).

Sociodemographic characteristics, n=100	
Residence, n (%)	
Village (<500 inhabitants)	5 (5%)
Town (500–3000 inhabitants)	7 (7%)
City (>3000 inhabitants)	88 (88%)
Employment, n (%)	
Employed	31 (31%)
Employed (home office)	1 (1%)
Employed but retired	2 (2%)
Unemployed	8 (8%)
Retired	58 (58%)
Do you have children/close relatives? n (%)	
Yes	94 (94%)
No	6 (6%)
Do you often meet them? n (%)	
Yes	92 (92%)
No	8 (8%)

Notes: The groups of sociodemographic characteristics are marked in bold.

Table 2 Patient Clinical Characteristics

Clinical characteristics, n=100	
Largest tumor diameter, mm	9.22 ± (4.80); range: 3–30
Tumor size groups, n (%)	
0–5 mm	21 (21%)
6–10 mm	51 (51%)
11–15 mm	18 (18%)
>15 mm	10 (10%)
Tumor location by TT Fattahi, n (%)	
1 Forehead unit	27 (27%)
1a central subunit	8
1b lateral subunit	19
2 Nasal unit	26 (26%)
2.1 tip subunit	8
2.3,6 right and left alar base subunits	7

(*Continued*)

Table 2 (Continued).

Clinical characteristics, n=100	
2.4,5 right and left alar side wall subunits	4
2.7 dorsal subunit	3
2.8,9 right and left dorsal side wall subunits	4
3 Eyelid unit	11 (11%)
3a lower lid subunit	5
3c lateral canthal subunit	1
3d medial canthal subunit	5
4 Cheek unit	28 (28%)
4a medial subunit	16
4b zygomatic subunit	2
4c lateral subunit	4
4d buccal subunit	6
5 Upper lip unit	7 (7%)
5b lateral subunit	7
7 Mental unit	1 (1%)
Surgery groups, n (%)	
E	49 (49%)
P	39 (39%)
T	12 (12%)

Notes: Surgery groups: E – primary excision, P – skin-plasty, T – skin transplantation. The groups of clinical characteristics are marked in bold.

Translation and Cultural Adaptation

The development of the Lithuanian Skin Cancer Index involved forward translation, backward translation, and a cognitive debriefing process. These procedures collectively ensured linguistic accuracy and cultural appropriateness, ultimately confirming the face and content validity of the scale.

Internal Consistency

The analysis yielded satisfactory Cronbach's alpha values for each subscale at the 1st, 2nd, and 3rd time points (Table 3). The results demonstrate a strong internal coherence among the questionnaire items, affirming the reliability of the

Table 3 Internal Consistency of the SCI

Subscale	SCI – I	SCI – II	SCI – III
Emotional	0.912	0.892	0.863
Social	0.705	0.769	0.7
Appearance	0.849	0.904	0.868

Abbreviation: SCI – I, Skin Cancer Index scores at the 1st visit; SCI– II, Skin Cancer Index scores at the 2nd visit; SCI – III, Skin Cancer Index scores at the 3rd visit.
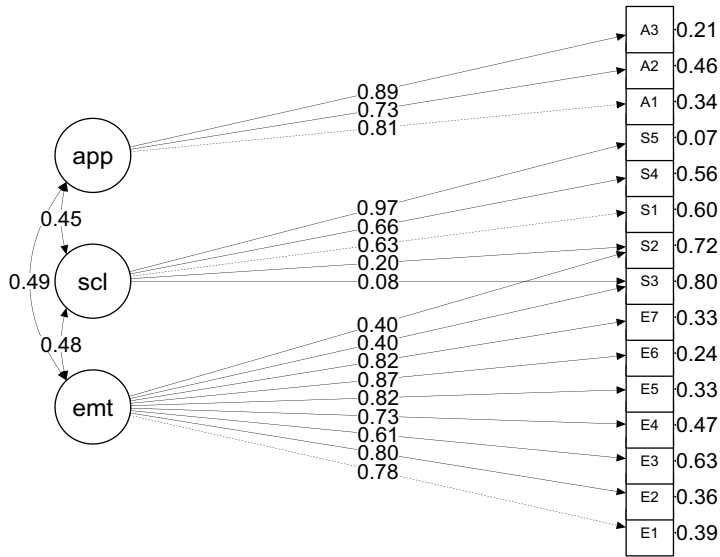
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Figure 1 Graphical representation of the refined model (Model 3), with standardized values.

instrument for assessing the intended variables. It reinforces the trustworthiness of the collected data for subsequent analyses and interpretation in our study.

Structural Validity

Based on modification indices (MI), modifications were performed to the original model to achieve better performance. Two cross-loadings were suggested by MI (Q2 and Q3 to emotional subscale) due to χ^2 increasing by more than ten units. Notably, items Q2 and Q3, originally part of the Social subscale, were suggested to cross-load in the Emotional subscale. This modification aligns with the theoretical perspective, given that both items ("Felt concerned that your skin cancer may worry friends or family?" for Q2 and "Worried about the length of time before you can go out in public?" for Q3) could reasonably pertain to either the Emotional or Social subscale (Figure 1 and Table 4).

Criterion Validity

The Spearman correlations between the SCI-I subscales and their total score are displayed in Table 5. The values for the total score range from 0.59 to 0.933 indicating medium to very strong positive association. Notably, the correlation between the Appearance subscale and the total score is relatively lower, a phenomenon likely stemming from the limited

Table 4 Fit Results of the Competing Models Tested (n=100)

	Description	χ^2	Df	RMSEA (95% CI)	CFI	TLI	SRMR
Model 1	Original model (with three factors and 15 items)	163.598	87	0.094 (0.067, 0.12)	0.904	0.884	0.091
Model 2	Original model with one cross-loading item (Q3) as suggested by MI	152.566	86	0.088 (0.06, 0.115)	0.916	0.898	0.079
Model 3	Original model with two cross-loading items (Q3 and Q2) as suggested by MI	139.991	85	0.08 (0.05, 0.108)	0.931	0.915	0.064

Abbreviations: χ^2, chi squared; df, Degrees of freedom; RMSEA, Root Mean Square Error of Approximation; CI, Confidence Interval; CFI, Comparative Fit Index; TLI, Tucker Lewis Index; SRMR, Standardized Root Mean Squared Residual; Q3, 3rd question of Skin Cancer Index scale; MI, Modification indices; Q2, 2nd question of Skin Cancer Index scale.

Table 5 Correlations Between the SCI – I Subscales and the Total Score

	SCI – I Emotional	**SCI – I Social**	**SCI – I Appearance**	**SCI – I Total**
SCI – I Emotional	I			
SCI – I Social	0.578 ***	I		
SCI – I Appearance	0.374 ***	0.293 **	I	
SCI – I Total	0.933 ***	0.715 ***	0.59 ***	I

Notes: Significance: ** - p-value <0.01, *** - p-value <0.001.
Abbreviation: SCI – I, Skin Cancer Index scores at the Ist visit.

number of items in the Appearance subscale (3 out of 15). Nevertheless, the correlation coefficient for Emotional and Social subscales is highly significant and indicates medium coherence among these factors.

Construct Validity

Table 6 represents the Spearman correlation coefficients between the SCI-I and WHO-5-I. The results reveal a positive score correlation, ranging from very weak to weak. Highlighting the questionnaire's particular attention to social aspects, the strongest correlation was observed between the WHO-5-1, 2 and the Social subscale of the SCI-I.

Spearman correlations between SCI-I and DLQI-I values are displayed in Table 7. The analysis indicates that there is a negative correlation between SCI and DLQI, characterized as very weak to medium. The most significant negative correlation is found between DLQI4 and SCI Emotional and Social subscales. Notably, the DLQI shows the strongest correlation with the SCI Social subscale, underscoring the questionnaire's focus on social aspects.

The convergent construct validity is supported by the fact that 75% of the hypotheses were confirmed as true.

Measurement Error and Reliability

The test–retest reliability of the questionnaire resulted in an ICC of 0.83 (95% CI = 0.716–0.899) for the overall score (Table 8). All ICC values for Emotional, Social, and Appearance subscales are higher than 0.8, suggesting high consistency and reliability between different observers or measurement occasions.

The SEM for the overall score is 1.77 points, indicating a 68% probability that the true score for a patient falls within a range of −1.77 to +1.77 points relative to the observed score. With a 95% probability, this range expands to −3.54 to +3.54 points. For individual subscales, the SEM values range from 0.316 to 1.22, reflecting the precision with which the true scores of patients in these specific domains can be estimated based on their observed scores. The SDCind for the overall score is 4.906 points. This implies that an individual's overall quality of life score would need to change by at least 4.906 points before it could be confidently considered as a true change rather than a result of measurement error. Additionally, the SDCgroup value is established at 0.694 for the overall score, providing a benchmark for the minimum change that can be considered significant at a group level.

Table 6 Spearman Correlation Coefficients Between SCI – I and WHO-5-I Scores

	WHO-5-I	**WHO-5-2**	**WHO-5-3**	**WHO-5-4**	**WHO-5-5**	**WHO-5 Total**
SCI – I Emotional	0.231 *	0.312 **	0.216 *	0.278 **	0.023	0.292 **
SCI – I Social	0.353 ***	0.337 ***	0.293 **	0.21 *	0	0.333 ***
SCI – I Appearance	0.01	0.05	0.126	0.21 *	−0.01	0.12
SCI – I Total	0.261 **	0.33 ***	0.266 **	0.287 **	0.013	0.323 **

Notes: Significance: * - p-value <0.05, ** - p-value <0.01, *** - p-value <0.001.
Abbreviations: SCI – I, Skin Cancer Index scores at the Ist visit; WHO-5, The World Health Organization- Five Well-Being Index; WHO-5-I, Ist question of WHO-5; WHO-5-2, 2nd question of WHO-5; WHO-5-3, 3rd question of WHO-5; WHO-5-4, 4th question of WHO-5; WHO-5-5, 5th question of WHO-5.

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Table 7 Spearman Correlation Coefficients Between SCI – I and DLQI Scores

	SCI – I Emotional	SCI – I Social	SCI – I Appearance	SCI – I Total
DLQI 1	−0.299 **	−0.318 **	−0.138	−0.311 **
DLQI 2	−0.207 *	−0.351 ***	−0.182	−0.256 *
DLQI 3	−0.19	−0.246 *	0.036	−0.174
DLQI 4	−0.343 ***	−0.394 ***	−0.036	−0.359 ***
DLQI 5	−0.208 *	−0.225 *	−0.021	−0.167
DLQI 6	−0.154	−0.178	−0.075	−0.152
DLQI 7	−0.014	−0.073	0.206 *	0.016
DLQI 8	−0.152	−0.225 *	−0.021	−0.14
DLQI 9	−0.167	−0.124	−0.018	−0.135
DLQI 10	−0.256 **	−0.115	−0.025	−0.238 *
DLQI Total	−0.355 ***	−0.478 ***	−0.072	−0.365 ***

Notes: Significance: * - p-value <0.05, ** - p-value <0.01, *** - p-value <0.001.
Abbreviation: SCI – I, Skin Cancer Index scores at the 1st visit; DLQI and the number represents the question of Dermatology Life Quality Index scale respectively.

Table 8 Test–Retest Reliability

	SCI – I Emotional	SCI – I Social	SCI – I Appearance	SCI – I Total
Test	30.16 ± 4.469	22.98 ± 2.308	13.42 ± 1.808	66.56 ± 7.251
Retest	30.08 ± 4.462	23.2 ± 2.148	13.26 ± 1.988	66.54 ± 7.279
ICC (95% CI)	0.81 (0.682; 0.886)	0.84 (0.737; 0.907)	0.88 (0.805; 0.932)	0.83 (0.716; 0.899)
MD (95% CI)	0.08 (−0.696; 0.856)	−0.22 (−0.566; 0.126)	0.16 (−0.093; 0.413)	0.02 (−1.170; 1.210)
SD_{dif}	2.798	1.25	0.912	4.293
SEM	1.22	0.5	0.316	1.77
SDC_{ind}	3.381	1.386	0.876	4.906
SDC_{group}	0.478	0.196	0.124	0.694
95% LoA	−5.404; 5.565	−2.67; 2.23	−1.627; 1.947	−8.394; 8.434

Abbreviations: SCI – I, Skin Cancer Index score during the 1st visit; ICC, Intraclass Correlation Coefficient; CI, Confidence Interval; MD, Mean difference score; SD_{dif}, Standard deviation of differences; SEM, Standard error of measurement; SDC_{ind}, Smallest detectable change in an Individual; SDC_{group}, Smallest detectable change in a group; LoA, Limits of agreement.

Sensitivity to Change and Responsiveness

The mean scores of SCI at 1st, 2nd and 3rd visits are presented Table 9.

The moderate to large responsiveness levels were observed for 1st vs 3rd as well as for 2nd vs 3rd visits, with the SRM values surpassing 0.5. It was detected that responsiveness fell into "low" category when analyzing the means of 1st vs 2nd visit (SRM <0.5).

Meaningful Changes Over Time

Statistically significant differences were observed in the SCI total and subscale scores across the 1st, 2nd, and 3rd visits ($p<0.001$). Notably, between the 1st and 3rd visits ($p<0.001$, mean difference +8.83 points), as well as between the 2nd and 3rd visits ($p<0.001$, mean difference +6.47 points). However, the only statistically significant difference between the 1st and 2nd visits was found to be in Emotional domain ($p=0.044$, mean difference +2.02) (Table 9 and Table 10).

Table 9 Mean SCI Scores at the 1st, 2nd and 3rd Visits

	SCI – I		SCI – II		SCI – III	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Emotional	25.66	6.27	27.68	5.55	30.55	4.28
Social	22.19	2.98	22.13	3.11	24.04	2.43
Appearance	12.36	2.86	12.60	2.53	14.24	1.69
Total	60.05	10.21	62.41	9.63	68.88	7.50

Abbreviations: SCI – I, Skin Cancer Index scores at the 1st visit; SCI – II, Skin Cancer Index scores at the 2nd visit; SCI – III, Skin Cancer Index scores at the 3rd visit; SD, Standard deviation.

Table 10 Standardized response mean (SRM)

		SRM value	**95% CI**	**p**
1st vs 2nd visit	SCI Total	0.22	0.04–0.37	0.22
	Emotional	0.40	0.20–0.57	0.04*
	Social	−0.02	−0.23–0.17	0.99
	Appearance	0.09	−0.12–0.30	0.80
1st vs 3rd visit	SCI Total	0.79	0.36–1.07	< 0.001***
	Emotional	0.81	0.47–1.04	< 0.001***
	Social	0.48	0.08–0.70	< 0.001***
	Appearance	0.62	0.29–0.79	< 0.001***
2nd vs 3rd visit	SCI Total	0.73	0.39–0.95	< 0.001***
	Emotional	0.58	0.34–0.77	< 0.001***
	Social	0.59	0.35–0.76	< 0.001***
	Appearance	0.71	0.40–0.89	< 0.001***

Notes: Significance values of post-hoc ANOVA tests: *p-value <0.05, ***p-value <0.001.
Abbreviation: SRM, Standardized response mean; CI, Confidence Interval.

The results indicate that there is significant improvement in Emotional domain 1 month after surgery compared to baseline scores. Furthermore, the statistically significant improvement in SCI Total and all subscale scores was detected 6 months after surgery, emphasizing the profound impact of the intervention.

Segment Analysis and SCI Score Differences Across Anatomic Units

To guarantee the feasibility of using statistical tests in the pilot phase, the analysis of score distributions across anatomical units excluded finer subunits due to the insufficient number of cases. Further division to subunits was reserved for descriptive statistics and future studies on this topic. Therefore, the mental unit comprising only one participant was excluded from the statistical analysis. The segment analysis with SCI score association to anatomic units at the 1st, 2nd, and 3rd visits is presented in Table 11, Tables 12 and 13.

SCI Differences Depending on Tumor Location

Across the anatomic units, there were no statistically significant differences observed in SCI Total/Emotional/Social/Appearance scores at 1st, 2nd, and 3rd visits.

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Table 11 Segment Analysis and SCI Score Differences Across Anatomic Units at the 1st Visit

	SCI – I Emotional	SCI – I Social	SCI – I Appearance	SCI – I Total
Anatomic Unit	No, p = 0.65	No, p = 0.49	No, p = 0.36	No, p = 0.63 ES small
Gender	Yes, p < 0.05	Yes, p < 0.01	Yes, p < 0.001	Yes, p < 0.001
- Score differences between men and women by anatomic units	No	Yes, eyelid, p = 0.05	Yes, cheek p < 0.001	Yes, cheek, p < 0.05
Age	No, p = 0.70	No, p = 0.87	No, p = 0.06	No, p = 0.49
- Score differences between age groups by anatomic units	Yes, eyelid, p < 0.05	Yes, eyelid, p < 0.05	Yes, eyelid, p < 0.05	Yes, eyelid, p < 0.01
Surgery group (E, P, T)	Yes, p < 0.05	No, p = 0.29	No, p = 0.20	No, p = 0.06
- Score differences between surgery groups by anatomic units	No	Yes, cheek, p < 0.01	No	Yes, p < 0.05 cheek
Size group	No, p = 0.63	No, p = 0.25	No, p = 0.38	No, p = 0.21
- Score differences between size groups by anatomic units	No	No	No	No

Abbreviation: SCI – I, Skin Cancer Index scores at the 1st visit.

Table 12 Segment Analysis and SCI Score Differences Across Anatomic Units at the 2nd Visit

	SCI – II Emotional	SCI – II Social	SCI – II Appearance	SCI – II Total
Anatomic Unit	No, p = 0.98	No, p = 0.95	No, p = 0.52	No, p = 0.90
Gender	Yes, p < 0.05	No, p = 0.09	Yes, p < 0.01	Yes, p < 0.05
- Score differences between men and women by anatomic units	No	No	Yes, p < 0.001 cheek	Yes, cheek, p < 0.05
Age	No, p = 0.13	No, p = 0.05	Yes, p < 0.05	No, p = 0.10
- Score differences between age groups by anatomic units	Yes, upper lip, p < 0.05	Yes, nose, p < 0.05	No	No
Surgery group (E, P, T)	No, p = 0.73	No, p = 0.38	No, p = 0.87	No, p = 0.60
- Score differences between surgery groups by anatomic units	No	No	No	No
Size group	No, p = 0.07	No, p = 0.08	No, p = 0.18	Yes, p < 0.05
- Score differences between size groups by anatomic units	No	No	No	No

Abbreviation: SCI – II, Skin Cancer Index scores at the 2nd visit.

Table 13 Segment Analysis and SCI Score Differences Across Anatomic Units at the 3rd Visit

	SCI – III Emotional	SCI – III Social	SCI – III Appearance	SCI – III Total
Anatomic Unit	No, p = 0.89	No, p = 0.73	No, p = 0.30	No, p = 0.68
Gender	Yes, p < 0.01	No, p = 0.18	Yes, p < 0.01	Yes, p < 0.05
- Score differences between men and women by anatomic units	Yes, p < 0.01 nose	No	No	No
Age	No, p = 0.06	No, p = 0.33	No, p = 0.14	No, p = 0.09
- Score differences between age groups by anatomic units	No	No	No	No
Surgery group (E, P, T)	No, p = 0.31	No, p = 0.18	No, p = 0.50	No, p = 0.20
- Score differences between surgery groups by anatomic units	No	Yes, p < 0.05 eyelid	No	No
Size group	No, p = 0.27	No, p = 0.61	No, p = 0.29	No, p = 0.43
- Score differences between size groups by anatomic units	No	No	No	No

Abbreviation: SCI – III, Skin Cancer Index scores at the 3rd visit.

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SCI Score Differences Between Men and Women

Noteworthy differences were detected in the SCI scores between men and women at all 3 time points, with the exception being SCI Social subscale at 2nd and 3rd visits. Men provided statistically significantly higher SCI scores, indicating better quality of life overall, especially in emotional and appearance aspects both pre- and post-interventionally.

Score Differences Between Men and Women by Anatomic Units

Upper lip unit group, consisting only of 1 woman participant was excluded from the analysis.

Considering the SCI score disparities between genders across anatomical units, three areas were found to exhibit statistically significant differences. Men showed higher SCI Total/Social/Appearance scores before surgery when their tumor was in either the cheek ($p < 0.05$) or eyelid unit ($p < 0.05$). This trend persisted post-surgery (visit 2nd), particularly in the cheek region ($p < 0.05$). Six months after intervention, men with primary tumors in the nose unit evaluated their QoL in emotional domain statistically significantly better than women ($p < 0.01$).

The anatomical tumor location did not appear to influence the scores between men and women on the SCI-I-Emotional, SCI II-Emotional/Social, and SCI III-Total/Social/Appearance subscales.

SCI Score Differences Between E, P, T Groups

The results indicate that significant differences between the SCI scores of E, P, and T groups were only found pre-interventionally. Patients in E group evaluated their QoL in emotional domain statistically significantly better than P group at 1st visit.

Score Differences Between Surgery Groups by Anatomic Units

T group in cheek unit, consisting only of 1 participant, was excluded from the analysis.

The findings suggest that the assessment of SCI by patients in different surgery groups varies significantly depending on tumor location. Particularly, the E group tends to evaluate the QoL in Social domain better compared to P group when the tumor is located on the cheek (1st visit) ($p < 0.05$) and on the eyelid (3rd visit) ($p < 0.05$).

SCI Score Differences Between Age Groups

Statistically significant differences between age groups were observed only in the SCI Appearance domain at the time of 2nd visit. Post hoc tests revealed that the 36–56 y group rated SCI Appearance subscale statistically significantly worse compared to 57–69 y group ($p < 0.05$).

Score Differences Between Age Groups by Anatomic Units

The results revealed three sensitive areas: the eyelid during the initial visit, and the upper lip and nose during the 2nd visit. These differences are reflected in both total and subscale scores. Notably, following intervention, the areas of age-related concern shift, with prominent disparities observed in SCI Emotional scores for the upper lip region and SCI Social scores for the nose region at the 2nd visit. Interestingly, the SCI-II-Appearance and SCI-III did not reveal any significantly different anatomic areas of concern between age groups.

Post hoc tests to identify differing pairs were not feasible due to the 70–79 y group, comprising only 1 participant in the eyelid unit – when this group was removed, p-value according to ANOVA was no longer statistically significant.

SCI Score Differences Between Tumors Size Groups

The results indicate that significant differences between the SCI Total scores by tumor size groups were only found post-interventionally at the 2nd visit. Patients with tumors ranging from 6 to 10 mm exhibited generally higher SCI Total scores compared to those with tumors measuring 11–15 mm ($p < 0.05$).

Score Differences Between Size Groups by Anatomic Units

Across the anatomic units, there were no statistically significant differences observed in SCI Total/Emotional/Social/Appearance scores at the 1st, 2nd, and 3rd visits between patients in different tumor size groups ($p > 0.05$).

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Discussion

In this study, the SCI was translated and culturally adapted to suit the Lithuanian patient population with facial NMSC. Following the rigorous methodology for PROM validation, an extensive investigation into various psychometric properties of the scale was conducted. The findings revealed that all assessed parameters, including internal consistency, structural validity, criterion validity, construct validity, discriminative convergent validity, sensitivity to change, responsiveness, measurement error, and reliability, surpassed acceptable thresholds. Our statistical analysis of the factorial structure corresponds to the model initially proposed by Rhee et al,[22] and subsequently confirmed by Samela et al,[25] validating the existence of three factors corresponding to Emotional, Social, and Appearance subscales. In contrast, the Spanish[23] and Melanoma-SCI[34] versions demonstrated a two-factor structure. Two cross-loadings were included for items Q2 and Q3, revealing their interchangeability in both Emotional and Social subscales. Similar phenomenon regarding these two subscales was identified during the validation process in the Italian language. However, the Italian study found cross-loadings in the items Q5 and Q9.[25]

Our study had a higher ratio of women to men compared to established literature, likely due to our methodology of including every consecutive patient meeting the inclusion criteria. The gender-specific behaviors and longer women's life expectancy could have led to an older average age among our participants. While this gender imbalance might have influenced the results, we believe our consecutive inclusion methodology minimizes potential selection bias. Therefore, the atypical gender distribution in our sample likely reflects the specific patient population at our center during the study period and the natural demographic variations in BCC incidence among older populations.

Primary differences of SCI scores were evaluated considering factors such as gender, age, tumor size, location, and surgery type. Sensitive groups throughout all 3 visits were identified.

Gender differences were evident, with men reporting higher overall SCI scores compared to women at all time points. This disparity was particularly notable in the emotional and appearance domains. These findings suggest that women may experience greater psychological and aesthetic distress related to facial BCC and its treatment. Clinicians should consider these gender differences when planning and providing post-operative care and support.

Age and tumor size were additional factors of QoL. Significant differences in the appearance domain were observed between age groups post-surgery, particularly between the 36 to 56 years group and the 57 to 69 years group. Patients with smaller tumors (6–10 mm) reported higher QoL than those with larger tumors (11–15 mm) at the second visit.

The segment analysis revealed notable variations in QoL of patients with tumors in various locations for different patient groups. Tumors in aesthetically sensitive areas such as the cheek, nose, and eyelid were associated with lower QoL scores both pre- and post-surgery. Although post hoc tests were mostly not feasible given the relatively small sample size, the identification of significant differences laid the groundwork for future studies. This highlights the importance of surgical precision and aesthetic considerations in these regions to minimize the impact on patients' QoL.

The type of surgery performed also influenced QoL outcomes. Patients undergoing primary excision reported better emotional domain scores compared to those undergoing skin plasty pre-surgery. However, post-surgery, the differences between these groups were not statistically significant, suggesting that the initial psychological impact of more extensive surgeries may diminish over time. This finding indicates that while less invasive surgeries may offer immediate emotional benefits, all surgical treatments eventually contribute to improved QoL. This observation suggests that following the intervention, the appearance of the scar could be a more significant factor over the extent of the surgery performed. Interestingly, this hypothesis does not manifest in the scores of the Appearance domain, which exhibited no significant differences among patients with varying tumor sizes or locations.

Our findings highlight the great impact of surgery on the QoL of patients with facial NMSC. However, in contrast to previous findings,[12] we observed that the most significant improvement in QoL following the intervention is apparent during later follow-up visits rather than within the first month post-surgery. Specifically, one month after surgery, the improvements tend to be present only in the emotional aspect of patients' lives.

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Strengths

The notable strengths of this study lie within its prospective longitudinal design, focusing exclusively on patients with facial BCC. By including each participant consecutively, we avoided selection bias, which enhanced the credibility and relevance of our findings. The use of multiple validated instruments, including SCI, DLQI, and WHO-5, offers a comprehensive evaluation of both immediate and longer-term QoL from different perspectives enhancing the reliability and depth of the findings.

Furthermore, the study identified significant determinants of QoL, including gender, tumor location, and size. These findings are highly relevant for clinical practice worldwide, as they can guide the development of personalized treatment plans aimed at optimizing patient outcomes. The emphasis on tumors in aesthetically sensitive areas provides valuable insights into the psychological and emotional impacts of BCC, which are critical for improving patient care and support globally.

Additionally, the inclusion of a culturally adapted and validated Lithuanian version of the SCI ensures that the findings are grounded in the specific context of the patient population, which enhances the study's relevance and applicability.

Limitations

While this study offers valuable insights, it has a few key limitations that should be noted. As a pilot study with a sample size of 100 patients, the findings may not be fully generalizable to all populations. Larger multi-center studies are needed to confirm these results and extend their applicability.

While we captured the QoL during the critical clinical period, a longer follow-up could offer further insights. Finally, the cultural adaptation of the SCI to Lithuanian patients, while essential, may limit the direct applicability of the findings to other cultural contexts.

These limitations highlight areas for further research to confirm and expand upon the study's findings, ensuring their relevance and applicability in diverse clinical settings. Future research should balance validation efforts with a more extensive examination of clinical outcomes.

Conclusions

The Lithuanian version of the SCI can be confidently used in clinical practice and research settings to assess the impact of skin cancer on patients' well-being, with three subscales offering detailed insights into emotional, social, and appearance-related distress.

Surgical NMSC treatment significantly improves QoL, with the most substantial impact being observed 6 months after surgery. Key determinants of QoL include gender, tumor location, and tumor size. Men, patients with smaller tumors, and those with tumors outside of aesthetically sensitive areas reported better QoL outcomes. Meanwhile, women, patients undergoing skin plasty and those with tumors located in aesthetically sensitive regions such as the cheek, nose, and eyelid presented with lower QoL.

These findings highlight the critical importance of early diagnosis, less invasive treatments, and tailored post-operative care in enhancing patient well-being. Further studies are needed to explore the multifactorial influences of sociodemographic, clinical, anthropometric, and scar-related variables on HRQoL in a bigger sample size.

Data Sharing Statement

The data underlying this article will be shared by the corresponding author upon reasonable request.

Ethics Statement

The approval to conduct the study was issued by The Vilnius Regional Biomedical Research Ethics Committee, Approval No. 2022/11-1476-943. In alignment with the Declaration of Helsinki, all study participants provided written informed consent.

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Appendix D

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Exploring the Role of Symptom Diversity in Facial Basal Cell Carcinoma: Key Insights into Preoperative Quality of Life and Disease Progression

Exploring the Role of Symptom Diversity in Facial Basal Cell Carcinoma: Key Insights into Preoperative Quality of Life and Disease Progression

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Simple Summary: Basal cell carcinoma is the most common skin cancer, especially on the face, yet many patients delay seeking medical care despite experiencing symptoms. This study investigates how different symptoms, such as discomfort, pain, or visible tumor presence, impact patients' quality of life and their decision to consult a doctor. The findings reveal that symptoms significantly affect emotional and social well-being but often do not prompt timely medical attention. On average, patients delayed seeking care for almost two years, which increases disease complexity and the need for more extensive treatment. This research underscores the importance of raising awareness about the symptoms and earlier diagnosis of basal cell carcinoma to improve patient outcomes and reduce the burden on healthcare systems.

Abstract: Facial basal cell carcinoma (BCC) is the most common skin cancer, yet delays in diagnosis and treatment persist. These delays affect quality of life (QoL), advance disease progression, and increase healthcare burden. This study explores the relationship between symptom diversity, QoL, and care-seeking behaviors, focusing on the impact of symptoms on clinical outcomes and consultation timing. A total of 278 adults with histologically confirmed facial BCC underwent surgical treatment at Vilnius University Hospital from November 2022 to April 2024. The data collected included demographics, tumor characteristics, and self-reported symptoms (pain, bleeding, itching, tumor presence, discomfort, and erosion). Disease-specific QoL was assessed using the Skin Cancer Index. ANCOVA compared QoL across symptom groups, multiple regression analyzed symptom effects on QoL, and logistic regression evaluated care-seeking behavior over time. Cox regression assessed symptom associations with time to medical consultation. The mean time from symptom onset to consultation was 21 months. Tumor presence (27%), erosion (18%), and discomfort (17%) were the most reported symptoms. Discomfort significantly reduced QoL in emotional, social, and appearance domains ($p < 0.05$). Logistic regression showed tumor presence and pain were associated with earlier care-seeking within 12 months ($p < 0.05$). Other symptoms, such as bleeding, itching, and erosion, did not significantly influence consultation timing. The findings highlight the need for public education and proactive patient counseling to promote timely intervention and reduce the disease progression.

1. Introduction

Facial basal cell carcinoma (BCC) is the most common form of skin cancer, characterized by slow growth and potential for significant local tissue destruction [1,2]. Despite the serious nature of BCC, much of the existing research on treatment delays has focused on melanoma, leaving a critical gap in understanding how BCC patients behave in similar circumstances [3–5].

Although the face is an aesthetically sensitive area, delays in seeking care for BCC remain, reflecting a multifaceted interaction of clinical, psychological, and social factors that require a deeper investigation. A crucial factor in postponing treatment is the patient's initial decision to seek medical attention [6]. Although the connection between BCC symptoms and their negative impact on quality of life (QoL) is well established, research shows that symptoms alone often fail to prompt timely medical consultations, with many patients delaying care due to denial, neglect, or fear of diagnosis and treatment [7–11].

Furthermore, symptoms such as itch and pain in BCC may be linked to tumor depth and the body's inflammatory response, potentially signaling disease progression [12]. Despite these indicators, many patients do not recognize the seriousness of the disease, further delaying necessary treatment. As the disease advances, the resulting tissue damage necessitates more complex reconstruction methods, impacting disease burden, patient QoL, and increasing healthcare costs [13–19]. This highlights the need for greater public awareness about BCC's signs and symptoms to promote earlier intervention.

This study seeks to explore the relationship between symptom diversity and patient behavior with facial BCC, focusing on how different symptom profiles influence disease-specific preoperative QoL, disease progression, and the timing of the first medical consultation. It also offers a novel viewpoint into how the variety of symptoms influences both clinical outcomes and the overall patient experience.

2. Materials and Methods

This study was conducted under the approval of the Vilnius Regional Biomedical Research Ethics Committee (No. 2022/11-1476-943, issued 18 November 2022). In compliance with the Declaration of Helsinki, all study participants provided written informed consent before inclusion. Data collection took place from 23 November 2022 to 19 April 2024 at the Vilnius University Hospital Santaros Klinikos (VUH) Centre of Dermatovenereology in Lithuania.

This cross-sectional analysis was a part of a larger study on nonmelanoma skin cancer that involved 300 cutaneous neoplasms of the face. For the present study, only the data from patients with postoperatively confirmed BCC were included, resulting in a total of 278 consecutive patients. The inclusion criteria focused on adult patients with either a clinically suspected or histopathologically confirmed diagnosis of facial BCC who were presenting for surgery, such as excision, skin-plasty, or skin transplantation. Patients were excluded if they had undergone any facial surgical treatment within the year prior to enrollment, or if they had significant cognitive impairments that could affect data accuracy.

On the day of surgery, demographic data such as age and gender were collected alongside tumor characteristics, including tumor size and histopathological classification into subtypes (superficial, nodular/micronodular, infiltrative, or other). Patients were also asked to report the presence of specific symptoms. These symptoms included pain,

described as a sharp or throbbing sensation; bleeding, which could be spontaneous or provoked; itching, defined as persistent or episodic pruritus; tumor presence, referring to a visible or palpable mass; discomfort, characterized as tightness, pressure, or mild aching distinct from pain; and erosion, defined as the breakdown or exposure of underlying skin layers, possibly accompanied by oozing. QoL was assessed using the Skin Cancer Index (SCI), which evaluates emotional, social, and appearance domains. Patients were also asked whether the tumor caused anxiety, which was analyzed separately from the physical symptoms and SCI scores.

Statistical Analysis

All statistical analyses were conducted using Python 3.12.5, and statistical significance was set at $p < 0.05$.

Differences in categorized tumor size, symptom count, and time until the first doctor appointment across age and gender groups were analyzed using chi-square tests. Additionally, chi-square tests were used to examine whether a particular gender, in relation to tumor size and age group, sought medical care sooner or later.

To determine whether QoL scores varied based on the presence of different symptoms, one-way ANCOVA calculations for each SCI subscale were conducted. Additionally, multiple linear regression analyses were performed to further investigate the individual effects of symptoms on QoL. The dependent variables in these analyses were the SCI subscales: emotional, social, appearance, and total SCI scores. The independent variables included categorical indicators for the presence of specific symptoms, such as Discomfort, Tumor, Pain, Itching, Erosion, and Bleeding. Each model estimated the unique contribution of each symptom to the QoL outcomes while controlling other symptoms. Interaction terms, chosen based on theoretical justification and clinical relevance, were included to explore potential combined effects of symptoms on QoL. The overall significance of each regression model was evaluated using ANOVA with the F-test, assessing whether the predictors collectively explained a significant portion of the variance in QoL outcomes.

To investigate the association between multiple symptoms and histological types, we performed separate multivariate logistic regression analyses for each histological type. The symptoms included as predictors were Discomfort, Tumor, Pain, Itching, Erosion, and Bleeding.

The influence of each symptom and their interactions on the likelihood of seeking medical care was analyzed using multiple logistic regression models, focusing on the time frames of ≤ 6 and >6 months, as well as ≤ 12 and >12 months. Additionally, a Cox Proportional Hazards model was employed to assess the association between symptoms and the time until patients sought medical care. The proportional hazards assumption was tested to validate the model. Hazard ratios, along with their confidence intervals, were interpreted to determine whether the presence of a symptom was associated with a shorter or longer time to seek medical care.

3. Results

3.1. Descriptive Statistics

The study analyzed data from 278 participants, of whom 65% were women and 35% were men. Most BCC cases were observed in patients aged 65–74 (27%) and 75–84 (25%), while younger patients (<44 years) accounted for only 5% of the cohort. Notably, 207 patients (74%) presented with a single histological type of BCC, and 71 patients (26%) had collision tumors. Both sexes had equal representation in superficial BCC (50%), but women demonstrated a higher prevalence in nodular (65%) and infiltrative BCC (66%) compared to males (35% and 34%, respectively). The average tumor size was 10.07 mm, with no significant differences in tumor size observed across gender or age groups ($p > 0.05$) (Table 1).

Table 1. Baseline demographic and clinical characteristics of the enrolled patients.

Demographic Characteristics		Verified BCC Histologic Types				
	Total Patients, *n* = 278	Total Verified BCC Types, *n* = 353	Superficial BCC, *n* = 40	Nodular BCC, *n* = 223	Infiltrative BCC, *n* = 87	Other Types of BCC, *n* = 3
Sex						
Male	97 (35%)	129 (37%)	20 (50%)	78 (35%)	30 (34%)	1 (33%)
Female	181 (65%)	224 (63%)	20 (50%)	145 (65%)	57 (66%)	2 (67%)
Age, years (%)						
<44	15 (5%)	19 (5%)	3 (8%)	13 (6%)	3 (3%)	0
45–54	36 (13%)	41 (12%)	6 (15%)	28 (13%)	7 (8%)	0
55–64	52 (19%)	64 (18%)	3 (8%)	44 (20%)	17 (20%)	0
65–74	76 (27%)	94 (27%)	11 (28%)	61 (27%)	22 (25%)	0
75–84	70 (25%)	93 (26%)	11 (28%)	57 (26%)	23 (26%)	2 (67%)
>85	29 (10%)	42 (12%)	6 (15%)	20 (9%)	15 (17%)	1 (33%)
Largest tumor diameter (mean), mm		10.07	12.13	9.98	10.89	9.33
Number of symptoms	Total patients, *n* = 278		Superficial BCC, *n* = 40	Nodular BCC, *n* = 223	Infiltrative BCC, *n* = 87	Other types of BCC, *n* = 3
None	1 (0%)		0	0	1 (1%)	0
1 symptom	26 (9%)		4 (10%)	20 (9%)	6 (7%)	0
2–3 symptoms	122 (44%)		19 (48%)	101 (45%)	33 (38%)	2 (67%)
>3 symptoms	129 (46%)		17 (43%)	102 (46%)	47 (54%)	1 (33%)

Patients reported a diverse range of symptoms, with tumor presence (27%) being the most frequently observed, followed by erosion (18%) and discomfort (17%). Bleeding, itching, and pain were less commonly reported, accounting for 13%, 10%, and 2% of cases, respectively. Most participants (46%) reported more than three symptoms at presentation, while 44% reported two to three symptoms, and only 9% reported a single symptom. Reported symptom characteristics by histologic tumor type, time from the symptom onset, and symptom specific QoL are presented in Tables 2 and 3.

Table 2. Patient symptom characteristics by neoplasm type and time from symptom onset.

Symptoms		Reported Number of Symptoms by Histologic Tumor Types, *n* = 923				Time from the Symptom Onset to 1st Visit
		Superficial BCC, *n* = 121	Nodular BCC, *n* = 741	Infiltrative BCC, *n* = 308	Other Types of BCC, *n* = 9	
Discomfort	160 (17%)	22 (18%)	130 (18%)	56 (18%)	3 (33%)	22.96
Anxiety	120 (13%)	20 (17%)	97 (13%)	41 (13%)	1 (11%)	18.7
Tumor presence	252 (27%)	35 (29%)	203 (27%)	72 (23%)	3 (33%)	20.76
Pain	22 (2%)	1 (1%)	17 (2%)	8 (3%)	0	24.95
Itching	89 (10%)	13 (11%)	72 (10%)	27 (9%)	1 (11%)	22.86
Erosion	162 (18%)	20 (17%)	131 (18%)	60 (19%)	0	23.68
Bleeding	118 (13%)	10 (8%)	91 (12%)	44 (14%)	1 (11%)	25.08

Table 3. Patient symptom-specific quality of life per symptom.

Symptom	Total Symptoms, *n* = 923	SCI Score			
		SCI Emotional	SCI Social	SCI Appearance	SCI Total
Discomfort	160 (17%)	25.92	21.54	11.98	59.44
Anxiety	120 (13%)	25.5	21.4	11.79	58.69
Tumor presence	252 (27%)	26.90	22.09	12.42	61.41
Pain	22 (2%)	25.27	21.41	11.54	58.23
Itching	89 (10%)	26.11	21.65	12.38	60.15
Erosion	162 (18%)	27.05	22.18	12.38	61.55
Bleeding	118 (13%)	26.94	22.03	12.30	61.28

The mean time from the symptom onset to the first doctor appointment was 21 months. The results highlighted higher BCC rates in older age groups and females, with nodular BCC being the most common subtype. Neither tumor size, nor the number of symptom presence, or the time until first doctor appointment differed by sex or age ($p > 0.05$). Additionally, there was no clear tendency for either men or women, based on their age or tumor size, to seek medical care earlier or later (categorized as <6 months vs. ≥6 months or <12 months vs. ≥12 months) ($p > 0.05$).

3.2. Impact of Symptoms on Quality of Life

The ANCOVA results indicated that patients with tumor-associated local discomfort had statistically significantly lower QoL scores in all three SCI subscales: emotional (F = 6.55, $p = 0.011$), social (F = 5.35, $p = 0.022$), appearance (F = 4.06, $p = 0.045$), and total (F = 7.69, $p = 0.006$) (Table S1). The multiple regression analyses revealed that discomfort was also a statistically significant factor negatively impacting QoL in all domains: (β = −1.96, $p = 0.011$), social (β = −1.00, $p = 0.022$), appearance (β = −0.76, $p = 0.045$), and total (β = −3.71, $p = 0.006$) (Table S2). The relatively low R-squared values for the models suggested that, while those symptoms did affect QoL, there were likely additional factors influencing QoL that were not captured in this analysis. In contrast, symptoms such as pain, bleeding, itching, tumor presence, and erosion did not significantly influence QoL scores. Interaction effects between symptoms were also non-significant, suggesting that their combined presence does not amplify their individual impact on QoL.

3.3. Symptom Associations with Histological Subtypes

Three patients presented with BCC types other than infiltrative, superficial, or nodular, and were thus excluded from the analysis. Multivariate logistic regression models were applied to explore the association between various symptoms and different histopathological types. The analysis revealed that bleeding was statistically less common in superficial BCC (β = −0.93, $p = 0.033$), while infiltrative BCC was associated with a lower likelihood of palpable tumor presence (β = −1.21, $p = 0.005$). Erosion showed a marginal association with infiltrative BCC (β = 0.59, $p = 0.067$). No significant symptom associations were observed for nodular BCC, indicating that this subtype may present with fewer distinctive symptoms. The coefficients for nodular BCC indicated weak relationships between symptoms and the histological type, such as discomfort (β = 0.21, $p = 0.498$), tumor (β = 0.23, $p = 0.640$), pain (β = −0.21, $p = 0.696$), itching (β = 0.11, $p = 0.753$), erosion (β = 0.38, $p = 0.300$), and bleeding (β = −0.57, $p = 0.122$), none of which reached statistical significance (Table S3).

3.4. Care-Seeking Behaviors

3.4.1. Likelihood to Seek Medical Care Within 6 Months

None of the individual symptoms significantly influenced the likelihood of seeking medical care within 6 months. The model's pseudo R-squared value was relatively low, indicating that while the model explained some variance in the outcome, other factors not included in this analysis might also play an important role in determining when patients seek care. The analysis suggested that neither the individual symptoms alone, nor the combination of them significantly influenced early care-seeking behavior (Table S4).

3.4.2. Likelihood to Seek Medical Care Within 12 Months

The analysis showed that the presence of a tumor (coefficient: −5.3836, $p = 0.040$) and pain (coefficient: −6.3793, $p = 0.031$) significantly increased the likelihood of seeking medical care within 12 months. In contrast, itching, discomfort, anxiety, erosion, and bleeding all showed statistically insignificant effects on care-seeking behavior. The interaction between tumor and itching was significant, indicating that patients with both symptoms were more likely to seek care over a longer time frame ($p = 0.022$) (Table S5).

3.4.3. Association Between Symptoms and Time to Seeking Medical Care

The results of Cox regression analysis overall suggest limited evidence for strong predictive value among the symptoms, with no covariate reaching conventional significance levels ($p < 0.05$). However, anxiety showed a borderline association with a shorter time to seek care (HR = 1.24, $p = 0.08$) (Table 4).

Table 4. Cox proportional hazards model results: association between symptoms and time to seeking medical care.

Covariate	Coefficient (coef)	Exp (Coefficient)	SE (coef)	Coef Lower 95%	Coef Upper 95%	Exp (Coefficient) Lower 95%	Exp (Coefficient) Upper 95%	Z-Value	*p*-Value (*p*)	-Log2(P)
Discomfort	−0.128	0.88	0.127	−0.377	0.121	0.686	1.129	−1.006	0.314	1.669
Tumor	0.169	1.184	0.221	−0.265	0.603	0.767	1.828	0.764	0.445	1.169
Pain	−0.1	0.905	0.229	−0.548	0.348	0.578	1.416	−0.438	0.661	0.597
Itching	−0.06	0.942	0.135	−0.325	0.206	0.722	1.228	−0.441	0.659	0.6
Erosion	−0.185	0.831	0.143	−0.466	0.095	0.628	1.099	−1.296	0.195	2.358
Bleeding	−0.181	0.834	0.144	−0.462	0.1	0.63	1.106	−1.261	0.207	2.269
Anxiety	0.219	1.244	0.126	−0.029	0.466	0.971	1.594	1.73	0.084	3.581

4. Discussion

Consistent with the global BCC trends, our study cohort reflects significant demographic and clinical patterns [20]. The results reveal a significant prevalence of BCC in individuals aged 65 and older, highlighting the correlation between age and increased skin cancer risk due to cumulative sun exposure and other environmental factors [21–23].

It might seem reasonable to assume that more severe symptoms would negatively impact QoL, motivating patients to seek help sooner. However, our findings challenge this notion. Our analysis showed that only tumor-associated local discomfort was significantly linked to a decline in QoL, affecting emotional, social, and appearance aspects of patients' lives. Interestingly, symptoms like bleeding, erosion, and the presence of a tumor itself did not significantly impact QoL. In contrast, Gaulin et al. found that symptoms such as pain and discomfort notably detracted from patients' daily lives [24]. This aligns with findings from Gordon et al., who noted pain and discomfort to be the most frequently reported issues, followed by anxiety and depression [25].

In this study, we also investigated the association between symptoms and different histopathological types of basal cell carcinoma (BCC), focusing on the infiltrative, superficial, and nodular subtypes. Our findings indicated that certain symptoms might be linked to the specific BCC types. Notably, we observed that bleeding was statistically less common in patients with superficial BCC ($\beta = -0.93$, $p = 0.033$). This aligns with existing literature suggesting that superficial BCCs, characterized by their less aggressive nature, often present as scaly patches and may less likely disrupt local blood vessels compared to other subtypes [26]. Additionally, our analysis revealed that patients with infiltrative BCC were less likely to report a palpable tumor ($\beta = -1.21$, $p = 0.005$), which may reflect the diffuse growth pattern of this subtype that often leads to less distinct tumor formation [26]. In contrast, our study found no statistically significant associations between symptoms and nodular BCC, indicating that this subtype may present with a different symptom profile. The weak relationships observed for symptoms such as discomfort, pain, and bleeding in nodular BCC (e.g., discomfort $\beta = 0.21$, $p = 0.498$; pain $\beta = -0.21$, $p = 0.696$) suggest that this subtype may often be asymptomatic until it reaches a significant size. These findings highlight the value of understanding the unique clinical characteristics of different histopathological types of BCC. Although they do not influence the timely care, they aid in guiding the final diagnosis.

A study by Yosipovitch et al. highlights that while pain and itch are not frequent symptoms in melanoma, they are more prevalent in nonmelanoma skin cancers, suggesting a potential correlation between these symptoms and the histological characteristics of the tumors [12]. This association may be attributed to the inflammatory response elicited by the tumor and its interaction with surrounding tissues, which can lead to pain and discomfort.

In examining care-seeking behavior for BCC, individual symptoms alone did not significantly influence early medical attention within 6 months, highlighting unmeasured factors in patient decision-making. Over a 12-month period, pronounced symptoms like tumor presence and pain significantly increased care-seeking likelihood, while symptoms such as itching, discomfort, and bleeding lacked urgency. Notably, the interaction between tumor presence and itching amplified care-seeking behavior, suggesting the importance of combined symptom effects.

Cox Regression analysis further revealed no significant associations between most symptoms and time to care-seeking, with hazard ratios close to one. However, a trend towards earlier care was observed with anxiety, hinting at a potential role of psychological factors. These findings emphasize the complexity of symptom perception in driving timely intervention for skin cancer.

The mean time of 21 months from symptom onset to the first medical appointment which we have observed in our study is alarming. Moreover, the lack of significant differences in tumor size, symptom presence, or time to first appointment based on sex or age raises important questions about the factors influencing patient behavior in seeking medical care. This delay is also echoed in the literature, which often cites denial of illness, older age, and difficulty scheduling doctor's appointment as significant factors contributing to late diagnosis of skin cancers, including BCC [6,11].

Despite the significant impact that discomfort and related symptoms have on their daily lives, many patients delay seeking medical advice, which can lead to the progression of the disease and more complex treatment requirements. This delay in seeking care is particularly concerning given that no individual symptom, including bleeding, pain, or itching, consistently drives patients to seek earlier medical attention. This underscores the need for a more proactive approach in the management of facial BCC. Healthcare providers should not only focus on treating the visible signs of the condition but also on understanding and addressing the underlying discomfort that patients experience. This

could involve more comprehensive assessments during routine check-ups, where patients are encouraged to discuss any discomfort or emotional distress they may be feeling, even if they do not perceive these symptoms as severe. Moreover, this situation highlights a broader issue in patient behavior: the tendency to underreport or ignore symptoms that are not perceived as immediately threatening. This can be due to a variety of factors, including fear, denial, or a lack of awareness about the seriousness of the condition. To counteract this, it is essential to improve patient counseling and education. Healthcare providers should emphasize the importance of early medical evaluation, regardless of the presence or severity of specific symptoms, to prevent the potential worsening of the condition. In practice, this could mean implementing more structured follow-up schedules, providing patients with detailed information about what to watch for, and creating an open line of communication where patients feel comfortable reporting changes in their condition, no matter how minor they may seem. Additionally, involving patients in their care through shared decision-making could increase their engagement and likelihood of seeking timely medical advice. Ultimately, addressing these issues requires a multi-faceted approach that includes not only medical treatment but also patient education, psychological support, and a healthcare system that prioritizes early intervention. By doing so, we can improve the overall quality of life for patients with facial BCC and potentially reduce the burden of this condition on both individuals and the healthcare system.

4.1. Strengths

This study stands out as one of the few to link symptoms with histological tumor types in nonmelanoma skin cancer, providing a unique perspective on the interplay between clinical presentation and tumor characteristics. With a large sample size of 278 patients, it captures a broad and representative spectrum of BCC demographics, aligning with global trends and enhancing the generalizability of the findings. The detailed data collection on symptomatic, demographic, and behavioral factors, combined with rigorous statistical methods, offers valuable insights into the relationship between symptom diversity, quality of life, and care-seeking behavior.

4.2. Limitations

The cross-sectional design restricts the ability to observe changes in symptoms, QoL, and patient behavior over time. Potential recall bias in self-reported symptoms could slightly affect data accuracy. Additionally, as the study was conducted within a single institution, the findings may not fully capture variations across different populations or healthcare systems.

5. Conclusions

Discomfort is the primary factor leading to a decline in QoL in patients with facial BCC. They postpone seeking medical advice, leaving lesions averaging 1 cm in size untreated for nearly two years. Given that no single symptom significantly influenced patients to seek earlier medical attention, it is essential to improve patient counseling, stressing the importance of early medical evaluation, irrespective of specific symptoms. This highlights the pressing need for greater awareness and more effective skin cancer prevention strategies.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/cancers17010138/s1, Table S1: ANCOVA results for quality of life differences based on symptoms associated with facial basal cell carcinoma.; Table S2: Multiple regression analysis results for quality of life subscales and associated symptoms.; Table S3: Multiple Regression analyses for symptoms and histological tumor types.; Table S4: Multiple logistic regression analysis for presence of symptoms and care-seeking behavior within 6 months.; Table S5: Multiple logistic regression analysis for presence of symptoms and care-seeking behavior within 12 months.

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Fragmentas iš Vilniaus universiteto auklėtinio Esajo Jakobo Franko (1771–1842) Medicinos fakultete apgintos daktaro disertacijos *Tentamen inaugurale medicum super causa proxima febrium* (Vilnius, 1793), pirmojo spausdinto mokslinio darbo Lietuvoje, dedikuotos patologijos kursą dėsčiusiam VU profesoriui Jozefui Langmajeriui (1750–1810).

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Fragment from *Tentamen inaugurale medicum super causa proxima febrium* (Vilnius, 1793), the first printed scholarly work in Lithuania, a doctoral thesis by Isaiah Jakob Frank (1771–1842) defended at the Faculty of Medicine of Vilnius University and dedicated to Vilnius University professor Józef Langmajer (1750–1810).

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