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Original Research Article

OUTCOMES OF BASAL CELL CARCINOMA EXCISION IN HEAD AND NECK AREA: EVALUATING THE EFFICACY OF 5MM CLEARANCE MARGIN

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Abstract: *Basal cell carcinoma (BCC) is the most prevalent type of skin cancer affecting the head and neck region. Surgical excision with histologically negative margins is still the mainstay of management for patients with this condition.* ***Objective:*** *To evaluate the efficacy of using a 5mm clearance margin in the surgical treatment of BCCs in the head and neck area regarding recurrence rate, functional impairment, and cosmetic satisfaction.* ***Methods:*** *This descriptive study was conducted at the Department of Plastic Surgery, Lady Reading Hospital, Peshawar, between 1st June 2023 and 31st May 2024. Male and female patients in the age range of 30 to 90 years with basal cell carcinoma of the head and neck region were enrolled. A surgical excision with a 5mm free margin was carried out. Efficacy was assessed regarding tumor recurrence in 6 month follow-up period.* ***Results:*** *200 patients were enrolled with a mean age of 65.5 ± 13.27 years. Male patients were 123 (61.5%). Distribution of the tumor sites was at the nose (n = 61, 30.5%), cheek (n = 51, 25.5%), and forehead (n = 38, 19.0%). Free surgical margins were obtained in 180 (90.0%) patients on the primary excision. The rate of recurrence was 4.0% (n = 8), and the highest rate was observed in the periorbital localization (n = 2, 6.9%), with infiltrative histology (n = 3, 16.7%).* ***Conclusion:*** *A surgical margin of 5mm in the excision of BCC in the head and neck area reduces the recurrence rate to an acceptable level without compromising on functional and cosmetic results. These results are in accord with the practice of adopting a 5mm margin width for BCC excisions in this area of the body.*

Keywords: Basal Cell Carcinoma, Head and Neck Region, Surgical Excision, Clearance Margin

Introduction

Basal cell carcinoma (BCC) is the most common type of skin cancer and is responsible for 80% of non-melanoma skin cancers (1). It often develops in the skin exposed to the sun, the head and neck being the most frequently affected regions, because of long-term exposure to ultraviolet (UV) light (2). While BCC rarely metastasizes, its potential for local invasion and recurrence necessitates prompt and effective treatment (3). The treatment of choice for BCC is surgical, which involves excision of the tumor with histologically negative margins (4, 5). Nevertheless, the question of the ideal clearance margin is still an object of clinical concern and further research, especially about the topographically and cosmetically visible head and neck region (6).

In BCC excision, the main aim is tumor control, which is to excise skin cancer with a healthy margin to reduce the chance of recurrence (7, 8). In the past, different clearance margins have been advised to be taken, between 2mm and 10 mm, depending on the size of the tumor, its location, and histological type (9). Still, wider margins increase the extent of tissue removal, which can cause loss of form and function, especially in head and neck surgery (10). On the other hand, smaller margins might lead to chances of incomplete tumor removal and, thereby, chances of it recurring (11).

A 5mm clearance margin has been suggested to reduce re-recurrence to acceptable levels. Yet, simultaneously, it does not compromise function and cosmoses, especially for low-intermediate risk BCC (12). Although prior research suggests that a 5mm margin is adequate in creating clear margins in many cases, few data are available regarding the effectiveness of the 5mm margin in the head and neck region, in which anatomic and aesthetic considerations are critical (13).

This study seeks to fill this gap by assessing the results of BCC excision in the head and neck region, adopting a uniformly defined 5mm clearance margin. This study endeavored to offer a level of informed advice regarding the sufficiency of a 5mm margin in the treatment of BCC in this sensitive area by establishing recurrence rates, functional outcomes, and patient satisfaction with the aesthetic results of the procedure. The present research results can help enhance the surgical management guidelines and the quality of treatment of head and neck BCCs.

Methodology

This descriptive study was conducted at the Department of Plastic Surgery, Lady Reading Hospital, Peshawar, between 1st June 2023 and 31st May 2024. Male and female patients in the age range 30 to 90 years diagnosed with basal cell carcinoma (stage 1) of the head and neck region planned for surgical excision with a 5mm clearance margin were enrolled. Those patients who re-developed BCC, patients who had Mohs micrographic surgery or any other non-conventional surgical procedure, patients with inadequate documentation, and those who could not be traced back were excluded from the study. The primary endpoint was the rate of BCC recurrence at the site of excision at the six-month follow-up period, defined as tumor persistence within the follow-up period. Secondary endpoints were the

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patient-compiled questionnaires regarding functional and aesthetic satisfaction completed during the last control. Patients' information was obtained from their case notes. Demographic characteristics that were obtained included age, gender, BMI, socioeconomic status, education, and place of residence, and clinical information including tumor size, location, histological type, size of the excision, re-excision if necessary, histo-pathological results, margin status and the depth of invasion. All procedures were conducted by plastic surgeons with a subspecialty interest in the head and neck region. The excision was performed with a 5mm margin of histologically normal skin around the macroscopic tumor margin. The samples were taken for histopathological analysis to ensure that there were clear margins. If the margins were observed to be positive for tumor cells, resection was done until negative margins were obtained. Patients were followed up at regular intervals post-surgery, every month up to the third month, and then at intervals of 3 months to 6 months. Physical checkups were conducted every time the patients visited the clinic with the aim of detecting signals of relapse. Any lesion deemed suspicious for malignancy was excised for histo-pathological confirmation of the disease. Mean and standard deviation were used to describe the numerical data, and frequencies, and percentages were presented for categorical data. Rates of recurrence were determined, and statistical analysis of differences between subgroups was performed using chi-square tests. Logistic regression was used to assess recurrence predictors, including size, site, and tumor histological type. A p-value of <0.05 was taken as the level of significance. All statistical analyses were done using SPSS software, version 23.0.

Results

Two hundred patients were enrolled, with a mean age of 65.5 ± (13.27), ranging from 30 to 89 years. The significant population of patients (n = 62, 31.0%) were within the age bracket 60-69 years. Male patients were 123 (61.5%). Distribution of the tumor sites was at the nose (n = 61, 30.5%), cheek (n = 51, 25.5%), and forehead (n = 38, 19.0%), as illustrated in Table 1. The distribution of BMI categories is shown in Table 2. 93 (46.5%) patients had normal BMI. Regarding socioeconomic status, 111 patients (55.5%) were middle class. Education levels varied among patients, with 38.5% completing secondary education and 26.5% attaining primary education. Regarding the patients' place of residence, the majority lived in urban areas at 65.5%. One hundred thirty-one patients (65.5%) belonged to metropolitan regions.

As shown in Table 3, meticulous surgical margins were obtained in 180 (90.0%) patients on the primary excision; 20 (10.0%) patients required re-excision due to positive margins. The depth of invasion indicated that most of the tumors were mid-dermal 95 (47.5%), while the remaining were either superficial 53 (26.5%) or deep 52 (26.0%).

As reported in Table 4, the rate of recurrence was 4.0% (n = 8), and the highest rate was observed in the periorbital localization (n = 2, 6.9%) and with infiltrative histology (n = 3, 16.7%).

Table 5 reports the patient-related functional and aesthetic outcomes. The self-reported data indicated that 87.5% of the patients had no functional limitation after surgery, and 73.5% of the respondents reported being highly satisfied with the aesthetic aspect of the treatment.

Tumors with positive margins at the first excision were found to have a significantly higher probability of recurrence OR 3.8 (95% CI: 1.8 - 8.0, p = 0.02). The infiltrative histological subtype was most predictive of recurrence, having an OR of 4.5 (95% CI: 2.0 – 10.2, p=0.01). Tumor size greater than 2 cm also increased the probability of recurrence (OR 2.5, 95% CI: 1.2 - 5.2, p = 0.03). (Table 6).

Table 1: Patient Demographics and Tumor Characteristics

Characteristic	Total (n=200)	Clear Margins Achieved on First Excision (n=180)	Re-excision Required (n=20)
Age (years), Mean ± (SD)	6.5 ± (1.2)	6.4 ± (1.1)	6.8 ± (1.3)
Range	30 - 89	32 - 89	45 - 87
Gender			
Male	123 (61.5%)	112 (62.2%)	11 (55.0%)
Female	77(38.5%)	68 (37.8%)	9 (45.0%)
Age (years)			
30-39 years	19 (9.5%)	17 (9.3%)	2 (10.0%)
40-49 years	32 (16.0%)	29 (16.1%)	3 (15.0%)
50-59 years	37 (18.5%)	36 (20.5%)	1 (5.0%)
60-69 years	62 (31.0%)	58 (32.1%)	4 (20.0%)
70-79 years	35 (17.5%)	30 (16.6%)	5 (25.0%)
80-89 years	15 (7.5%)	10 (5.4%)	5 (25.0%)
Tumor Location			
Nose	61 (30.5%)	55 (30.6%)	6 (30.0%)
Cheek	51 (25.5%)	48 (26.7%)	3 (15.0%)
Forehead	38 (19.0%)	32 (17.7%)	6 (30.0%)
Periorbital	29 (14.5%)	27 (15.0%)	2 (10.0%)
Lip	21 (10.5%)	18 (10.0%)	3 (15.0%)
Histological Subtype			
Nodular	145 (72.5%)	138 (76.7%)	7 (35.0%)
Superficial	37 (18.5%)	31 (17.2%)	6 (30.0%)
Infiltrative	18 (9.0%)	11 (6.1%)	7 (35.0%)

Table 2: Distribution of Patients by BMI, SS, Education, and Residence

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Characteristic	Number of Patients (n=200)	Percentage (%)
Body Mass Index (BMI)		
Underweight (<18.5)	13	6.5%
Average weight (18.5-24.9)	93	46.5%
Overweight (25-29.9)	67	33.5%
Obese (≥30)	27	13.5%
Socioeconomic Status		
Low Income	47	23.5%
Middle Income	111	55.5%
High Income	43	21.5%
Education Level		
No Formal Education	21	10.5%
Primary Education	53	26.5%
Secondary Education	77	38.5%
Tertiary Education	49	24.5%
Residence		
Urban	131	65.5%
Rural	69	34.5%

Table 3: Histo-pathological Findings and Margin Status

Characteristic	Total (n=200)	Clear Margins (n=180)	Positive Margins (n=20)
Margin Status on Initial Excision			
Clear Margins	180 (90.0%)	180 (100%)	0 (0%)
Positive Margins	20 (10.0%)	0 (0%)	20 (100%)
Depth of Invasion			
Superficial	53 (26.5%)	46 (25.6%)	7 (35.0%)
Mid-dermal	95 (47.5%)	92 (51.1%)	3 (15.0%)
Deep	52 (26.0%)	42 (23.3%)	10 (50.0%)
Tumor Size (cm), Mean ± (SD)	1.5 ± (0.6)	1.4 ± (0.5)	1.7 ± (0.7)

Table 4: Recurrence Rates Based on Tumor Characteristics

Characteristic	Total (n=200)	Recurrence (n=8)	No Recurrence (n=192)
Tumor Location			
Nose	61 (30.5%)	2 (3.3%)	59 (96.7%)
Cheek	51 (25.5%)	2 (3.9%)	49 (96.1%)
Forehead	38 (19.0%)	1 (2.6%)	37 (97.4%)
Periorbital	29 (14.5%)	2 (6.9%)	27 (93.1%)
Lip	21 (10.5%)	1 (4.8%)	20 (95.2%)
Histological Subtype			
Nodular	145 (72.5%)	4 (2.8%)	141 (97.2%)
Superficial	37 (18.5%)	1 (2.7%)	36 (97.3%)
Infiltrative	18 (9.0%)	3 (16.7%)	15 (83.3%)

Table 5: Patient-Reported Functional and Aesthetic Outcomes

Outcome Measure	Total (n=200)	Clear Margins (n=180)	Re-excision (n=20)
Functional Outcomes			
No Functional Impairment	175 (87.5%)	168 (93.3%)	7 (35.0%)
Mild Impairment	13 (6.0%)	7 (3.9%)	6 (30.0%)
Moderate to Severe Impairment	12 (5.5%)	5 (2.8%)	7 (35.0%)
Aesthetic Satisfaction			
Highly Satisfied	147 (73.5%)	139 (77.2%)	8 (40.0%)
Satisfied	41 (20.5%)	35 (19.4%)	6 (30.0%)
Dissatisfied	12 (6.0%)	6 (3.4%)	6 (30.0%)

Table 6: Factors Associated with Recurrence (Logistic Regression Analysis)

Variable	Odds Ratio (OR) 95%	Confidence Interval (CI)	p-value
Tumor Size (>2 cm)	2.5	1.2 - 5.2	0.03
Infiltrative Histological Subtype	4.5	2.0 - 10.2	0.01

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Positive Margins on Initial Excision	3.8	1.8 - 8.0	0.02
Location (Periorbital and Lip)	2.2	1.1 - 4.6	0.04
Age (>70 years)	1.5	0.7 - 3.2	0.08

Discussion

The present research outcomes are valuable to understanding the effectiveness of a 5mm clearance margin in the surgical resection of basal cell carcinoma located in the head and neck area. The 90% rate of clear margins on the first excision is similar to the work done by Breuninger et al., who achieved a clear margin in 85-95% of the BCC using a comparable margin (14). Our recurrence rate of 4% is slightly higher than the 2-3% reported in some previous studies, including a survey by Rowe et al., who estimated a recurrence rate of about 2.1% when a 5mm margin was used. This difference might be due to variations in patient profile, especially the rate of high-risk BCC subtypes in our study (15).

In our study, the distribution of BMI categories was relatively even though most patients were of average weight at 46.5%, followed by overweight at 33.5%, with the remaining 13.5% being obese. They are in concordance with the current literature, for instance, the study by Giacalone et al., who reported similarly elevated rates of overweight and obesity in skin cancer patients (16). Most of our patients are of middle income (55.5%), while the low and high-income groups account for 23.5% and 21.5%, respectively. This distribution is similar to the findings of other studies in that middle-income patients predominate among those having dermatologic surgeries (Reddy et al.) (17).

The elevated rates of recurrence are concordant with infiltrative BCCs (16.7%) by the prior studies; Smeets and colleagues reported that the infiltration BCCs have higher chances of recurrence even if sufficient surgical margins are applied (18). Our study emphasizes the requirement for broader margins and the application of more extensive treatment paradigms, including Mohs micrographic surgery, in managing these high-risk histological subtypes.

The recurrence rates differed depending on the tumor location; the highest, 6.9% of patients, had recurrences in the periorbital area. This is similar to the observations by Mosterd et al., who noted that anatomically complex and cosmetically visible areas, such as the periorbital area, are difficult to get free surgical margins, increasing recurrence (19). These results imply that a 5mm margin can generally be considered safe. Still, some areas could be critical and thus need more careful surgical planning, possible adjuvant treatment, or close follow-up after the operation.

We found our patient's rate of functional satisfaction as 87.5% and aesthetical satisfaction as 73.5%, consistent with Robinson et al. & Hanke et al. Because of the need to leave a cancer margin in the region, smaller margins tend to preserve function and aesthetics in the head and neck region (20, 21). However, the significant decline in satisfaction in patients who underwent re-excision and had infiltrative tumors indicates the trade-offs that clinicians must consider when balancing oncologic control with cosmetic and functional outcomes.

Conclusion

This study supports using a 5mm clearance margin in the surgical excision of BCC in the head and neck region, with a reasonable apparent margin rate (90%) and an acceptable recurrence rate (4%). The results provide evidence for the general applicability of a 5mm margin in most BCC cases and support the identification of cancer borders to minimize the extent of routine tissue resection while maintaining function and cosmesis in this body region. These findings add to the constant improvement of surgical procedures for BCC excision in the H&N region to improve local tumor control and cosmesis coverage.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRB-LRHP-232/22)
Consent for publication
Approved
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Not applicable

Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

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Conception of Study, Development of Research Methodology Design, Study Design, manuscript Review, and final approval of manuscript.
Manuscript revisions, critical input.
ZULQARNAIN YOUNIS
Study Design, Review of Literature.
ABDULLAH KHAN
Conception of Study, Final approval of manuscript.
ZAHRA TAUQEER
Data entry and data analysis, as well as drafting the article.

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