Prediction of the invasive level of basal cell carcinoma in the facial area : Analysis of the largest Asian cohort

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INTRODUCTION & OBJECTIVES

Basal cell carcinoma (BCC) is the most common skin cancer. While Mohs micrographic surgery is commonly accepted for BCC treatment, surgical excision with free margins is widely considered the best treatment modality for BCC in Japan. However, little is known about the predictors of the invasion level of BCCs. **We investigated the optimization of adequate deep surgical margins by identifying factors that significantly influence the invasion level of BCCs arising in facial areas.**

MATERIALS AND METHODS

We retrospectively collected **705 Japanese patients comprising 718 cases of primary BCC in the facial area**. The factors independently associated with tumor thickness and invasion level (up to the subcutis or to the muscle and below) were identified by multivariate analysis. In the multivariate analysis, six variables were included in the study: age, sex, anatomical region (nose, orbit, others), histologic pattern (aggressive, non-aggressive), presence of pigmentation, and diameter. We also analyzed the correlation between the tumor diameter and the vertical surgical edge, and further analyzed the correlation between the anatomical region and tumor invasion levels divided into <10 mm or ≥10 mm diameter.

RESULTS

Table 1. Patients characteristics

characteristics	n (%)
No. of cases	718
Sex	
Male	391 (54.5)
Female	327 (45.5)
Age (years)	
Range	23-101
Mean	74.8
Anatomical region	
Nose	257 (35.8)
Orbit	110 (15.3)
Lip	59 (8.2)
Auricle	37 (5.2)
*Other	255 (35.5)
Presence of pigmentation	
non-pigmented	67 (9.3)
pigmented	651(90.7)
Histologic pattern	
Nodular	505 (70.3)
Superficial	14 (2.0)
Micronodular	42 (5.9)
Infiltrative	57 (7.9)
Morpheic	10 (1.4)
Mixed	90 (12.5)
Tumor diameter (mm)	
Range	0.5-45
Mean	9.19
Tumor thickness (mm)	
Range	0.1-23.7
Mean	2.86
Invasion level	
Upper dermis	26 (3.6)
Mid dermis	152 (21.2)
Deep dermis	403 (56.1)
Subcutis	92 (12.8)
Muscle	40 (5.6)
Cartilage/bone	5 (0.7)

*Other, including the cheek, chin, forehead, and temporal region

Table 2. Independent correlative factor with **invasion level up to the subcutis or the muscle and below**

Factor	AOR (95% CI)	P-value
Age (/1)	1.000 (0.973-1.030)	> 0.99
Sex (M/F)	1.125 (0.591-2.132)	0.72
Anatomical region (Nose/Others)	2.769 (1.235-6.493)	0.01
(Orbit/Others)	6.369 (2.728-15.429)	< 0.001
(Orbit/Nose)	2.300 (1.056-4.984)	0.04
Histologic pattern (Aggressive[1]/Non-aggressive[2])	1.606 (0.805-3.130)	0.18
Pigmentation (Non-pigmented/Pigmented)	0.510 (0.128-1.610)	0.27
Diameter (mm) (entire range)	71.189 (11.420-430.931)	0.01

Table 3. Independent correlative factor with **tumor thickness**

Variables	Regression coefficient	Standard Error	Standardized regression coefficient	t-value	P-value
Constant	0.380	0.642	0.000	0.59	0.55
Age	0.008	0.008	0.033	0.91	0.36
Sex	-0.051	0.102	-0.018	-0.50	0.62
Anatomical region	-0.169	0.144	0.042	-1.17	0.24
(nose, orbit, others)	0.169	0.117	0.040	1.11	0.27
Histologic pattern ([1]Aggressive, [2]Non-aggressive)	-0.189	0.117	-0.006	-0.16	0.87
Presence of pigmentation	0.108	0.198	0.216	0.55	0.59
Diameter (mm)	0.182	0.018	0.377	10.28	< 0.001

Table 4. Correlation between **tumor diameter** and **vertical surgical edge**

Tumor diameter (mm)	Vertical surgical edge		P
	negative (%)	positive (%)	
< 6	215 (99.1)	2 (0.9)	0.015
6≤ <10	233 (99.6)	1 (0.4)	
10≤ <20	215 (96.0)	9 (4.0)	
≥20	41 (95.3)	2 (4.7)	

Fisher extract test; **P= 0.002** (less than 10mm, and 10mm and more tumor diameter)

Table 5. Correlation between **anatomical region** and **resection levels**

Resection levels / Anatomical region	Up to subcutis (%)	Muscle & below (%)	P
Nose	88 (34.2)	169 (65.7)	<0.0001
Orbit	16 (14.5)	94 (85.5)	
Lip	25 (42.4)	34 (57.6)	
Auricle	5 (13.5)	32 (86.5)	
Other	145 (56.9)	110 (43.1)	

Table 6. Correlation between **anatomical region** and **tumor invasion levels** with <10mm or ≥10 mm tumor diameter

Tumor diameter (mm)	<10		10≤		P
Invasion levels / Anatomical region	Dermis-subcutis (%)	Muscle and below (%)	Dermis-subcutis (%)	Muscle and below (%)	
Nose	190 (96.4)	7 (3.6)	50 (83.3)	10 (16.7)	<0.001
Orbit	65 (90.3)	7 (9.7)	30 (78.9)	8 (21.1)	
Lip	34 (97.1)	1 (2.9)	21 (95.5)	3 (12.5)	
Auricle	14 (100)	0 (0)	22 (95.7)	1 (4.3)	
Other	132 (99.2)	1 (0.8)	115 (94.3)	7 (5.7)	

Table 7. Correlation between **anatomical region** and **vertical surgical edge** with <10mm or ≥10 mm tumor diameter

Tumor diameter (mm)	<10		10≤		P
Vertical surgical edge / Anatomical region	negative (%)	positive (%)	negative (%)	positive (%)	
Nose	194 (98.5)	3 (1.5)	55 (91.7)	5 (8.3)	<0.001
Orbit	72 (100)	0 (0)	36 (94.7)	2 (5.3)	
Lip	35 (100)	0 (0)	24 (100)	0 (0)	
Auricle	14 (100)	0 (0)	23 (100)	0 (0)	
Other	133 (100)	0 (0)	118 (96.7)	4 (3.3)	

CONCLUSIONS

1. This study has the largest sample size for an Asian population.
2. Tumor invasion levels up to the subcutis, or to the muscle and below, were significantly correlated with tumor diameter and anatomical region (nose, orbit, others). Tumor diameter was the only factor correlated with tumor thickness.
3. Tumors with ≥10 mm diameter showed a significantly higher vertical positive rate.
4. Tumors <10 mm in diameter localized in regions other than the orbital and the nasal regions, resection up to the subcutis would be sufficient in these tumors. Resections that include the muscle might be required for tumors localized in the orbital region regardless of the diameter; the tumors ≥10 mm in diameter localized in the nasal regions should consider the anatomical structural complexity in the surgical decision.