



RESEARCH ARTICLE

CORRELATION BETWEEN SURGICAL MARGINS AND TUMOR THICKNESS IN ORAL CANCER

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ABSTRACT

One of the important predictive factors in carcinomas of the oral cavity is tumor thickness and it can help in decision making with regard to management of primary tumor and neck.

Aim: To evaluate the significance of tumor thickness and margin involvement in malignancies of oral cavity affecting different sub sites.

Methods: A descriptive study was conducted on 60 patients with a clinical diagnosis of carcinoma of the oral cavity attending the Otorhinolaryngology out-patient department in our institution between 2012 and 2014. The collected data was then analyzed by frequency, percentage, mean, standard deviation, chi-square test and ROC analysis.

Results: Out of the 60 patients included in this study, 32% were female and 68% were male with a mean age of 50.72 years. Out of the 60 patients, 6 patients had positive margin involvement. Using Chi-Square tests, it was found that there is significantly higher tumor depth when margin is involved ($P=0.021$).

Conclusion: This study was done to correlate clinical and pathological data to surgical margins in cancers of the oral cavity and it was found that tumors of greater thickness were more correlated to unsatisfactory resection margins.

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INTRODUCTION

Squamous cell carcinoma of the oral cavity is the sixth leading cause of cancer worldwide¹. It accounts for 0.6% to 5% of all cancers in Europe, United States, and Australia, respectively, but up to 45% of cancers in India². Males are most commonly affected, but the incidence is growing among females. It usually occurs in the seventh decade of life. The most common causative factor associated with squamous cell carcinoma of the oral cavity is tobacco abuse. Betel nut and tobacco chewing are responsible for the high incidence in the Indian subcontinent.

The American Joint Committee on Cancer (AJCC) and Union Internationale Contre le Cancer (UICC) TNM staging systems are important international standards for cancer reporting, prognosis evaluation, formulation of treatment strategy, and comparison of treatment results^{3,4}.

Tumor size is an important TNM staging parameter in many solid cancers, and the largest tumor diameter has been used for many years in the AJCC and UICC TNM staging systems.

The importance of obtaining tumor-free margins when treating squamous cell carcinoma of the oral cavity has been known for decades⁵. Unsatisfactory margins have been correlated with local relapsing tumors and decreased patient survival⁵.

Associations between involved margins and factors related to oral cancer patient survival such as T-stage⁵⁻¹⁰, N-stage^{7, 8}, thickness¹¹, and pattern of tumor invasion^{7, 12, 13} have been reported. The ability of the surgeon to obtain disease-free margins may be affected by the location of the tumor⁸.

Loree & Strong⁵ reported significant variations in involved margin incidence for different sites in the mouth. This paper aimed to evaluate the significance of tumor thickness and

margin involvement in malignancies of oral cavity affecting different sub sites.

MATERIALS AND METHODS

The study was approved by the Research Ethics Committee of the institution.

This descriptive study was conducted on 60 patients with a clinical diagnosis of oral cavity malignancy attending the Otorhinolaryngology out-patient department in our institution between 2012 and 2014.

A detailed history of patients was taken including history of pan chewing, smoking, alcohol consumption etc. All patients underwent a detailed clinical examination in the Otorhinolaryngology OPD, to evaluate the site and extent of the growth. They also underwent a detailed ear, nose, and throat examination including indirect laryngoscopy to look for second primary. The neck was assessed for any evidence of clinically palpable lymph nodes.

A biopsy from the growth was taken under local anesthesia in order to obtain a histological diagnosis of malignancy. Patients with a confirmed diagnosis of malignancy were counseled for further management that included a minimum of wide local excision with neck dissection.

All patients with a histologically confirmed (biopsy) malignancy of oral cavity and patients who were willing to undergo the necessary surgical intervention (minimum of wide local excision of primary and neck dissection) were included in this study. Patients with oral cavity malignancy extending into oropharynx, or with recurrence or second primary in the oral cavity were excluded from the study. Also, patients who had received chemotherapy/radiotherapy and patients not

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willing to undergo surgery were excluded from the study. After undergoing the required surgery, the specimen was sent for his topathological evaluation. The distance between tumor cells and surgical margins was measured using an ocular micrometer. Note was made about the lymph node involvement, grade of differentiation, perineural spread, muscle invasion and vascular invasion. Descriptive analysis was used to summarize the data. Variables were expressed in terms of frequencies, mean values and standard deviations as needed. Chi-square test was used to compare the frequencies of qualitative variables.

RESULTS

Out of the 60 patients included in this study, 32% were female and 68% were male (Table 1) with a mean age of 50.72 years. The buccal mucosa was involved in 43% of the cases and the tongue was involved in 33% of the cases (Table 2).

Table 1 Sex Predilection

	SEX	Percent
Female	19	31.7
Male	41	68.3
Total	60	100

Table 2 Frequency distribution of primary site of involvement

	Primary site	Percent
Buccal mucosa	26	43.3
Floor of mouth	4	6.7
Lower Alveolus	6	10
Retromolar trigone	4	6.7
Tongue	20	33.3
Total	60	100

Table 3 Sensitivity and specificity

Coordinates of the curve			
Test result variable(s) :Tumor thickness(mm)		Sensitivity	Specificity
Positive if Greater Than or Equal To			
1		1	0
2.5		1	0.077
3.5		1	0.096
4.5		1	0.135
5.5		1	0.231
7		1	0.25
8.5		1	0.346
9.5		1	0.365
11		0.625	0.673
13.5		0.375	0.712
16		0.25	0.846
17.5		0.25	0.865
19		0.25	0.885
23		0.125	0.923
28		0	0.923
35		0	0.962
42.5		0	0.981
46		0	1

Table 4 Relation between tumor thickness and margins involved

		Crosstab			
			Tumourcat		Total
			<=11	>=12	
Margins involved	Negative	Count	37	17	54
		% within margins involved	68.5%	31.5%	100.0%
		% within tumourcat	97.4%	77.3%	90.0%
	Positive	Count	1	5	6
		% within margins involved	16.7%	83.3%	100.0%
		% within tumourcat	2.6%	22.7%	10.0%
Total	Count	38	22	60	
	% within margins involved	63.3%	36.7%	100.0%	
	% within tumourcat	100.0%	100.0%	100.0%	

ROC curve analysis (Figure 1) was used for establishment of tumor thickness cut off using node involvement as aim. The test result variable - tumor thickness (mm), has at least one tie between the positive actual state group and the negative actual state group. Statistics may be biased. The area under the curve is .694, indicating moderate to good predictability of tumor thickness and node involvement.

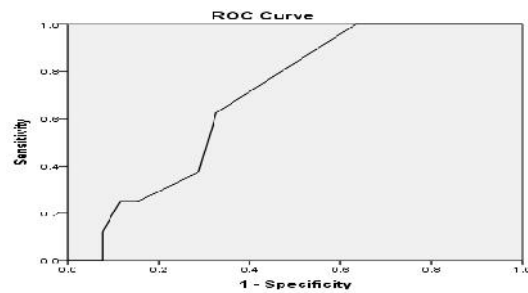


Figure 1 ROC curve analysis for establishment of cut

Off using node involvement as aim

A tumor thickness cut off of 11mm was found to have a sensitivity of 62.5 and specificity of 67.3 percent (Table 3). Out of the 60 patients, 6 patients had positive margin involvement. Out of these 6 patients, 83.3% had a tumor thickness greater than or equal to 12mm and only 16.7% had a tumor thickness lesser than or equal to 11mm (Table 4). Using Chi-Square tests, it was found that there is significantly higher tumor depth when margin is involved (Table 5) (P=0.021).

Table 5 Chi –Square tests determining significance of tumour thickness and margin involvement

	Value	df	Exact Sig. (2-sided)
Pearson Chi-Square	6.252	1	.021
N of Valid Cases	60		

b. Computed only for a 2x2 table

DISCUSSION

Two large multi-centre randomized trials confirmed that surgical margins affect the prognosis of patients with squamous cell carcinoma of the oral cavity¹⁴⁻¹⁶. Larsen *et al.*⁹ noted that the rate of free margins decrease as tumor diameter and thickness increase. In this study too it was found that when tumor depth increases there was positive margin involvement.

Studies have shown that tumors of the tongue resected with narrow or involved margins resulted in worse local and regional control than tumors involving other sites in the mouth, even when adjuvant therapy was offered¹⁷.

The definition of narrow margin varies substantially in the literature. For squamous cell carcinoma of the oral cavity, however, there is consensus in stating that narrow margins are

the ones in which there is tumor tissue less than 5 mm away from the border of the surgical specimen^{18,19}.

In order to produce satisfactory margins from the standpoint of histopathology, one must bear in mind that the borders of formalin-fixed specimens shrink by approximately 40%-50%¹⁸. Mucosal margins are usually given preference, although most recurrences involve deep resection margins.

The high rates of unsatisfactory margins have shown that visual inspection and palpation at the time of surgery, as well as traditional imaging methods, fall short of determining tumor borders in the oral cavity. Intra operative frozen section analysis is also limited, as surgical margins cannot be thoroughly assessed and this analysis can only determine the thickness of the tumor-free margin. High-resolution transoral ultrasonography seems to offer better pre and intra operative assessment of tumor thickness²⁰ when compared to CT and MRI scans, particularly for tumors with thicknesses under 5 mm²¹.

CONCLUSION

One of the important predictive factors in carcinomas of the oral cavity is tumor thickness and it can help in decision making with regard to management of primary tumor and neck.

This study was being done to evaluate the significance of tumor thickness and margin involvement in malignancies of oral cavity affecting different sub sites and it was found that when tumor depth increases there was positive margin involvement.

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