

Original Research Article

Relationship of depth of invasion of tumour with neck node metastasis in oral squamous cell carcinoma: a clinico pathological correlation

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ABSTRACT

Background: Squamous cell carcinomas of the oral cavity are relatively common among the head and neck cancers. The increasing depth of invasion (DOI) and the microvascular proliferation caused by neoplastic growth might determine proximity to blood vessels and lymphatics, thus facilitating the tumor's ability to metastasize. The role of tumour DOI as a prognostic parameter for the development of nodal metastases and for the survival of patients with OSCC are important. Aim of the study was to determine the relationship of the DOI of tumor with the neck node metastasis in squamous cell carcinoma of the oral cavity.

Methods: This study is conducted in the State cancer institute, Gauhati medical college over a period of 1 year from June 2021 to June 2022 among 100 patients. All patients underwent tumor resection with neck dissection, and the DOI is measured.

Results: Out of 100 patients included in the study 66 were males and 34 were females. Maximum number of cases 30% were seen in the age group of 51-60 years. Gingivobuccal sulcus (32%) is the most commonly involved site. Maximum number of nodal meta-stasis present in tumours with DOI>11 mm and minimum nodal metastasis present in tumours with DOI<3 mm.

Conclusions: We conclude that tumor DOI is significantly related with neck nodal metastasis in oral cavity squamous cell carcinoma.

Keywords: Invasion, Metastasis, Squamous cell carcinoma

INTRODUCTION

Squamous cell carcinomas of the oral cavity are relatively common among the head and neck cancers. Oral squamous cell carcinoma (OSCC) is widely recognized as the most common type of head and neck malignancy, representing the sixth most frequent leading cause of cancer death worldwide.¹ Oral cancer is the 3rd most common cancer in Southeast Asia. Head and neck Cancers account for about 30% of all cancers in India. Head and neck malignancies within the Indian population

are very unique with regard to its demographic profile, risk factors, diet and personal and family history. OSCC has loco regional evolution. As it grows, it invades the surrounding tissue and metastasizes to regional neck nodes, but it rarely develops distant metastases. The increasing DOI and the microvascular proliferation caused by neoplastic growth might determine proximity to blood vessels and lymphatics, thus facilitating the tumor's ability to metastasize. The role of tumour DOI as a prognostic parameter for the development of nodal metastases and for the survival of patients with OSCC are important.²

Aims and objectives

Aim and objectives were to determine the relationship of the DOI of tumor with the neck node metastasis in squamous cell carcinoma of the oral cavity.

Primary objective

Primary objective was correlation between DOI and neck node metastasis.

Secondary objective

Secondary objective was values of DOI of tumor being used as a cutoff for management of the neck.

METHODS

This study is conducted in the State cancer institute, Gauhati medical college over a period of 1 year from June 2021 to June 2022 after approval from the institutional ethics committee of State cancer institute.

Study design

Study design was prospective and observational.

Sample size

Sample size were 100 cases.

Inclusion criteria

Individuals with clinical evidence and histo pathologically proven as OSCC operated at State cancer institute and patients willing to give consent regarding the conduct of the study were included.

Exclusion criteria

Patients who had previously received treatment, recurrence and individuals with any known systemic diseases were excluded.

Statistical analysis

Statistical package for social sciences version no. 16.0 employed to analyse data. Chi square test used for data analysis. Statistical significance considered at $p < 0.05$.

Measurement of depth of tumor invasion

DOI concerns measuring the invasion of tumor mass below the epithelial surface. An objective parameter is required to meaningfully access the depth of tumor invasion. This can be effectively achieved using an ocular micrometer. DOI is measured from the basement membrane of adjacent normal to the deepest point of invasion of the tumor.

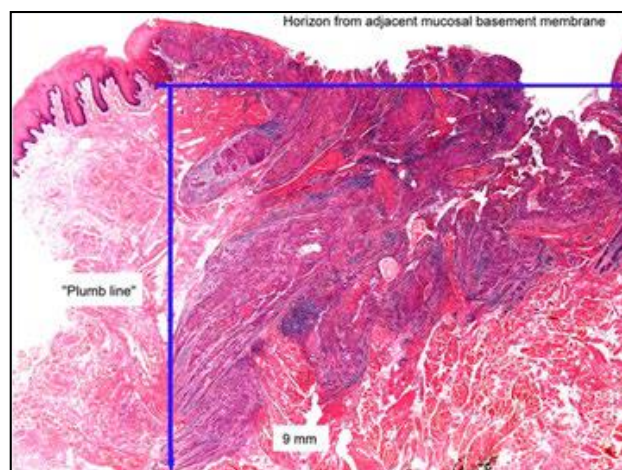


Figure 1: Method of measurement of DOI.

The horizon is established at the level of the basement membrane relative to the closest intact squamous mucosa. The greatest DOI is measured by dropping a “plumb line” from the horizon.³

RESULTS

Out of 100 patients included in this study 66 were males and 34 were females. M:F ratio is 1.94:1.

Table 1: Sex incidence.

Sex incidence	N	Percentage (%)	Ratio (M:F)
Male	66	66.00	1.94:1
Female	34	34.00	
Total	100	100.00	

Table 2: Age incidence.

Age incidence (Years)	N	Percentage (%)
31-40	7	7
41-50	26	26
51-60	30	30
61-70	29	29
71-80	8	8
Mean ± SD	56.19±10.81	

Maximum number of cases 30% were seen in the age group of 51-60 years and minimum number of cases 7% were in the age group of 31-40 years.

Table 3: Tumour site incidence.

Tumour site	N	Percentage (%)
BM	26	26.00
GBS (UGBS+LGBS)	32	32.00
Alveolus	18	18.00
Tongue	16	16.00
LIP	4	4.00
RMT	13	13.00
AOM	5	5.00

Gingivobuccal sulcus (32%) is the most commonly involved site followed by buccal mucosa (26%), lip (4%) is least commonly involved site.

Table 4: Pathological nodal status (pN) incidence.

Pathological nodal status (pN)	N	Percentage (%)
N0	61	61
N1	11	11
N2a	1	1
N2b	10	10
N3a	0	0
N3b	17	17

Out of 100 cases in this study, 61 cases were found to be N0 and 39 cases with N+. Out of 39 nodal metastasis (N+) cases 17 patients were present with ENE+.

Table 5: Pathological staging incidence.

Pathological staging	N	Percentage (%)
Stage I	8	8.00
Stage II	17	17.00
Stage III	20	20.00
Stage IV	55	55.00

In this study maximum number of cases were seen in stage IV (55%) followed by stage III (20%), stage II (17%) and least in stage I (8%).

Table 6: Correlation between T stage and nodal metastasis.

T stage	N	Nodal metastasis		P value
		Present	Absent	
T1	10	2	8	0.2921
T2	24	7	17	
T3	23	11	12	
T4	43	19	24	

In this study maximum number of nodal meta-stasis were seen in T4 group but it is statistically not significant.

Table 7: Correlation between DOI and nodal metastasis.

DOI (mm)	N	Nodal metastasis		P value
		Present	Absent	
≤3	7	1	6	0.1792
>3-≤5	12	2	10	
>5-≤8	14	5	9	
>8-≤11	13	5	8	
>11	54	26	28	
DOI (mm)	N	Nodal metastasis		P value
		Present	Absent	
≤5	19	3	16	0.0212
>5	81	36	45	

In this study nodal metastasis varies according to DOI. Maximum number of nodal metastasis present in tumours with DOI>11 mm and minimum nodal metastasis present in tumours with DOI <3 mm. In a correlation between DOI and nodal metastasis it has been observed that out of 39 nodal metastasis patients, 36 nodal metastasis present in tumours with DOI >5 mm and only 3 nodal metastasis present in tumours with DOI ≤5 mm, p=0.0212 that is statistically significant.

Table 8: Correlation between tumour grade and nodal metastasis.

Broders grade	N	Nodal metastasis		P value
		Present	Absent	
WDSCC	70	25	45	0.5194
MDSCC	27	13	14	
PDSCC	3	1	2	

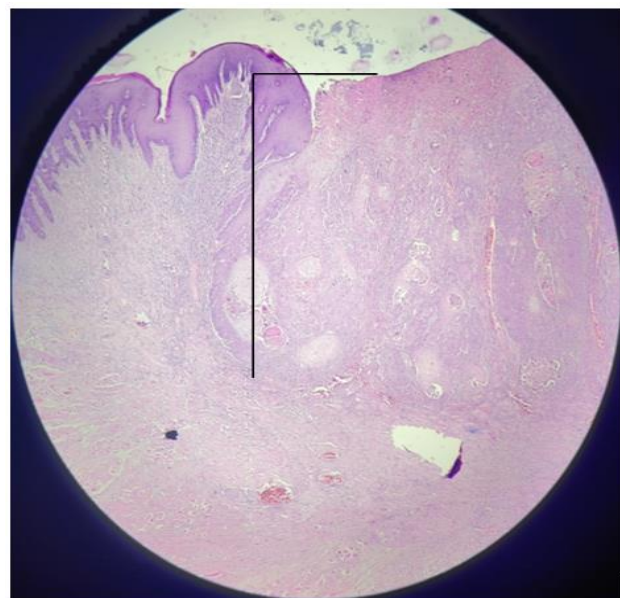


Figure 2: DOI in a WDSCC buccal mucosa.

DISCUSSION

The OSCC is one of the rapidly growing oral cancers in the literature of oncology and it is the 6th most common cancer in the world. It is more common in south Asian countries specially India and Sri Lanka.⁴

In the present study showed higher incidence of malignancy in males (66%) as compared to females (34%). Male to female ratio of 1.94:1. Most commonly involved age group is 51-60 years. Sharma et al revealed a male to female ratio of 2.2:1 with the largest number of OSCCs developing in the fourth and fifth decades of life.⁵

Jones et al reported female patients with carcinoma of tongue outnumbering males by almost 2:1 in patients under 40 years old and similar findings have been reported by McGregor et al.^{6,7} A study by Hashmi et al

reported similar observations showing greater incidence of age within 4th -5th decade of life.⁸

In this study most commonly, involved site is gingivobuccal sulcus (32%) followed by buccal mucosa (26%), alveolus (18%), tongue (16%), retromolar trigone (13%), angle of mouth (5%) and lip (4%). Sharma et al reported the most common site was the buccal mucosa (63.75%), followed by retromolar area (15%), floor of the mouth (11.25%), lateral border of the tongue (3.75%), labial mucosa (3.75%), and palate (2.5%).⁵ Chaturvedi et al mention that, higher involvement of buccal mucosa in Indian population is related to a peculiar habit of placing the smokeless tobacco/areca nut product in the lower buccal vestibule.⁹

In the present study, we found that OSCC showed depth of tumor invasion ranging from 2 to 40 mm. In present study nodal positivity is 15.7% with DOI <5 mm and 44.4% with DOI >5 mm, which is statistically significant (p=0.0212).

Ambrosch et al reported that tumor depth has a strong correlation with node metastasis. Their study showed that 2 mm depth was a valuable threshold for determining the risk of nodal metastasis.¹⁰ Shah et al reported that there is a 50% rate of node metastasis when tumor depth is between 2- and 9-mm.¹¹ Fukano et al did a study on 34 cases with a cutoff value of DOI as 5 mm. The nodal metastatic rate was 64.7% with DOI >5 mm as compared to 5.9% for DOI 5 mm.¹² It is well understood that with increase of DOI the nodal positivity rate increases.

Rasgon et al and Mendelson described a relationship between cervical metastasis and differentiation grade.^{13,14} Majority of our cases are well differentiated (70%) with nodal metastasis (35.71%) which was statistically insignificant.

Limitations

This is a single center study and sample size is less.

Multicenter studies will include a large number of cases and standardized measurements of DOI, which might lead to identification of an ideal cutoff value and its relation to cervical lymph node metastasis.

CONCLUSION

Depth of tumor invasion is a more important parameter. Therefore, we must measure the depth of tumor invasion before deciding for performing elective neck dissection. DOI in oral cavity malignancies has profound impact on lymph node metastasis

In a correlation between DOI and nodal metastasis it has been observed that tumors with DOI >5 mm, nodal metastasis is more in comparison with tumours with DOI < or =5 mm, p=0.0212 that is statistically significant. It is

well understood that with increase of DOI the nodal positivity rate increases.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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