Pattern of Lymphatic Metastasis in Relation to the Depth of Tumor in Oral Tongue Cancers: A Clinico Pathological Correlation

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Abstract Carcinoma of tongue is one of the most notorious cancers of oral cavity. Multivariate analysis have shown that the parameter with greatest influence on survival is tumor thickness especially in carcinoma tongue. To study the pattern of lymphatic metastasis in oral tongue in relation to the depth of tumor. This is a prospective study of 60 patients over a period of 4 years. Squamous cell carcinoma of anterior two-third (oral tongue) which were managed by upfront surgery were considered in the study. USG tongue was done in a few cases (25 out of 60) but was not a mandatory criteria for inclusion or exclusion of the case. The measurements for depth of invasion were made from surface of mucosa to maximal depth by an ocular micrometer. Frequency, proportions and percentages were used to analyse the data. Out of 15 patients who had tumor thickness less than 5 mm, two had nodal metastasis i.e. 13%, whereas 28 patients out of 45 patients with tumor thickness more than 5 mm had nodal disease i.e. 62%. Out of 60 patients enrolled, 13 (21.66%) lost to follow up by the end of 1 year. Of remaining 47 patients seven (14.89%) presented with recurrence (four nodal and three local), three out of which underwent second surgery and four were referred for palliative care. All the four patients referred for palliative care died within 1 year of surgery. As evident from above study only two patients had positive nodal disease when the depth of the tumor was less than 5 mm. There is no role of observation of neck in carcinoma tongue, however if observation is being planned then preoperative

ultrasonography of tongue should be done and tumors more than 5 mm should at least be offered extended supraomohyoid neck dissection. Chance of level V involvement is negligible and can be omitted in N0 and N1 neck.

Keywords Carcinoma tongue ·
Nodal metastasis in carcinoma tongue ·
Significance of tumor thickness in carcinoma tongue

Introduction

The presence of cervical lymphnode metastases is the most significant prognostic factor in patients with squamous cell carcinoma of upper aerodigestive tract. The 5 year survival rate in patients with neck metastases decreases according to the number and level of the nodes involved and if capsular rupture is present [1]. Apart from this multivariate analysis have shown that the parameter with greatest influence on survival is tumor thickness especially in carcinoma tongue. Many authors have found that the thickness of the tumor correlates better with survival and involvement of lymph-nodes than does its superficial diameter [2].

Materials and Methods

A prospective study in 60 patients was conducted from January 2007 to December 2010, to study the pattern of lymphatic metastasis in oral tongue in relation to the depth of tumor. Last patient enrolled in the study was in December 2008. Period from January 2008 to December 2010 was for observation and follow up. Period for shortest follow up was 1 year and longest follow up was 3 years 10 months.

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Squamous cell carcinoma of anterior two-third (oral tongue) which were managed by upfront surgery were considered in the study. Patients who had taken neoadjuvant treatment were not considered for the study (Fig. 1).

USG tongue was done in a few cases (25 out of 60) but was not a mandatory criteria for inclusion or exclusion of the case. As sonography is highly operator dependent and a large number of patients had trismus, it was not done in all the patients.

Surgeries performed for the tumor were wide excision, hemiglossectomy or total glossectomy along with modified neck dissection, selective neck dissection (extended SOHND) or radical neck dissection depending on the clinical stage of the disease, location and size of the tumor.

The measurements for depth of invasion were made from surface of mucosa to maximal depth by an ocular micrometer. In the case of exophytic tumor growth, the measurement was made from the height of the surface adjacent normal mucosa to the deepest-reaching front of infiltration.

Tumor staging was done according to the AJCC classification

All the patients with stage III, IV disease and adverse histological parameters were referred for adjuvant radiotherapy.

The various cases included in the series were studied on the basis of age and gender distribution, cT and cN stage of the tumor, surgery for the disease, pT, pN and relation between the two, lymphatic invasion in relation to nodal metastasis, clinico pathological correlation in nodal status, level of positive nodes and correlation between depth of tumor and nodal metastasis, radiopathological correlation using ultrasonography done in 25 out of 60 cases enrolled and lastly correlating the depth of the tumor to tumor recurrence and survival.

Fig. 1 Squamous cell carcinoma of tongue: clinical photograph

Observation and results

Out of 60 patients included in the study 44(73.33%) were males and 16(27.67%) females. Thirty-seven out sixty (61.67%) had right sided tumors and remaining 23(38.33%) had left sided tumors.

Age distribution amongst the cases was as follows

Maximum number of cases 19 (31.67%) were in the age group of 41–50 and minimum number of cases (two) were in the age group of more than 70 (3.33%). Twenty-three cases out of 60 were T1 lesions, 30 were T2, T3 and T4 were five and two respectively (Fig. 2).

There were 30 patients were clinically palpable neck disease with following pattern.

Clinically palpable nodes

Forty-four patients out of 60 underwent hemiglossectomy, 12 underwent wide excision, two had total glossectomy done and two composite resection.

Thirty patients underwent radical neck dissection, 20 modified neck dissections (1 and 2) were performed, 6 extended supraomohyoid neck dissections (SOHND) and four ipsilateral radical neck dissection alongwith contralateral extended SOHND were done (Table 1)

Fig. 2 Bar chart showing age distribution

Table 1 Number of patients with clinical nodal status

N1	10
N2a	02
N2b	14
N2c	04
N3	0
Total	30

Pathological nodal status

Grossly the clinical and the pathological nodal status was correlating except in the N2b and N2c disease (Table 2).

Eighteen (78.26%) of the T1, ten (33.33%) of T2 and two (40%) of T3 disease had no neck nodes. Five (22%) of T1, 20(67%) of T2, three (60%) of T3 lesions had positive neck nodes.

Remaining two cases of T4 disease had positive neck nodes.

Out of 30 patients with positive neck nodes six had lymphatic permeation on histopathology and 24 did not have any lymphatic permeation. Only one patient with N0 neck had lymphatic permeation. Out of 30 patients with positive neck nodes 14 had extracapsular spread.

Clinicopathological correlation showed that when a node was clinically palpable it was positive in 87% of the patients, whereas when a node was not palpable it was positive in 20% of the patients. This correlation can be better understood in the following table (Table 3).

Twelve patients out of 30 had single node (N1 and N2a). Eighteen patients had multiple nodes (N2b).

Three patients had isolated level I, nine had isolated level II node. No patient had isolated level III or IV node. Amongst 18 patients who had multiple nodes seven had level I and level II, nine had level II and level III and two had level II, III and IV involvement. Hence level I involvement in ten patients (3 + 7), 27 patients with level II involvement (9 + 9 + 7 + 2), 11 patients with level III involvement (9 + 2) and two patients with level IV involvement.

None of the patients had level 5 involvement. Level 2 is by far the most common site to be involved in oral tongue cancer followed by level III and I respectively (Fig. 3).

Table 2 Number of patients with pathological nodal status

N0	30
N1	10
N2a	02
N2b	18
N2c	0
N3	0

Table 3 Clinicopathological relation between clinically palpable and pathologically positive node

	pN0	pN+
cN0	24 (80%)	06%
cN+	04 (13.33%)	26 (86.67%)

Staging of the patients is as follows

All patients with stage III and IV disease were advised radiotherapy. One patient with N0 neck and lymphatic permeation was also advised radiotherapy. Hence total 33 patients out of 60 were referred for radiotherapy (Table 4).

Relation of the depth of the tumor with nodal metastasis is as follows

As the tumor thickness increases, chances of nodal metastasis increases. It is evident from the above study that out of fifteen patients who had tumor thickness less than 5 mm, two had nodal metastasis i.e. 13.33%, whereas 28 patients out of 45 patients with tumor thickness more than 5 mm had nodal disease i.e. 62.2% (Table 5).

Tumor thickness evaluated by preoperative ultrasonography of tongue in 25 cases randomly showed no difference in thickness in nine cases. In three cases there was a difference of ± 1 mm, ten cases showed the difference of ± 2 mm and three patients had a difference of ± 3 mm (Fig. 4).

Fig. 3 Pictorial representation of patients with multiple node involvement

Table 4 Distribution of patients according to stage

Stage	Number of patients
Stage I (T1N0)	18
Stage II (T2N0)	10
Stage III (T3N0, T1N1, T2N1)	12
Stage IVa (T2N2a, T2N2b, T3N2b, T4N2b)	20
Total	60

Out of 60 patients enrolled, 13 (21.66%) lost to follow up by the end of 1 year. Of remaining 47 patients seven (14.89%) presented with recurrence (four nodal and three local) within 6 months to 1 year of follow up, three out of

which underwent second surgery and four were referred for palliative care. All the four patients referred for palliative care died within 1 year of surgery. All the patients with recurrence had tumor thickness of more than 5 mm with cervical nodal metastasis.

Mean survival at 1 year was 91.48%.

Table 5 Correlation between the depth of the tumor and nodal status

Depth of tumor on pathological gross examination (mm)	N0	N+
1–3	03	0
3–5	10	02
5–8	12	08
8–11	03	10
>11	02	10

Fig. 4 Line diagram showing correlation between depth of tumor and nodal status

Discussion

Carcinoma tongue does create a confusion as to the management of neck when the tumor is very small and superficial. There has been full spectrum of treatments offered to patients with very small and superficial tumors of tongue right from radical neck dissection to observation of neck. Here is a list of various studies which demonstrate the cut off for some form of treatment to neck in relation to depth of tumor in oral cancer (Table 6).

Conclusion

As evident from above study only two patients had positive nodal disease when the depth of the tumor was less than 5 mm. There is no role of observation of neck in carcinoma tongue, however if observation is being planned then pre-operative ultrasonography of tongue should be done and tumors more than 5 mm should at least be offered extended supraomohyoid neck dissection. Chance of level V

Table 6 Various studies [2,3,4,5,6,7,8,9,10] on depth of tumor thickness in oral cavity

Study	No. of patients	Site	Parameter evaluated	Conclusion
O-charoenrat P et al. [3]	50	Tongue	Tumor thickness	Elective neck treatment (surgery or irradiation) is indicated for tumours exceeding 5 mm thickness.
Miguel Angel Gonzalez-Moles et al. [2]	81	Tongue	Depth of invasion	Survival significantly reduces above a thickness of 3 mm
Fukano et al. [4]	34	Tongue	Depth of invasion	Tongue tumors exceeding 5 mm, elective regional dissection should be considered
Jones et al. [5]	49	Oral cavity	Depth of invasion	Tumor thickness greater than 5 mm has increased risk of recurrence.
Rasgon et al. [6]	22	Oral cavity and oropharynx	Tumor thickness in mm	Tumor thickness greater than 5 mm appeared to have significantly increased incidence of cervical metastasis
Brown et al. [7]	87	Floor of mouth	Maximum thickness	Tumor thickness of more than 2 mm prompted strong consideration of elective treatment of the neck
Urist et al. [8]	89	Buccal mucosa	Maximum thickness	Tumors greater than 6 mm in thickness had of tumor and significantly poor survival depth of tumor invasion
Mohit-Tabatabai et al. [9]	84	Floor of mouth	Maximum lesion	Elective neck dissection appears to be strongly indicated in any patients with an N0 lesion more than 1.5 mm in thickness
Spiro et al. [10]	92	Tongue and floor of mouth	Maximum thickness	Elective neck therapy seems appropriate for floor of mouth the N0 oral cancer of tumor patients whose primary tumors exceed 2 mm in thickness

involvement is negligible and can be omitted in N0 and N1 neck.

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