Original Article

JCMCTA 2026 ; 37 (1) : 91-96
DOI: https://doi.org/10.3329/jcmcta.v37i1.91608

A Cross-Sectional Study on Patterns of Lymph Node Involvement and Metastasis in Tongue Cancer

Sujit Kumar Dutta[1*] Shaikh Nurul Fattah Rumi[2] Dipankar Lodh[3]
Mohammad Al-Mamun Hamid[4] Moniruzzaman[5]

Abstract

Background: Cancer of the tongue mucosa may present as an indurated ulcer with raised edges or as an exophytic growth. Approximately one third of the patients come in to the hospital with a neck swelling. Lymph nodes are an important part of immune system and play a crucial role in tumorprogression. The present study is an attempt to diagnose lymph node involvement and the pattern of metastasis among different groups of lymph node with the tongue cancer and helps to create accurate clinical staging and appropriate choice of neck dissection, thus reduce tumor recurrence and cancer-specific mortality.

Materials and methods: This cross-sectional observational study was conducted in Sir Salimullah Medical College, Dhaka from March 2019 to February 2020 for a period of one year. A total no of fifty patients suffering from tongue cancer admitted in the Department of Otolaryngology during study period were included. Imaging of neck was done for diagnosis and staging of lymph node. Data were collected and analyzed by using Statistical Package for social Science version 25.

Results: A total of 50 patients with tongue carcinoma were included in this study. The mean age of the patients was 55.08 ± 11.97 years (Range: 35–75 years) with the majority of patients aged 51–60 years (38%) followed by those above 60 years (28%). Among all patients, 66% had cervical lymph node metastasis, while 34% had no metastatic lymph node involvement. Among metastatic cases (n=33), Level II lymph node involvement was the most common (51.5%), followed by combined Level I+II involvement (30.3%) isolated Level I involvement (15.1%) and Level I+II+III involvement (3.0%). Single lymph node metastasis was more common in oral tongue carcinoma (78.6%) whereas multiple nodal metastases were more frequent in base of tongue carcinoma (57.9%). Regarding tumor size, 50% of oral tongue tumors were <3 cm, while most base of tongue tumors (63.2%) measured 3–6 cm.For tumor staging, T2 stage was the most common stage in both oral tongue (64.3%) and base of tongue carcinoma (36.8%). In nodal staging, N2 stage was predominant in oral tongue (57.1%) and base of tongue cancers (47.4%). A statistically significant association was found between tumor stage and nodal stage in both oral tongue (p=0.003) and base of tongue carcinoma (p=0.006).

Conclusions: Tongue cancers usually cause symptoms related to the upper aero digestive tract, including difficulty in swallowing, speech and breathing.

Key words: Lymph node; Metastasis; Tongue cancer.

Introduction

Oral cavity cancer is the eleventh most common cancer worldwide.[1,2] Tongue is the most affected site.[3] Although it can occur at any site, oral cancer involves the tongue and floor of the mouth, represent about 90% of all malignancies of the oral cavity.[4] Despite major progress in surgery and chemotherapy over the past few decades, tongue cancer still has a poor outlook and a low survival rate.[5,6] Patients under the age of thirty are rarely affected, and the typical age of presentation is sixty.[7] Only about 2% are present below the age of 35 years. Squamous cell carcinoma of tongue is the most common histological variant. It is more common in males than females, with a ratio of 2: 1. The incidence is higher in Asia. It may be due to different social habits such as chewing betel nuts mixed with lime and the habit of reverse smoking. Most people start these habits from a very young age. Therefore, it might be the cause of the growing incidence of young age cancer in these countries.[7] Although alcohol and tobacco usage are documented for a small number of patients in certain series, they are thought to be the primary etiological component. Many have hypothesized other factors, such as immuno-deficiency, hereditary factors and nutritional factors,

1. Assistant Professor of ENT
Gonoshashthaya Samaj Vittik Medical College, Savar.
2. Professor of ENT
Dhaka Medical College, Dhaka.
3. Professor of ENT
National Institute of ENT, Dhaka.
4. Assistant Professor of ENT
Chittagong Medical College, Chattogram.
5. Registrar of ENT
Gonoshashthaya Samaj Vittik Medical College Hospital, Savar.

***Correspondence:** Dr Sujit Kumar Dutta
Cell : 01928 78 76 38
E-mail: sujitgsvmc@gmail.com

Submitted on : 11.11.2025
Accepted on : 14.03.2026

JCMCTA 2026 ; 37 (1) : 91-96
DOI: https://doi.org/10.3329/jcmcta.v37i1.91608

in the etiology of these cancers due to the lack of substantial habits in young patients. There have also been reports of viruses such the human papillomavirus and herpes simplex virus as significant factors. The aggressive course and poor prognosis were the main trends found in the limited reported data on tongue cancer in young individuals.[8]

Patients who have tongue cancer might experience different signs such as pain, sores, or a swelling on the tongue.[9,10] Clinically positive cervical lymphadenopathy at the time of presentation is found in the area of 21–34%.[9,11] Occult cervical metastasis has been found in up to 53% of people with tongue cancer and this might be connected to how thick the tumor is.[9,12] Tumors that develop on the side of the tongue are usually thicker than those on the bottom part of the tongue. Also, up to 4.5% of these cases may have hidden cancer in the opposite neck area.[12] Clinical examination, CT and MRI have sensitivity at determining cervical lymphadenopathy.[13] Physical examination is the basic procedure for checking cervical lymph nodes enlargement.[14]The TNM clinical stage system has been adopted worldwide. This system uses the size of the primary tumor (T) the extent of regional lymph node involvement (N) and the presence of distant metastases (M) to predict prognosis.[15]

The present study is an attempt to diagnose lymph node and the pattern of metastasis among different groups of lymph node in tongue cancer and helps to create accurate clinical staging and appropriate choice of neck dissection, thus reduce tumor recurrence and cancer-specific mortality.

Materials and methods

A cross-sectional observational study was conducted in the department of Otolaryngology, Sir Salimullah Medical College Hospital (SSMCH) Dhaka from March 2019 to February 2020. Prior to the commencement of this study, the research protocol was approved by the local ethical committee (Institutional Review Board) of SSMC. Verbal and written consent was taken from the patients. 50 Patients of tongue cancer was included irrespective of age and sex in this study. Exclusion criteria of data were patients with carcinoma in situ, verrucous carcinoma, recurrent tongue cancer or prior Chemo-radiotherapy. CT scan, MRI, FNAC were done for diagnostic purpose for 50 patients. Data were collected using a structured questionnaire. Quantitative data were expressed as mean±SD and qualitative as frequencies and percentages. Statistical analysis was performed by using window-based computer software devised with Statistical Packages for Social Sciences (SPSS-25) (SPSS Inc, Chicago, IL, USA). 95% confidence limit was taken.

Results

A total number of 50 tongue cancer patients were recruited according to selection criteria. The results are as follows:

Table I Distribution of cases according to age (n=50)

	Frequency (n)	Percentage (%)
Age (Years)		
≤50	17	34.0
51 - 60	19	38.0
>60	14	28.0
Mean±SD	55.08 ± 11.97	
Min – max	35 - 75	

Mean age of the patients was 55.08 ± 11.97 years. 38% patients were from the 51-60 years of age and 28% patients were above 60 years old.

Table II Type of Lymph node metastasis of the study subjects (n=50)

Type of Lymph node metastasis	Frequency (n)	Percentage (%)
Metastatic	33	66.0
Non-metastatic	17	34.0

Incidence of tongue metastasis malignancy was 66.0%.

Table III Local examination and imaging findings of neck node of the study subjects (Metastatic cases) (n=33)

	Frequency (n)	Percentage (%)
Level		
I	5	15.1
I + II	10	30.3
II	17	51.5
I+II+III	1	3.0
Number		
Oral tongue		
Single	11	78.6
Multiple	3	21.4
Base		
Single	8	42.1
Multiple	11	57.9

JCMCTA 2026 ; 37 (1) : 91-96
DOI: https://doi.org/10.3329/jcmcta.v37i1.91608

	Frequency (n)	Percentage (%)
Size		
Oral Tongue		
<3 cm	7	50.0
>3 - 6 cm	5	35.7
>6 cm	2	14.3
Base		
<3 cm	4	21.1
>3 - 6 cm	12	63.2
>6 cm	3	15.8

Level II lymph node metastasis was the most common pattern of nodal involvement seen in 51.5% of patients. Combined level I and II involvement were seen in 30.3% and isolated level I involvement in 15.1% of cases. Combined involvement of levels I, II and III was rare seen in only 3.0% of patients.In oral tongue carcinoma, 78.6% of patients had single lymph node involvement and 21.4% of patients had multiple nodal involvement. However, the patients with base of tongue cancer had more frequent multiple nodal involvement (57.9%) than a single node involvement (42.1%). In terms of nodal size, the majority of oral tongue cancer patients had lymph nodes less than 3 cm (50.0%) followed by those with nodes between 3 cm and 6 cm (35.7%) and nodes greater than 6 cm (14.3%). In cancer of the base of the tongue, the majority of lymph nodes were between 3 cm and 6 cm in size (63.2%), 21.1% were less than 3 cm and 15.8% were greater than 6 cm.

Table IV Stages of tongue metastasis (n=33)

	Frequency (n)	Percentage (%)
T staging		
Oral tongue		
T1	3	21.4
T2	9	64.3
T3	2	14.3
T4	0	0.0
Base		
T1	5	26.3
T2	7	36.8
T3	6	31.6
T4	1	5.3
N staging		
Oral tongue		
N1	4	28.6
N2	8	57.1
N3	2	14.3
Base		
N1	7	36.8
N2	9	47.4
N3	3	15.8

The majority of patients with oral tongue cancer were in T2 stage (64.3%) followed by T1 stage (21.4%) and T3 stage (14.3%) while no patient with T4 stage was found. Whereas, T2 stage was the most common stage (36.8%) among patients with base of tongue carcinoma followed by T3 stage (31.6%) and T1 stage (26.3%) and T4 stage was seen in only 5.3% of cases.In terms of nodal staging, the majority of oral tongue cancer patients were N2 stage (57.1%), followed by N1 stage (28.6%) and N3 stage (14.3%). Similarly, in patients with base of tongue cancer, N2 stage was the most common nodal stage, 47.4% of cases, followed by N1 stage in 36.8% and N3 stage in 15.8% of patients.

Table V Association of tumor staging with nodal staging (n=33)

	T1	T2	T3	T4	p-value
Oral tongue					
N1	2 (66.7)	2 (22.2)	0 (0.0)		0.003
N2	1 (33.3)	7 (77.8)	0 (0.0)		
N3	0 (0.0)	0 (0.0)	2 (100.0)		
Base					
N1	5 (100.0)	2 (28.6)	0 (0.0)	0 (0.0)	0.006
N2	0 (0.0)	4 (57.1)	5 (83.3)	0 (0.0)	
N3	0 (0.0)	1 (14.3)	1 (16.7)	1 (100.0)	

Chi-Square test was done.

In patients with oral tongue cancer, N1 stage was most frequently associated with T1 tumors (66.7%) whereas N2 stage was predominant in T2 tumors (77.8%). All patients with T3 tumors were N3 (100.0%). Tumor stage and nodal stage were statistically significant associated ($p = 0.003$). Similarly, for base of tongue cancer, all T1 tumors were seen with N1 stage disease (100.0%). Among T2 tumors, the most common nodal status was N2 (57.1%) and most T3 tumors also occurred with N2 stage disease (83.3%). One T4 tumor was associated with N3 stage (100.0%). This association was also significant ($p = 0.006$).

Discussion

Cancer in oral tongue is one of the aggressive malignancies of the oral cavity and is characterized by an early tendency for neck lymph node metastasis. Nodal involvement remains the single most important prognostic factor affecting survival and disease control in tongue cancer patients.[16,17] A total number of 50 tongue cancer patients were recruited according to selection

JCMCTA 2026 ; 37 (1) : 91-96
DOI: https://doi.org/10.3329/jcmcta.v37i1.91608

criteria to observe the clinical and pathological presentation of lymph node metastasis in tongue cancer.

In the present study, the mean age of the patients was 55.08 ± 11.97 years with the majorityof patientsaged 50 years and above. Similar age distribution has been reported by De Silva et al, Mishra and Sharma indicating that tongue cancer predominantly affects older population.[18,19]

In the present study 66% of patients had lymph node metastasis, whereas 34% had no metastatic lymph node. Similar finding reported by Shah JP et al.[16]

Among the metastatic cases (n=33) the present study found that Level II lymph node involvement was the most common (51.5%) followed by combined Level I + II involvement (30.3%) while isolated Level I metastasis was observed in 15.1% cases. Only 3.0% patients had involvement of Level I+II+III nodes. This finding suggests that cervical metastasis from tongue carcinoma most frequently spreads to Level II lymph nodes, which is consistent with the known lymphatic drainage pattern of the oral tongue and base of tongue.

Regarding the number of metastatic lymph nodes, single node metastasis was more common in oral tongue carcinoma (78.6%) whereas multiple nodal involvement was more frequent in base of tongue carcinoma (57.9%). This may indicate that base of tongue tumors tend to present at a more advanced stage due to their hidden anatomical location and delayed diagnosis.

In terms of tumor size, 50.0% of oral tongue tumors were less than 3 cm, while the majority of base of tongue tumors (63.2%) measured 3–6 cm. Larger tumor size is associated with increased risk of cervical metastasis because of deeper invasion and higher tumor burden.

These findings are comparable with previous studies. Shah and Patel reported that oral tongue cancers commonly metastasize to Level I–III lymph nodes, with Level II being the most frequently involved site.[20] Woolgar observed that cervical nodal spread in oral cavity cancers usually follows predictable lymphatic pathways, predominantly affecting Levels I and II.[21] Byers et al. also demonstrated that larger primary tumors and multiple nodal involvement are associated with poorer prognosis and increased recurrence risk.[22]

In the present study, among metastatic oral tongue cases, T2 stage was the most common (64.3%) followed by T1 (21.4%) and T3 (14.3%) while no patient presented with T4 disease. In contrast, among base of tongue malignancies, T2 stage was also the most frequent (36.8%) followed by T3 (31.6%) T1 (26.3%) and T4 (5.3%). These findings suggest that most patients presented with moderately advanced primary tumors, particularly in base of tongue carcinoma where higher T stages were comparatively more common due to delayed diagnosis caused by the hidden anatomical location.

Regarding nodal staging, N2 stage was the predominant nodal stage in both oral tongue (57.1%) and base of tongue cancers (47.4%) followed by N1 and N3 stages. This indicates a substantial burden of regional lymph node metastasis at presentation. Advanced nodal stage is an important prognostic factor and is associated with poorer survival outcomes and increased recurrence rates.

These findings are comparable with previous studies. Shah and Patel reported that tongue cancers frequently present at T2 and T3 stages, with cervical nodal involvement commonly seen in N1 and N2 stages.[20] Spiro et al. observed that advanced T stage and nodal metastasis significantly worsen prognosis in oral tongue carcinoma.[23] Similarly, Byers et al. reported that regional nodal disease is strongly associated with disease progression and reduced survival in tongue cancer patients.[23]

The present study demonstrated a statistically significant association between primary tumor stage and nodal stage in both oral tongue and base of tongue carcinoma. In oral tongue cancer, N1 stage was most commonly associated with T1 tumors (66.7%) while N2 stage predominated in T2 tumors (77.8%). Notably, all T3 tumors were associated with N3 nodal disease (100%) and this association was statistically significant ($p = 0.003$). These findings suggest that increasing primary tumor stage is associated with more advanced cervical nodal metastasis.

Similarly, in base of tongue carcinoma, all T1 tumors were associated with N1 nodal stage (100%) whereas N2 nodal involvement was most frequent in T2 (57.1%) and T3 tumors (83.3%).

JCMCTA 2026 ; 37 (1) : 91-96
DOI: https://doi.org/10.3329/jcmcta.v37i1.91608

The only T4 case was associated with N3 disease (100%). This association was also statistically significant (p = 0.006) indicating that advanced primary tumor stage correlates with increased nodal burden in base of tongue malignancy.

These findings are consistent with recent literature. Lydiatt et al. highlighted in the 8th edition of the American Joint Committee on Cancer staging manual that higher T stage is strongly associated with increased risk of nodal metastasis and poorer prognosis in oral cavity cancers.[24,25] Amit et al. reported that advanced tumor stage and nodal disease significantly reduce survival in oral tongue squamous cell carcinoma patients.[26] Additionally, Mascitti et al. found that cervical lymph node metastasis increases with tumor progression and depth of invasion in tongue cancers.[27]

The significant association found in this study emphasizes the importance of early diagnosis and timely treatment of tongue malignancies before progression to advanced nodal disease. Proper staging through clinical examination, imaging, and histopathological evaluation remains essential for treatment planning and improving survival outcomes.

Limitation

The present study has some limitation including small sample size, single center design, limited time of span, which may limit the generalizability of the results. Additionally, survival outcomes and extracapsular nodal spread were not evaluated.

Conclusion

After analyzing the results of present study, we concluded that cancer of tongue exhibits predictable yet aggressive patterns of cervical lymph node metastasis. Level II lymph nodes are most commonly involved, and base of tongue tumors show a higher tendency for bilateral and multiple nodal metastasis. Early detection and appropriate management of cervical lymph nodes are essential for improving prognosis and treatment outcomes in tongue cancer patients.

Recommendation

Prolongation of the study period and multicenter studies with larger sample sizes are recommended.

Acknowledgement

The authors would like to express their special gratitude to all associates of Department of Otolaryngology- Head & Neck Surgery, BMU and special thanks and grateful to all of their patients.

Contribution of authors

SKD-Conception, design, data collection, data analysis, manuscript writing & final approval.

SNFR-Interpretation of data, critical revision of version & final approval.

DL-Design, critical revision & final approval.

MAH-Data analysis, drafting & final approval.

MZ-Acquisition of data, data analysis, drafting & final approval.

Disclosure

No conflicts of interest were declared by any of the authors.

References

1. Ghantous Y, Abu EI. Global incidence and risk factors of oral Cancer. Harefuah. 2017;156(10):645-649.

2. Adeel M, Suhail A. Squamous cell carcinoma of oral tongue in young patients-a 10 year tertiary care experience. J Pak Med Assoc. 2016;66(2):155-158.

3. Ukrani RD, Danish MH, Ikram M et al. Survival of oral tongue cancer in low middle-income country:a cohort study. The Egyptian Journal of Otolaryngology. 2023;39(70):1-6

4. Brandizzi D, Gandolfo M, Velazco ML, Cabrini RL, Lanfranchi HE. Clinical features and evolution of oral cancer: A study of 274 cases in Buenos Aires, Argentina. Med Oral. 2008;13(9):544-548.

5. Xi S, GrandisJR. Gene therapy for the treatment of oral squamous cell carcinoma. Journal of dental research. 2003; 82(1):11-16.

6. Pukkila M, Kosunen A, Ropponen K, Virtaniemi J, Kellokoski J, Kumpulainen E et al. High stromal versican expression predicts unfavourable outcome in oral squamous cell carcinoma. Journal of clinical pathology. 2006; 60(3):267-272.

7. Bagale G, Pradhan S R, Basnet A, Tongue Cancer in a Young Male. Cureus. 2021; 13(9): e17702.
DOI 10.7759/cureus.17702

8. Iype EM, Pandey M,Mathewy A,Thomasz G,Sebastian P, Nai KM. Squamous Cell Carcinoma of the Tongue Among Young Indian Adults. Neoplasia. 2001;3(4):273–277.

9. Pernot M, Malissard L, Hoffstetter S et al. The study of tumoral, radiobiological and general health factors that inuence results and complications in a series of 448 oral tongue carcinomas treated exclusively by irradiation. Int J Radiat Oncol Biol Phys. 1994; 29: 673–679.

JCMCTA 2026 ; 37 (1) : 91-96
DOI: https://doi.org/10.3329/jcmcta.v37i1.91608

10. Gujrathi D, Kerr P, Anderson B, Nason R. Treatment outcome of squamous cell carcinoma of the oral tongue. J Otolaryngo. 1996; 25: 145–149.

11. Haddadin KJ, Soutar DS, Oliver RJ et al. Improved survival for patients with clinically T1/T2, N0 tongue tumors undergoing a prophylactic neck dissection. Head Neck .1999; 21: 517–525.

12. Yuen AW, Wei WI, Wong YM, Tang KC. Elective neck dissection versus observation in the treatment of early tongue carcinoma. Head Neck .1997; 19: 583–588.

13. Yuen AW, Lam KY, Lam LK et al. Prognostic factors of clinically stage I and II oral tongue carcinoma: A comparative study of stage, thickness, shape, growth pattern, invasive front malignancy grading, martinez-gimeno score, and pathologic features. Head Neck .2002; 24: 513–520.

14. Fan S, Tang QL, Lin YJ, Chen WL, Li JS, Huang ZQ, Yang ZH et al. A review of clinical and histological parameters associated with contralateral neck metastases in oral squamous cell carcinoma. International journal of oral science. 2011; 3(4):180-191.

15. Lopes FF, da Costa Miguel MC, PereiraALA, da Cruz MCFN, de Almeida Freitas R, Pinto LP et al. Changes in immune expression of E-cadherin and -catenin in oral squamous cell carcinoma with and without nodal metastasis. Annals of diagnostic pathology. 2009;13(1):22-29.

16. Shah JP, Gil Z. Current concepts in management of oral cancer-Surgery. Oral Oncol. 2009;45(4):394-401.

17. Woolgar JA, Histopathological prognosticators in oral oropharyngeal squamous cell carcinoma. Oral Oncol. 2006;42(3):229-239.

18. De Silva RK, Siriwardena BSMS, Samaranayaka A, Tilakaratne WM. Demographic, clinicopathological and treatment outcomes of oral squamous cell carcinoma in Sri Lanka.J Oral Patho Med. 2018;47(2):130-136.

19. Mishra A, Sharma R. Pattern of lymph node metastesis in carcinoma of the oral tongue. Indian J Otolaryngol Head Neck Surg. 2010;62(2):135-140.

20. Shah JP, Patel SG. Cancer of the Head and Neck. 4th ed. Hamilton: BC Decker Inc. 2001.

21. Woolgar JA. Histological distribution of cervical lymph node metastases from intraoral and oropharyngeal squamous cell carcinoma. Br J Oral Maxillofac Surg. 1999;37(3):175–180.

22. Byers RM, El-Naggar AK, Lee YY, Rao B, Fornage B, Terry NH et al. Can we detect or predict the presence of occult nodal metastases in patients with squamous carcinoma of the oral tongue? Head Neck. 1998;20(2):138–144.

23. Spiro RH, Huvos AG, Wong GY, Spiro JD, Gnecco CA, Strong EW. Predictive value of tumor thickness in squamous carcinoma confined to the tongue and floor of mouth. Am J Surg. 1986;152(4):345-350.

24. American Joint Committee on Cancer. AJCC Cancer Staging Manual. 8th ed. Cham: Springer. 2017.

25. Lydiatt WM, Patel SG, O'Sullivan B, Brandwein MS, Ridge JA, Migliacci JC et al. Head and Neck cancers-major changes in the American Joint Committee on Cancer eighth edition cancer staging manual. CA Cancer J Clin. 2017;67(2):122-137.

26. Amit M, Yen TC, Liao CT, Chaturvedi P, Agarwal JP, Kowalski LP et al. Improvement in survival of patients with oral cavity squamous cell carcinoma: An international collaborative study. Cancer. 2013;119(24):4242-4248.

27. Mascitti M, Rubini C, De Michele F, Balercia P, Girotto R, Troiano G, et al. American Joint Committee on Cancer staging system 7th vs 8th edition in oral squamous cell carcinoma: A comparative study. Oral Dis. 2020;26(2):392-401.