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*Original Article*

# Predictors of Cervical Lymph Node Metastasis in Patients with Laryngeal Carcinoma

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**Abstract**

**Background:** Cervical lymph node metastasis is a critical prognostic factor in laryngeal carcinoma, linked to diminished survival, heightened recurrence risk, and modified treatment approaches. Lymph node involvement is influenced by the stage of the tumor, its subsite, and pathological features. This study sought to determine factors predictive of cervical lymph node metastasis to enhance risk stratification, treatment strategies, and prognostic evaluation in patients from Bangladesh.

**Methods:** A cross-sectional study based in a hospital was carried out at Dhaka Medical College Hospital between May 2019 and June 2020 involving 85 patients diagnosed with laryngeal carcinoma through histopathology. Demographic, clinical, radiological, and pathological information was gathered, and cervical lymph node metastasis was evaluated through clinical, imaging, FNAC, or surgical results. Data were analyzed via SPSS 25.0 using logistic regression to determine predictors of nodal metastasis. Approval for ethical standards and informed consent was secured.

**Results:** In a study of 85 patients with laryngeal carcinoma, cervical lymph node metastasis was observed in 45.9% of the instances. Nodal metastasis was significantly linked to supraglottic tumors, advanced T stage, and poor histological differentiation. Multivariable analysis revealed supraglottic location (AOR=3.28), advanced T stage (AOR=4.12), and poor differentiation (AOR=3.67) as independent indicators of cervical lymph node metastasis.

**Conclusion:** Cervical lymph node metastasis frequently occurs in laryngeal carcinoma and is closely linked to supraglottic tumor positioning, advanced T stage, and low histological differentiation. Recognizing these predictors could aid in early risk assessment, treatment strategies, and enhancing prognostic results.

**Keywords:** Cervical Lymph Node, Laryngeal Carcinoma, Predictors, Supraglottic, Histological grade

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## Introduction

Laryngeal squamous cell carcinoma (LSCC) comprises 85% to 95% of all cancerous laryngeal tumors and is a significant malignancy in the head and neck region. Often diagnosed with lymph node metastasis (LNM)—especially in advanced and supraglottic cases—LNM is a vital

prognostic indicator that greatly decreases patient survival rates [1,2]. Cervical lymph node metastasis significantly influences prognosis in laryngeal carcinoma, linked to lower survival rates and heightened locoregional recurrence. The quantity, dimensions, and extracapsular extension of metastatic lymph nodes also influence results. Thus, precise forecasting and prompt identification of nodal engagement are essential for effective treatment strategy and enhanced survival [3,4].

Metastasis to cervical lymph nodes in laryngeal carcinoma depends on tumor stage, subsite, histological characteristics, and biological behavior. It happens in around 20–50% of instances, especially in advanced-stage and supraglottic tumors. Occult nodal disease in clinically node-negative (cN0) individuals continues to be a worry, since undetected metastasis can lead to regional recurrence and lower disease-free survival rates [5,6]. The depth of invasion serves as a crucial indicator for cervical lymph node metastasis, since deeper tumors can more readily access lymphatic channels and carry a higher risk of metastasis. Molecular indicators associated with tumor inhibition, blood vessel formation, epithelial–mesenchymal transition, and immune response might enhance predictions, yet their application in clinical settings is still constrained [7,8]. CT, MRI, and PET-CT enhance lymph node evaluation, yet their capacity to identify tiny hidden metastases is constrained. Consequently, clinicopathological elements are essential for forecasting nodal involvement and directing treatment choices [9,10]. Recognizing indicators of cervical lymph node metastasis allows for tailored treatment strategies. Patients at high risk might need intensive management, whereas those at low risk could gain from more conservative methods. Predictive models that combine clinical, radiological, and pathological factors can enhance staging and treatment choices [5].

Worldwide research has indicated that hidden cervical lymph node metastasis may arise in clinically node-negative supraglottic laryngeal carcinoma. Tumor features and pathological elements aid in anticipating nodal involvement and prognosis, highlighting the significance of risk evaluation and suitable neck management [6,11]. Studies in Bangladesh indicated that the occurrence of cervical lymph node metastasis in laryngeal carcinoma differs based on tumor subsite and stage. Supraglottic tumors displayed greater nodal involvement, and advanced disease correlated with a heightened metastatic risk, highlighting the importance of thorough neck assessment and treatment [12,13].

Few studies in Bangladesh have examined the clinicopathological factors associated with cervical lymph node metastasis in laryngeal carcinoma. This study seeks to determine essential predictive elements for nodal metastasis to enhance risk evaluation, treatment strategy, and prognostic assessment.

## Methodology:

This hospital-based observational cross-sectional study was conducted in the Department of Otolaryngology and Head–Neck Surgery, Dhaka Medical College Hospital (DMCH), Dhaka, Bangladesh, from May 2019 to June 2020. A total of 85 patients with histopathologically confirmed laryngeal carcinoma were consecutively enrolled after obtaining informed written consent. Patients of either sex who were newly diagnosed with laryngeal carcinoma and underwent comprehensive clinical evaluation were included in the study. Patients with recurrent laryngeal carcinoma, distant metastasis at presentation, a history of previous neck dissection or radiotherapy, or incomplete clinicopathological data were excluded.

Baseline demographic and clinical information, including age, sex, smoking history, alcohol consumption, primary tumor site, and clinical tumor stage, were recorded using a structured data collection form. All patients underwent detailed head and neck examination, flexible or direct laryngoscopy, contrast-enhanced computed tomography (CT) of the neck when indicated, and biopsy of the primary lesion. Histopathological examination confirmed the diagnosis and determined the degree of tumor differentiation. Cervical lymph node metastasis was assessed based on clinical examination, radiological findings, and histopathological evaluation of neck dissection specimens or fine-needle aspiration cytology (FNAC), where appropriate. Tumors were staged according to the American Joint Committee on Cancer (AJCC) TNM staging system (8th edition) [14].

Data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were summarized as frequencies and percentages. Associations between clinicopathological characteristics and cervical lymph node metastasis were evaluated using the Chi-square test or Fisher's exact test, as appropriate. Variables with a p-value <0.10 in univariate analysis were entered into a multivariable logistic regression model to identify independent predictors of cervical lymph node metastasis. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated, and a p-value <0.05 was considered statistically significant.

Ethical approval for the study was obtained from the Institutional Review Board (IRB) of Dhaka Medical College Hospital, and written informed consent was obtained from all participants prior to enrollment.

## Results:

A total of 85 patients with histopathologically confirmed laryngeal carcinoma were enrolled in the study during the one-year study period.

### Demographic and Clinical Characteristics

Table 1 shows the mean age of the patients was 59.4 ± 9.8 years (range: 41–81 years). The majority of patients (43.5%) were aged 51–60 years, followed by 61–70 years (34.1%). Most participants were male (78, 91.8%), giving a male-to-female ratio of 11.1:1. A history of smoking was present in 74 (87.1%) patients, while 49 (57.6%) reported regular alcohol consumption.

Table 1. Demographic and clinical characteristics of the study participants (n=85)

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Age group (years)** | | |
| ≤50 | 12 | 14.1 |
| 51 – 60 | 37 | 43.5 |
| 61 – 70 | 29 | 34.1 |
| >70 | 7 | 8.2 |
| **Sex** | | |
| Male | 78 | 91.8 |
| Female | 7 | 8.2 |
| **Smoking history** | | |
| Yes | 74 | 87.1 |
| No | 11 | 12.9 |
| **Alcohol consumption** | | |
| Yes | 49 | 57.6 |
| No | 36 | 42.4 |

### Tumor Characteristics

Table 2 presents supraglottic carcinoma was the most common primary tumor site (43.5%), followed by glottic carcinoma (37.6%) and transglottic carcinoma (18.9%). Most patients presented with advanced primary tumors, with T3 (36.5%) and T4 (27.1%) lesions accounting for nearly two-thirds of cases. Histopathological examination revealed that 63.5% of tumors were moderately differentiated squamous cell carcinomas.

Table 2. Tumor characteristics (n=85)

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Primary tumor site** | | |
| Supraglottic | 37 | 43.5 |
| Glottic | 32 | 37.6 |
| Transglottic | 16 | 18.9 |
| **T stage** | | |
| T1 | 8 | 9.4 |
| T2 | 23 | 27.1 |
| T3 | 31 | 36.5 |
| T4 | 23 | 27.1 |
| **Histological grade** | | |
| Well, differentiated | 18 | 21.2 |
| Moderately differentiated | 54 | 63.5 |
| Poorly differentiated | 13 | 15.3 |

### Frequency of Cervical Lymph Node Metastasis

Figure I show cervical lymph node metastasis was identified in 39 (45.9%) patients, while 46 (54.1%) had no evidence of nodal metastasis at diagnosis.

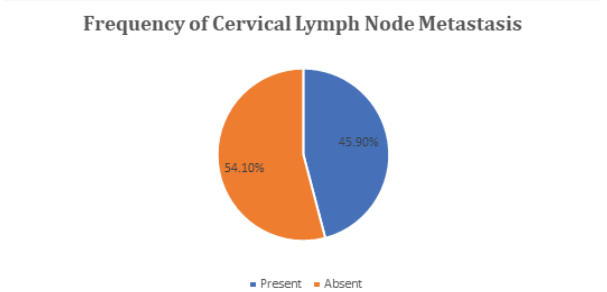



Figure I: Distribution of cervical lymph node metastasis among patients with laryngeal carcinoma (n = 85)

### Association Between Clinicopathological Characteristics and Cervical Lymph Node Metastasis

Table 3 shows the prevalence of cervical lymph node metastasis was significantly higher among patients with supraglottic tumors (64.9%) than among those with glottic

tumors (25.0%) (p=0.002). Advanced T stage (T3–T4) was also significantly associated with lymph node metastasis (58.9% vs. 22.6%; p=0.001). Poorly differentiated tumors demonstrated a significantly higher metastatic rate compared with well and moderately differentiated tumors (76.9%, p=0.008).

Table 3. Association between clinicopathological characteristics and cervical lymph node metastasis (n=85)

| Variable | Metastasis Present n (%) | Metastasis Absent n (%) | p-value |
|---|---|---|---|
| **Primary site** | | | |
| Glottic (n=32) | 8 (25.0) | 24 (75.0) | |
| Supraglottic (n=37) | 24 (64.9) | 13 (35.1) | **0.002** |
| Transglottic (n=16) | 7 (43.8) | 9 (56.2) | |
| **T stage** | | | |
| T1–T2 (n=31) | 7 (22.6) | 24 (77.4) | |
| T3–T4 (n=54) | 32 (59.3) | 22 (40.7) | **0.001** |
| **Histological grade** | | | |
| Well, differentiated (n=18) | 4 (22.2) | 14 (77.8) | |
| Moderately differentiated (n=54) | 25 (46.3) | 29 (53.7) | |
| Poorly differentiated (n=13) | 10 (76.9) | 3 (23.1) | **0.008** |

### Multivariable Logistic Regression Analysis

Table 4 shows variables with p<0.10 in univariate analysis were entered into a multivariable logistic regression model. Supraglottic tumor location (Adjusted Odds Ratio [AOR]=3.28, 95% CI: 1.29–8.37; p=0.012), advanced T stage (AOR=4.12, 95% CI: 1.54–10.99; p=0.005), and poor histological differentiation (AOR=3.67, 95% CI: 1.11–12.16; p=0.033) remained independent predictors of cervical lymph node metastasis.

Table 4. Multivariable logistic regression analysis of predictors of cervical lymph node metastasis (n=85)

| Variable | AOR | 95% CI | p-value |
|---|---|---|---|
| Supraglottic location | 3.28 | 1.29 –8.37 | 0.012 |
| Advanced T stage (T3 –T4) | 4.12 | 1.54 –10.99 | 0.005 |
| Poor histological differentiation | 3.67 | 1.11 –12.16 | 0.033 |

## Discussion:

The current study indicated that laryngeal carcinoma primarily impacted individuals aged 51–60 years, exhibiting a significant male predominance, aligning with earlier studies from Bangladesh that highlighted the highest incidence in the fifth and sixth decades of life, particularly among men. Cigarette smoking was the predominant risk factor, with consistent alcohol use at 57.6%, reinforcing previous research indicating that tobacco is the primary cause, while alcohol works in conjunction with smoking to heighten the risk of laryngeal cancer. These results emphasize the significance of regulating tobacco and alcohol to lessen the disease burden [13,15].

This study showed that supraglottic carcinoma was the most frequent tumor location, with the majority of patients exhibiting advanced T3–T4 disease and moderately differentiated squamous cell carcinoma, aligning with earlier research. These results suggest that laryngeal cancer is often identified at a late stage, highlighting the necessity for early diagnosis and prompt treatment [16,17].

The current research identified cervical lymph node metastasis in 45.9% of patients, aligning with earlier studies that documented a significant incidence of nodal involvement in laryngeal carcinoma. This relatively elevated rate of metastasis indicates the disease's aggressive nature and highlights the necessity of comprehensive neck assessment during initial staging, treatment planning, and prognosis [18].

This study showed that cervical lymph node metastasis was notably linked to supraglottic tumors, advanced T stage, and poor histological differentiation, aligning with earlier research that also indicated an increase in nodal metastasis in supraglottic cancers, advanced primary tumors, and poorly differentiated lesions. These results suggest that the location of the tumor, its stage, and histological grade are key predictors of cervical lymph

node metastasis and must be taken into account during staging and treatment strategies [4,16].

The current study determined that supraglottic tumor site, advanced T stage, and low histological differentiation serve as independent indicators of cervical lymph node metastasis, aligning with prior studies that identified these elements as key predictors of regional nodal dissemination. These results underscore their importance in risk assessment and treatment strategy [6,8].

Overall, Supraglottic position, advanced T stage, and low histological differentiation are independent predictors of cervical lymph node metastasis in laryngeal cancer, highlighting the need for early detection and precise staging.

## Conclusion:

Cervical lymph node metastasis serves as a frequent and clinically important prognostic indicator in laryngeal carcinoma, closely linked to the supraglottic tumor site, advanced T stage, and low histological differentiation. Recognizing these predictive factors could aid in early risk assessment, accurate staging, tailored treatment planning, suitable neck management approaches, and enhanced long-term survival results for impacted patients.

## References:

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. CA: a cancer journal for clinicians. 2019 Jan;69(1):7-34.
2. Forastiere AA, Ismaila N, Lewin JS, Nathan CA, Adelstein DJ, Eisbruch A, Fass G, Fisher SG, Laurie SA, Le QT, O'Malley B. Use of larynx-preservation strategies in the treatment of laryngeal cancer: American Society of Clinical Oncology clinical practice guideline update. Journal of Clinical Oncology. 2018 Apr 10;36(11):1143-69.
3. Ma H, Lian M, Feng L, Li P, Hou L, Chen X, Huang Z, Fang J. Factors contributing to lymph node occult metastasis in supraglottic laryngeal carcinoma cT2-T4 N0M0 and metastasis predictive equation. Chinese Journal of Cancer Research. 2014 Dec;26(6):685.
4. Shen CX, Li YS, Wang ZH, Liu C, Lu T, Zeng Q, Wang XQ, Zhu J, Cao YD, Hu GH. Characteristics of cervical lymph node metastasis of cN0 laryngeal carcinoma. Zhonghua er bi yan hou tou Jing wai ke za zhi= Chinese Journal of Otorhinolaryngology Head and Neck Surgery. 2019 May 1;54(5):343-8.
5. Mutlu V, Ucuncu H, Altas E, Aktan B. The relationship between the localization, size, stage and histopathology of the primary laryngeal tumor with neck metastasis. The Eurasian Journal of Medicine. 2014 Feb;46(1):1.
6. Bradford CR, Ferlito A, Devaney KO, Mäkitie AA, Rinaldo A. Prognostic factors in laryngeal squamous cell carcinoma. Laryngoscope Investigative Otolaryngology. 2020 Feb;5(1):74-81.
7. Leemans CR, Snijders PJ, Brakenhoff RH. The molecular landscape of head and neck cancer. Nature Reviews Cancer. 2018 May;18(5):269-82.
8. Feng JW, Yang XH, Wu BQ, Sun DL, Jiang Y, Qu Z. Predictive factors for central lymph node and lateral cervical lymph node metastases in papillary thyroid carcinoma. Clinical and Translational Oncology. 2019 Nov;21(11):1482-91.
9. Joshi VM, Wadhwa V, Mukherji SK. Imaging in laryngeal cancers. Indian journal of radiology and imaging. 2012 Jul;22(03):209-26.
10. Iovănescu GH, Poenaru M, Doroş C, Borugă O. Histopathological prognostic and risk factors in patients with laryngeal neoplasms. Rom J Morphol Embryol. 2013 Jan 1;54(4):1087-92.
11. Wang SX, Ning WJ, Zhang XW, Tang PZ, Li ZJ, Liu WS. Predictors of occult lymph node metastasis and prognosis in patients with cN0 T1–T2 supraglottic laryngeal carcinoma: a retrospective study. ORL. 2019 Oct 22;81(5-6):317-26.
12. Zafar MH, Islam MM, Rahim MM, Taous A, Asad MK, Kamal MA, Shumon AM. Pattern of Nodal Metastasis in Laryngeal Carcinoma. Bangladesh Journal of Otorhinolaryngology. 2017;23(2):109-14.
13. Uddin MM, Quadir S, Salam KS, Sattar MA, Uddin MM, Siddiquee BH. Pattern of Neck Node Metastasis in Laryngeal Carcinoma. Bangladesh Journal of Otorhinolaryngology. 2018;24(2):115-24.
14. Zanoni DK, Patel SG, Shah JP. Changes in the 8th edition of the American Joint Committee on Cancer (AJCC) staging of head and neck cancer: rationale and implications. Current oncology reports. 2019 Jun;21(6):52.
15. Hossain MA, Ali MI, Rahman M, Huque SN, Alam MM, Islam MA, Ahmed SU. Study on topographical distribution of carcinoma larynx. Bangladesh Journal of Otorhinolaryngology. 2011;17(2):96-103.
16. Fullmer T, Wilde DC, Shi JW, Wagner T, Skinner H, Eicher SA, Sandulache VC, Hernandez DJ. Demographic and tumor characteristic impact on laryngeal cancer outcomes in a minority underserved patient population. Otolaryngology–Head and Neck Surgery. 2020 Jun;162(6):888-96.
17. Ciolofan MS, Vlăescu AN, Mogoantă CA, Ioniță E, Ioniță I, Căpitănescu AN, Mitroi MR, Anghelina F. Clinical, histological and immunohistochemical evaluation of larynx cancer. Current health sciences journal. 2017 Dec 28;43(4):367.
18. Rahman MM, Ali MI, Haque MM, Talukder MH, Rahman M, Islam MT. Metastatic neck node-A study of 60 cases. Bangladesh Journal of Otorhinolaryngology. 2015 Jul 27;21(1):17-22.