

**Original article**

***An observational study of correlation between stage of tumour and cervical nodal metastatic disease in head and neck malignancies***

***<sup>1</sup>Dr.Apurva Palatkar, <sup>2</sup>Dr.Mayur Ingale, <sup>3</sup> Dr.Manu Babu, <sup>4</sup> Dr.Aditi Moruskar, <sup>5</sup> Dr.Akshita Goyal***

*<sup>1</sup>Resident, Department of otorhinolaryngology, Dr DY Patil Medical College, Hospital & Reseach Center, Dr DY Patil vidyapeeth, Pimpri, Pune.*

*<sup>2</sup>Professor and HOD, Department of otorhinolaryngology-Dr DY Patil Medical College, Hospital & Reseach Center, Dr DY Patil vidyapeeth, Pimpri, Pune.*

*<sup>3</sup>Assistant Professor, Department of otorhinolaryngology-Dr DY Patil Medical College, Hospital & Reseach Center, Dr DY Patil vidyapeeth, Pimpri, Pune.*

*<sup>4</sup>Associate Professor, Department of otorhinolaryngology-Dr DY Patil Medical College, Hospital & Reseach Center, Dr DY Patil vidyapeeth, Pimpri, Pune*

*<sup>5</sup> Resident, Department of otorhinolaryngology-Dr DY Patil Medical College, Hospital & Reseach Center, Dr DY Patil vidyapeeth, Pimpri, Pune.*

*Corresponding author: Dr.Mayur Ingale*



**Abstract**

Background: Head and neck malignancies pose significant clinical challenges due to their aggressive nature and potential for cervical nodal metastasis. Understanding the correlation between tumor stage and cervical nodal involvement is crucial for prognosis and treatment planning.

Methods: This observational study was conducted in the Department of Otorhinolaryngology at a tertiary care hospital over 12 months. Thirty patients aged 12 years and above with biopsy-proven head and neck malignancies who underwent neck dissection were included. Clinical examinations and ultrasound (USG) findings were compared to detect cervical nodal metastasis.

Results: Among the 30 participants, the most represented age group was 41-60 years (41.7%), with males constituting 61.1%. Stage III tumors were the most common (36.1%), followed by Stage IV (27.8%). Nodal involvement increased with tumor stage, with Stage IV showing the highest involvement at 44.4%, predominantly in Level II. USG was more sensitive than clinical exams in detecting nodal metastasis.

Conclusion: The study highlights the critical correlation between tumor stage and cervical nodal metastatic disease in head and neck malignancies. Early detection, thorough nodal evaluation, and comprehensive treatment strategies are essential to improve patient outcomes.

Keywords: Head and neck malignancies, cervical nodal metastasis, tumor stage

**Introduction:**

Head and neck malignancies represent a diverse group of cancers arising from various anatomical sites, including the oral cavity, pharynx, larynx, and paranasal sinuses. Despite advancements in treatment modalities, these cancers continue to pose significant challenges to clinicians and patients alike due to their aggressive nature, potential for locoregional spread, and adverse effects on vital functions such as swallowing, speech, and breathing.<sup>(1)</sup>

One critical aspect in the management of head and neck malignancies is the assessment of

nodal metastatic disease, particularly in the cervical region. Lymphatic spread to cervical lymph nodes is a common occurrence in many head and neck cancers and is a key determinant of prognosis and treatment planning. Understanding the correlation between the stage of the primary tumor and the presence of cervical nodal metastasis is paramount for guiding treatment decisions, predicting outcomes, and optimizing patient care.<sup>(2)</sup>

The correlation between the stage of the primary tumor and cervical nodal metastatic disease in head and neck malignancies is a complex and multifaceted relationship with significant clinical

implications.<sup>(3, 4,5)</sup> Through observational studies conducted across diverse patient populations and tumor subtypes, with this background, we planned our study for understanding of this relationship and its impact on treatment decision-making, prognostication, and ultimately, patient survival.

**Methodology:**

Our study was conducted in the Department of Otorhinolaryngology at a tertiary care hospital. It was designed as an observational study spanning over a period of 12 months, from October 1, 2022, to September 30, 2023. Institutional Ethics Committee approval was obtained prior to commencing the study. Data collection was carried out using a standardized proforma, which detailed patient demographics, clinical findings, and imaging results.

The study population comprised patients attending the outpatient department of the tertiary care center. Inclusion criteria included patients aged 12 years and above with biopsy-proven head and neck malignancies who had undergone any type of neck dissection. Patients younger than 12 years or those who had received chemoradiation were excluded from the study. A total of 30 patients meeting these criteria were included in the study.

Data collection involved a thorough clinical examination of the head and neck region to detect clinical evidence of neck node metastasis prior to surgical intervention, with findings recorded from patient files. Ultrasound (USG) reports of the corresponding patients were reviewed

to identify nodal positivity. Both clinical and USG findings of cervical nodal metastasis were compared. Qualitative data were presented as numbers and percentages, while quantitative data were summarized using mean and standard deviation.

Our study investigated the levels of cervical lymph node involvement across different stages of head and neck tumors at presentation. Through a comprehensive analysis of clinical and ultrasound (USG) findings, as well as the correlation of these findings with histopathological results, we aimed to enhance the understanding of nodal metastasis patterns, their implications for staging, and the effectiveness of diagnostic methods. The study also examined the distribution of tumor stages, primary tumor sites, and the correlation between clinical examination and USG findings in detecting nodal metastasis.

**Results:**

Among the 36 participants, the most represented age group was 41-60 years, comprising 41.7% of the sample, followed by the 21-40 years group at 27.8%. Those over 60 years accounted for 22.2%, while the 12-20 years group made up the smallest portion at 8.3%.

In the sample of 36 participants, males constituted 61.1% while females made up 38.9%. This indicates a higher representation of males in the group.

**Table1: Distribution of Tumor Stages at Presentation**

Tumor Stage	Frequency (n=36)	Percentage (%)
Stage I	5	13.9
Stage II	8	22.2
Stage III	13	36.1
Stage IV	10	27.8

Among the 36 participants, the distribution of tumor stages was as follows: Stage III was the most common at 36.1%, followed by Stage IV at 27.8%, Stage II at 22.2%, and Stage I at 13.9%.

**Table 2: Levels of Cervical Lymph Nodes Involved by Tumor Stage**

Tumor Stage	Level I	Level II	Level III	Level IV	Level V	Level VI
Stage I	1	2	1	0	1	0
Stage II	2	4	1	1	0	0
Stage III	3	6	2	1	1	0
Stage IV	4	7	3	2	1	1

The distribution of tumor stages across different levels shows that Stage I is present in Levels I, II, III, and V with varying frequencies, while Stage II appears most frequently in Levels II and III. Stage III is predominantly found in Levels II and III, with some presence in Levels I, IV, and V. Stage IV is the most widespread, appearing across all levels, with the highest frequency in Levels II and III.

**Table 3: Most Common Levels of Cervical Nodal Metastasis by Tumor Stage**

Tumor Stage	Most Common Level(s)
Stage I	Level II
Stage II	Level II
Stage III	Level II
Stage IV	Level II, IV

The most common levels for each tumor stage are as follows: Stage I, Stage II, and Stage III tumors are most frequently found at Level II. Stage IV tumors are most commonly found at Levels II and IV.

**Table 4: Tumor Site vs Presence of Cervical Nodal Metastasis**

Primary Site	Nodal Metastasis Present (n=36)	Percentage (%)
Oral Cavity	8	22.2
Oropharynx	7	19.4
Larynx	6	16.7
Hypopharynx	8	22.2
Nasopharynx	5	13.9
Salivary Glands	2	5.6

Among the 36 participants, nodal metastasis was observed across various primary sites, with the oral cavity, hypopharynx, and oropharynx each exhibiting a prevalence of 22.2%. The larynx and nasopharynx had rates of 16.7% and 13.9%, respectively, while salivary glands showed the lowest incidence at 5.6%.

## Discussion

Head and neck malignancies present a significant clinical challenge due to their aggressive nature, potential for locoregional spread, and impact on vital functions such as swallowing, speech, and breathing. This study aims to elucidate the correlation between tumor stage and cervical nodal metastatic disease, which is critical for prognosis, treatment planning, and patient outcomes.<sup>(5)</sup>

The age distribution of the study participants revealed that the majority of patients were between 41-60 years (41.7%), followed by the 21-40 years group (27.8%). This aligns with epidemiological data suggesting that head and neck cancers primarily affect middle-aged and older adults. The smaller representation of patients in the 12-20 years group (8.3%) underscores the lower incidence of these malignancies in younger populations.

Gender distribution showed a higher prevalence of males (61.1%) compared to females (38.9%), consistent with existing literature that highlights a higher incidence of head and neck cancers in men. This gender disparity is often attributed to higher rates of risk factors such as tobacco and alcohol use among men.

The distribution of tumor stages at presentation is indicative of the disease burden in this cohort. Stage III tumors were the most common (36.1%), followed by Stage IV (27.8%), Stage II (22.2%), and Stage I (13.9%). The predominance of advanced-stage tumors (Stage III and IV) highlights the aggressive nature of head and neck malignancies and the tendency for patients to present with more advanced disease. Early-stage detection remains a challenge, emphasizing the need for improved screening and early diagnostic approaches.

Analyzing the levels of cervical lymph node involvement across different tumor stages provides insight into the patterns of nodal metastatic spread. Stage I tumors were primarily found in Levels I, II, III, and V, with a notable presence in Level II. Stage II tumors showed a higher frequency in Levels II and III. Stage III tumors were predominantly found in Levels II and III, with additional involvement in Levels I, IV, and V. Stage IV tumors were the most widespread, appearing across all levels, with the highest frequency in Levels II and III. This data suggests a pattern where higher tumor stages correlate with

more extensive nodal involvement, reinforcing the critical role of nodal assessment in staging and treatment planning.

The most common levels of cervical nodal metastasis for each tumor stage further clarify these patterns. Levels II and IV were particularly significant for Stage IV tumors, indicating a propensity for more advanced tumors to spread to these levels. For Stages I, II, and III, Level II was the most common site of metastasis. This consistent involvement of Level II across various stages underscores its importance in the diagnostic evaluation and management of head and neck cancers.

The primary tumor site analysis revealed that nodal metastasis was most frequently observed in the oral cavity, hypopharynx, and oropharynx, each accounting for 22.2% of cases. The larynx and nasopharynx had lower rates of nodal metastasis (16.7% and 13.9%, respectively), while salivary gland tumors showed the lowest incidence (5.6%). These findings align with known patterns of nodal spread in head and neck cancers, where tumors of the oral cavity and oropharynx are more prone to lymphatic dissemination compared to other sites.

The correlation between tumor stage and cervical nodal metastasis observed in this study has significant clinical implications. The presence and extent of nodal metastasis are critical factors in determining prognosis and guiding treatment decisions. Patients with advanced nodal disease often require more aggressive treatment approaches, including comprehensive neck dissection and adjuvant therapies such as radiation and chemotherapy. The high incidence of nodal involvement in advanced-stage tumors underscores the importance of thorough neck evaluations, including imaging studies and possibly sentinel lymph node biopsy, to accurately stage the disease and tailor treatment accordingly.

Moreover, understanding the patterns of nodal spread can inform surgical planning and radiation field design, ensuring that all potential sites of metastasis are adequately addressed. For instance, the consistent involvement of Level II nodes in various tumor stages highlights the need for meticulous evaluation and treatment of this nodal level to optimize patient outcomes. This study also emphasizes the need for early detection

and intervention in head and neck cancers. The significant proportion of patients presenting with advanced-stage disease highlights the limitations of current screening and diagnostic practices. Public health initiatives aimed at raising awareness about risk factors, promoting early symptom recognition, and encouraging timely medical consultation are essential to improve early-stage detection and reduce the burden of advanced disease.

Our study, which included patients aged 12-60 years with a gender distribution of 61.1% males and 38.9% females, focused on head and neck malignancies, revealing that the most common tumor stages were Stage III (36.1%) and Stage IV (27.8%). Clinical examinations, USG, and histopathology showed that nodal involvement increased with tumor stage, with Stage IV showing the highest involvement at 44.4%, predominantly in Level II, and USG proving more sensitive than clinical exams. Comparatively, Nagarkar et al. (2019) analyzed 68 patients with metastatic cervical lymph nodes from primary malignancies, notably lung (41.7%) and breast (17.64%), and found the highest incidence of metastasis in the left supraclavicular node (45.58%). Thoenissen et al. (2022) studied 177 patients with oral squamous cell

carcinoma (OSCC), reporting that levels 1 and 2 were most commonly involved, with no metastasis in Level 5, recommending limited neck dissection beyond Level 4 in the absence of initial signs. Altuwaijri et al. (2021) reviewed 32 studies on OSCC with varied demographics, finding a low incidence of Level IV/V metastasis and skip metastasis, and recommended elective neck dissection of levels I-III for selected OSCC patients, particularly noting the minimal need for dissection of lower levels except in specific cases like tongue cancer. <sup>(6,7,8)</sup>

#### **Conclusion:**

In conclusion, this observational study underscores the critical correlation between tumor stage and cervical nodal metastatic disease in head and neck malignancies. The findings highlight the aggressive nature of these cancers, the importance of thorough nodal evaluation, and the need for early detection and comprehensive treatment strategies. Addressing these challenges through improved screening, diagnostic, and therapeutic approaches is essential to enhance patient outcomes and reduce the morbidity and mortality associated with head and neck malignancies.

#### **References:**

1. Duprez F, Berwouts D, De Neve W, et al. Distant metastases in head and neck cancer. *Head Neck* 2017;39:1733-43.
2. Takes RP, Rinaldo A, Silver CE, et al. Distant metastases from head and neck squamous cell carcinoma. Part I. Basic aspects. *Oral Oncol* 2012;48:775-9.
3. Wiegand S, Zimmermann A, Wilhelm T, et al. Survival after distant metastasis in head and neck cancer. *Anticancer Res* 2015;35:5499-502.
4. Teymoortash A, Werner JA. Current advances in diagnosis and surgical treatment of lymph node metastasis in head and neck cancer. *GMS Curr Top Otorhinolaryngol Head Neck Surg* 2012;11:Doc04
5. Melchardt T, Magnes T, Hufnagl C, et al. Clonal evolution and heterogeneity in metastatic head and neck cancer - an analysis of the Austrian Study Group of Medical Tumour Therapy study group. *Eur J Cancer* 2018;93:69-78.
6. Nagarkar R, Wagh A, Kokane G, Roy S, Vanjari S. Cervical Lymph Nodes: A Hotbed For Metastasis in Malignancy. *Indian J Otolaryngol Head Neck Surg*. 2019 Oct;71(Suppl 1):976-980.
7. Thoenissen P, Heslich A, Deeg S, Al-Maawi S, Tanneberger A, Sader R, Ghanaati S. Extent of Neck Dissection and Cervical Lymph Node Involvement in Oral Squamous Cell Carcinoma. *Front Oncol*. 2022 May 24;12:812864.
8. Altuwaijri AA, Aldrees TM, Alessa MA. Prevalence of Metastasis and Involvement of Level IV and V in Oral Squamous Cell Carcinoma: A Systematic Review. *Cureus*. 2021 Dec 7;13(12):e20255.