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Cervical Nodal Status According to Tumor Location in Laryngeal Cancer: A Retrospective Analysis of 120 Patients

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ABSTRACT

Laryngeal cancer is a malignant neoplasm arising from the tissues of the larynx, accounting for approximately one third of head and neck cancers. These cancers represent a major medical challenge due to their high morbidity and mortality rates. Nodal status is of paramount importance in laryngeal tumors, with clinical implications that vary according to tumor location.

This was a retrospective study conducted over a five-year period, from January 1, 2019, to December 31, 2023, including 120 patients.

The mean age of the patients was 65 years, with a marked male predominance (97.5%). Smoking was the main risk factor. Dysphonia (98.72%) and dyspnea (74.36%) were the most common presenting symptoms. Glottic tumors were the most frequent (50.83%), with 46.5% of cases diagnosed at an advanced stage (T4). Squamous cell carcinoma was the predominant histological type (98.72%). Cervical lymph node metastases were more frequent in transglottic tumors involving multiple subsites. A significant correlation was observed between the ulcero-proliferative tumor appearance and the presence of lymphadenopathy ($p = 0.001$).

Analysis of nodal status according to tumor location allows for the adaptation of therapeutic strategies. Cervical lymph node dissemination in laryngeal cancer is strongly correlated with tumor location and extension. Tumors involving multiple subsites carry a higher risk of nodal metastasis, particularly at levels III and VIa, supporting the need for tailored neck dissection strategies.

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Introduction

Laryngeal cancer is a neoplastic growth characterized by cellular atypia and uncontrolled, disorganized cell proliferation. It may be primary or secondary, arising from the constituent tissues of the larynx. These tumors account for approximately one-third of all head and neck cancers and are a significant source of morbidity and mortality [1]. Several risk factors have been implicated in the pathogenesis of laryngeal cancer, the most significant of which are tobacco and alcohol consumption [2]. Squamous cell carcinoma represents the most common histologic subtype [1]. The lymphatic drainage of the larynx varies according to its anatomical subsite: while glottic tumors have limited lymphatic drainage, the supraglottic and subglottic regions are rich in lymphatic networks, favoring nodal dissemination [2]. Tumor extension across multiple laryngeal levels may further increase the risk of regional metastasis.

Despite advances in diagnostic imaging and therapeutic strategies, cervical lymph node metastasis continues to be one of the most important prognostic factors affecting survival [3]. However, few studies have focused specifically on the relationship between

precise tumor location and nodal involvement. Understanding this correlation is essential for optimizing neck management strategies. The aim of this study was to analyze the impact of tumor location on cervical lymph node metastasis in patients with laryngeal carcinoma.

Material and Methods

This was a retrospective study conducted in the Department of Otorhinolaryngology at the 20 August Hospital (Ibn Rochd University Hospital Center, Casablanca) over a 5-year period, from January 2019 to December 2023, focusing on laryngeal cancers. A total of 120 patients were included.

Data were collected using a standardized form capturing epidemiological, clinical, radiological, and histopathological information for all patients diagnosed and treated for laryngeal cancer in the department during this period, with histopathological confirmation and complete, usable medical records.

Univariate and multivariate analyses were performed using SPSS version 23.0. The relationship between cervical lymphatic metastasis and clinicopathological factors was assessed using the χ^2 test or Fisher's exact test. A p -value < 0.05 was considered statistically significant.

Results

Among the 120 patients included in our study, males predominated, representing 97.5% of cases, with a male-to-female ratio of 39:1. The median age was 65 ± 9 years (range: 49–88 years). A history of smoking was reported in 95 patients (79.17%), and alcoholism was observed in 7 patients (5.83%).

At presentation, dysphonia (98.72%) was the most common symptom, followed by dyspnea (74.36%) and dysphagia (13%). The mean duration of symptoms was 14 months (range: 2–72 months).

An ulcerated-budding tumor appearance was observed in 61.11% of patients, while 38.89% presented with an infiltrative appearance. Tumor distribution was unilevel in 11.7% of cases, bilevel in 37.5%, and trilevel in 50.8%.

According to the TNM classification, tumors were staged as T1 (7%), T2 (11.6%), T3 (34.9%), and T4 (46.5%). Clinical lymphadenopathy was present in 14.3% of patients, including bilateral involvement in 1.28% (Table 1).

Total laryngectomy was performed in 80 patients, and partial laryngectomy in 40 patients. All patients underwent functional bilateral neck dissection. Squamous cell carcinoma was the most frequent histological type, accounting for 98.72% of cases. One case of sarcomatoid carcinoma was identified.

Duration of symptoms and macroscopic tumor appearance were both significantly associated with the presence of cervical lymphadenopathy on univariate analysis (Table 2).

Table 2: Clinical Factors Associated with Cervical Lymphadenopathy

Factor	Category	With Lymphadenopathy	Without Lymphadenopathy	p-value
Duration of symptoms (mean)	-	14 months (3-72)	12 months (2-24)	0.031
Macroscopic appearance	Ulcerobudding	66 (55.0 %)		
5 (4.16 %)	0.001			
Macroscopic appearance	Infiltrative	10 (8.32 %)	39 (32.5 %)	0.001

On multivariate analysis, a longer duration of symptoms remained significantly associated with nodal involvement (*p* = 0.031). Tumors involving all three laryngeal levels tended toward a higher frequency of lymph node metastasis (*p* = 0.151), with predominant involvement of levels III and VIa. Ulcerative-exophytic tumor appearance, although associated with a higher rate of nodal metastasis on univariate analysis, was not significantly associated with nodal status on multivariate analysis (*p* = 0.299).

Table 3: Lymph Node Dissection Findings According to the Number of Laryngeal Subsites Involved (n = 120)

Nodal Level	Single-Subsite Tumor	Two-Subsite Tumor	Three-Subsite Tumor	p-value (2 subsites)	p-value (3 subsites)
IIa	6 (5.0 %)	18 (15.0 %)	0 (0 %)	0.012	1.000
IIb	2 (1.7 %)	9 (7.5 %)	4 (3.33 %)	0.091	0.612
III	2 (1.7 %)	13 (10.8 %)	15 (12.50 %)	0.410	0.025
IV	0 (0 %)	2 (1.7 %)	4 (3.33 %)	0.836	0.310
VIa	0 (0 %)	0 (0 %)	28 (23.33 %)	1.000	0.001
VIb	0 (0 %)	3 (2.5 %)	10 (8.33 %)	0.310	0.641

Discussion

Laryngeal cancer is a common disease associated with high morbidity and mortality, with a stable or increasing incidence worldwide. All epidemiological indicators of this malignancy are significantly higher in men, and incidence peaks after the age of 65 years [4,5].

The delay before consultation varies across studies, ranging on average from 6 months to more than one year depending on the country. This delay is clearly reflected in the reasons for hospitalization, which may range from relatively mild symptoms

Table 1: Distribution of T, N and M Stages in the Cohort (n = 120)

Classification	Category	Number (n)	Percentage (%)
T	1	3	7.0
	2	5	11.6
	3	15	34.9
	4	20	46.5
N	0	54	85.71
	1	4	6.35
	2	4	6.35
	X	1	1.59
M	0	4	12.12
	X	29	87.88

Nodal metastases were most frequently located at level III (25.0%), followed by level VIa (23.33%) and level IIa (20.0%) (Table 3).

such as chronic dysphonia to more severe manifestations including dysphagia, dyspnea, or even acute respiratory distress [6].

Squamous cell carcinoma is the predominant histological type, accounting for more than 90% of cases according to several studies [6-8].

The presence of cervical lymph node metastasis in laryngeal cancer is generally associated with a poor prognosis and reduced survival rates [9].

Cervical nodal involvement in laryngeal cancer is strongly influenced by both tumor location and anatomical extent. Tumors confined to a single laryngeal subsite particularly glottic cancers exhibit low metastatic potential, consistent with the sparse lymphatic drainage of this region [10-11]. In contrast, tumors involving two laryngeal levels are significantly associated with level IIa nodal metastases, reflecting the primary lymphatic drainage pathways of the supraglottic compartment. Tumors extending across three laryngeal levels show a markedly higher propensity for nodal spread, particularly to levels III and VIa [11-12]. This pattern is likely explained by extensive lymphatic interconnectivity and subglottic drainage pathways directed toward the central compartment [11].

Ulcerative-exophytic tumors carry a higher likelihood of cervical lymph node metastasis compared with infiltrative tumors [13]. The increased metastatic rate observed in ulcerative-exophytic tumors may reflect a more aggressive biological behavior [14].

Several authors have reported that cervical lymph node metastases are commonly associated with prolonged tumor evolution, with approximately half of the cases presenting after more than four months of disease progression [15-17]. This correlation highlights the critical importance of early diagnosis to improve prognosis and reduce the risk of locoregional recurrence [14].

Conclusion

Accurate assessment of nodal status based on tumor topography allows for more tailored therapeutic strategies. Tumor location remains a primary determinant of cervical lymph node involvement in laryngeal cancer. These results support a targeted, extension-based surgical approach to optimize management and improve overall patient outcomes.

Declarations

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Ethics Approval and Consent to Participate: This study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was obtained from the Ethics Committee of 20 August 1953 Hospital. Written informed consent was obtained from all participants prior to inclusion.

Consent for Publication: Written informed consent for publication was obtained from all participants.

Competing Interests: The authors declare no competing interests.

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