

Involvement of Submental Lymph Node in Oral Squamous Cell Carcinoma (OSCC)

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Abstract:-

➤ *Background:*

Squamous cell carcinoma (OSCC) is one of the most common malignancies of oral cavity. Metastasis of oral squamous cell carcinoma (OSCC) is a complex process involving detachment of cells from the tumor tissue, regulation of cell motility and invasion, proliferation and evasion through the lymphatic system or blood vessels. The metastasis may affect the prognosis. ¹

Since not only the suppression of primary lesion but also the presence or absence of metastasis in the cervical lymph nodes may greatly influence the outcome of oral cancer. ^{2,3}

The submental lymph nodes are categorized as Level Ia lymph nodes. ⁴ Aim of present study was to evaluate Level Ia lymph node metastasis in patients having oral squamous cell carcinoma.

➤ *Materials and methods:*

The research was undertaken following approval from the institutional ethics committee and spanned a duration of two years, during which a comprehensive evaluation was performed on 67 participants.

➤ *Results:*

Level Ia lymph node metastasis was 22.4% (15 patients). Among 22.4% patients with level Ia lymph node metastasis, most common site of primary tumor was lip (50%). T4b lesions showed highest prevalence in patients with level Ia lymph node metastasis. Out of total 22.4% of level Ia lymph node metastasis, 13.04% (3 patients) patients had clinically N0 neck. On comparison of final histopathological diagnosis with level Ia lymph node metastasis, 50% cases diagnosed with poorly differentiated squamous cell carcinoma. Metastasis at level Ia was associated along with level Ib lymph node metastasis (46.6%) followed by level IIa lymph node metastasis (33.3%).

➤ *Conclusion:*

In conclusion, the present study depicted that level Ia lymph node metastasis was significant. Hence, level Ia lymph node dissection should be taken into the consideration in patients with OSCC.

Keywords:- Oral Squamous Cell Carcinoma, Cervical Lymph Node, Metastasis, Level Ia Lymph Node, Submental, Tumor, Neck Dissection.

I. INTRODUCTION

Squamous cell carcinoma of the oral cavity (OSCC) is a highly infiltrative condition. Detecting and treating oral squamous cell carcinoma (OSCC) in its early stages offers a positive outlook for prognosis. ¹Cancers originating in the oral cavity frequently spread to the lymph nodes in the cervical region. The primary factor influencing the prognosis of OSCC is the potential for cervical metastasis. Therefore, it is imperative to conduct precise staging of cervical lymph node metastasis. ^{5, 6} Squamous cell carcinomas of the oral cavity typically spread to lymph node levels I, II, and III. Initially, most of the metastatic tumor activity originates within a nearby "local" lymph node, which is the node in the first tier responsible for draining the primary site. Subsequently, there is a systematic progression to higher-level lymph nodes. Therefore, it's crucial to pay particular attention to Level I lymph nodes. However, it's worth noting that skip metastasis can occur, where the disease bypasses levels I or II, or both, and directly affects levels III or IV. ^{7, 8}

Submental lymph nodes are categorized as Level Ia lymph nodes. The submental lymph nodes are situated between anterior bellies of digastric muscles which forms submental triangle. The structures which drain into submental lymph nodes are central portions of lower lip, floor of the oral cavity and the anterior part of tongue. ⁵

In our study, we evaluated the prevalence of submental (level Ia) lymph node metastasis in the squamous cell carcinoma of oral cavity.

II. MATERIALS AND METHODS

Our study was conducted in the Department of Oral and Maxillofacial Surgery, Rural Dental College, Loni after obtaining approval from the Institutional Ethical Committee, of pravara institute of medical sciences, Maharashtra. This Descriptive cross sectional prospective study was carried out over a period of 2 years. our study was screened irrespective of age, sex, cast, creed, and religion. All patients with a suspected malignant lesion of oral cavity underwent incisional biopsy for histopathological confirmation of malignancy into well / moderate / poorly differentiated (by

Broder’s classification). Age, gender and site of primary lesion were also noted.

TNM staging was done, on basis of clinical and radiological examination.

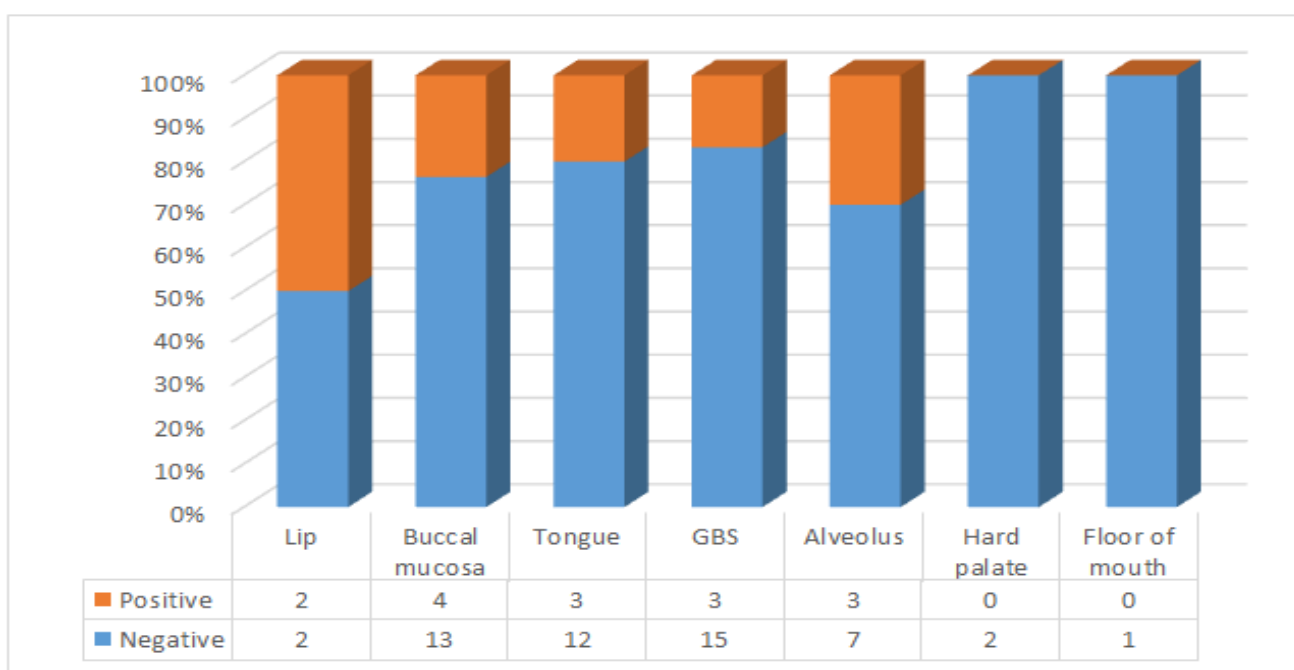
Patients of histopathological proven cases of OSCC who underwent neck dissection whose age was between 20 years to 85 years were included in the study. Recurrent cases of OSCC and patients having history of radiotherapy, chemotherapy or neck dissection were excluded from study. Following surgical treatment all cervical lymph nodes along with primary tumor were removed separately from different levels according to the type of neck dissection. Level Ia lymph node is separated and sent for histopathological evaluation along with all resected lymph nodes. After microscopic evaluation of all excised lymph nodes by oral pathologist for the presence or absence of malignancy in each level, further evaluation using post-operative histopathological reports were carried out. On the basis of collected data of total 67 cases, status of Ia lymph node and its co-relation with clinical findings such as age and gender wise distribution, TNM staging, site of primary lesion and with histopathological findings such as histopathological grade of malignancy and comparison with other cervical lymphadenopathy was evaluated of total 67 patients.

III. RESULTS

The study included total 67 patients who underwent neck dissection among which 45 patients (67.2%) were male and 22 females (32.8%). Out of total 67 patients of OSCC 15 patients (22.4%) had level Ia lymph node metastasis. Among 22.4% patients with level Ia lymph node metastasis, most common site of primary tumor was lip 50% followed by 30% of alveolus, 23.52% of buccal mucosa, 20% of tongue and 16.66% patients of GBS had Ia lymph node metastasis. T4b lesions showed highest prevalence (50%) in patients with level Ia lymph node metastasis followed by T4a (35.71%), T2 (25%) and T3 (15.15%). None of the patients of T1 lesion showed level Ia lymph node metastasis. On comparison of clinical nodal status with Ia lymph node, 13.04% (3 patients) patients had clinically N0 neck. On comparison of final histopathological diagnosis with level Ia lymph node metastasis, 50% cases diagnosed with poorly differentiated squamous cell carcinoma followed by moderately differentiated squamous cell carcinoma (25%) and well differentiated squamous cell carcinoma (13.63%). In analysis of relationship between level Ia lymph node metastasis with other cervical lymph node metastasis, level Ia metastasis was associated along with level Ib lymph node metastasis (46.6%) followed by level IIa lymph node metastasis (33.3%).

Table 1 Comparison of Primary Tumour Site with Ia Lymph Node

Sr. no.	Site of primary tumor	Total	Negative	Positive	Percent
1	Lip	04	02	02	50%
2	Buccal mucosa	17	13	04	23.52%
3	Tongue	15	12	03	20%
4	GBS	18	15	03	16.66%
5	Alveolus	10	07	03	30%
6	Hard palate	02	02	00	0%
7	Floor of mouth	01	01	00	0%
P value		0.763			



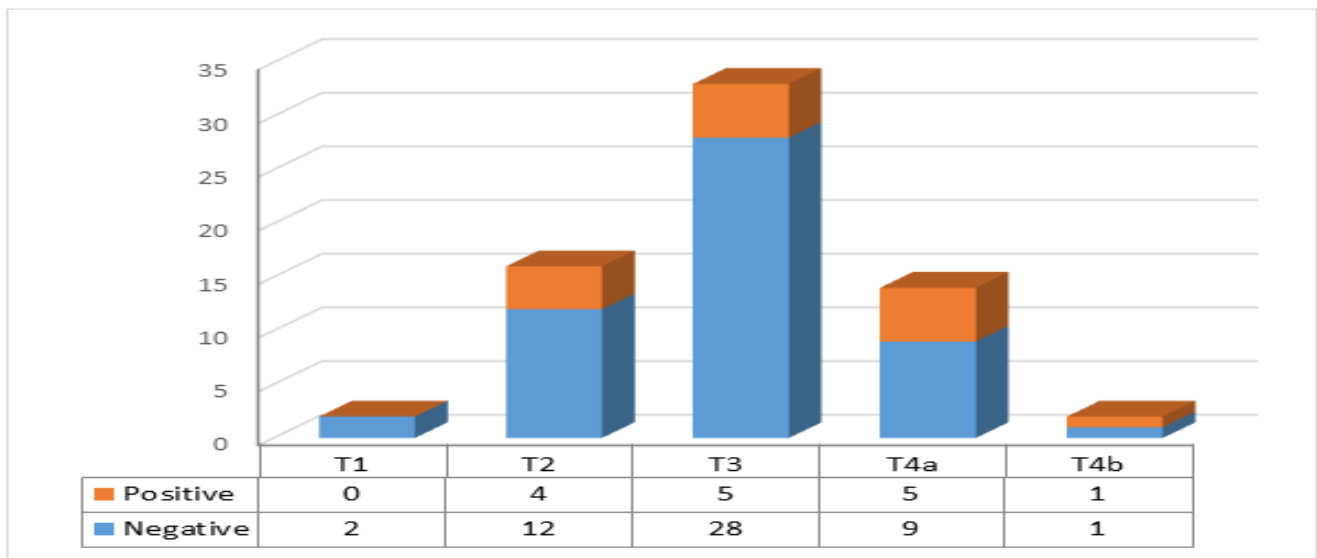
Graph 1 Comparison of Primary Tumor Site with Ia Lymph Node

Table 1 shows comparison of tumor site (site of primary lesion) and involvement of Level Ia lymph node. Out of 4 patients of lip, 2 patients (50%) had level Ia lymph node involvement. 4 patients (23.52%) of buccal mucosa out of 17 patients had Ia lymph node involvement. 3 patients (20%) out of 15 patients of tongue had Ia lymph node

involvement. Out of 18 patients of GBS, 3 patients (16.66%) had Ia lymph node positive. 3 patients (30%) out of 10 patients of alveolus had Ia lymph node positive. Among 2 patients of hard palate and 1 patient of floor of mouth, none of the patient had level Ia lymph node positive. With non-significant p value of 0.763.(Graph 1)

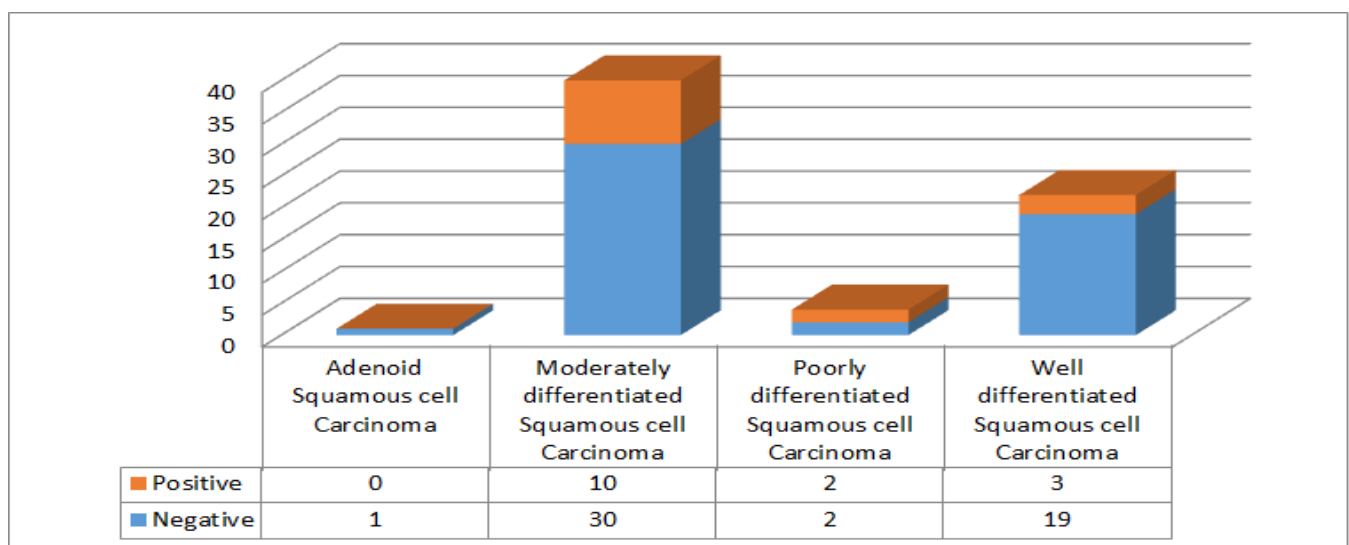
Table 2 Comparison of Tumour Size with Ia Lymph Node

Tumor size (T)	Total number of patients	Patients with level Ia lymph node metastasis	Percentage (%)	P value
T1	2	0	0	0.414
T2	16	4	25	
T3	33	5	15.15	
T4a	14	5	35.71	
T4b	2	1	50	
Total	67	15		



Graph 2 Showing Tumor Size Vs Level Ia Lymph Node

Table 2 shows comparison of tumor size and involvement of Level Ia lymph node. Out of total 67 patients 15 patients had level Ia lymph node metastasis. Among which patients with T1 showed no involvement of level Ia lymph node, T2 showed by 4 patients (25%) with involvement of level Ia lymph node, T3 showed by 5 patients (15%) with involvement of level Ia lymph node, T4a showed by 5 patients (35.71%) with involvement of level Ia lymph node and T4b showed by 1 patient (50%). With a non-significant p value of 0.414. (Graph 2)



Graph 3 Showing Histopathological Diagnosis Vs Level Ia Lymph Node

IV. DISCUSSION

Oral squamous cell carcinoma (OSCC) ranks as the most prevalent form of cancer globally.⁹ The development of oral squamous cell carcinoma (OSCC) is influenced by a variety of factors, including chronic tobacco use (both smoking and smokeless forms), alcohol consumption, and viral infections.¹⁰ OSCC can develop at various sites within the oral cavity, encompassing the tongue, upper and lower gingiva, floor of the mouth, palate, and buccal mucosa. Anatomically, OSCC affecting the tongue is more inclined to invade deeper muscle tissues, while OSCC in the gingiva can potentially affect the jawbone. Furthermore, OSCC frequently leads to cervical lymph node metastasis due to the extensive network of lymphatic vessels in the oral cavity, characterized by numerous connections.¹¹ It usually appears in patients older than 50 years of age.

The most important prognostic factor in the management of oral squamous cell carcinoma is the status of the cervical lymph nodes. The presence of the metastasis to cervical lymph nodes can reduce the cure rate by 50 %.¹²

Many studies have been conducted till date on evaluation of cervical lymph node metastasis, but very few authors have done separate study on level Ia lymph node metastasis in cases of OSCC. In present study we analysed prevalence of level Ia lymph node metastasis.

In present study, the involvement of Level Ia lymph node in oral squamous cell carcinoma were present in 15 patients (22.4%) out of 67 patients; whereas **Murakami R et al.**¹³ retrospectively evaluated the prognostic impact of level of nodal involvement in 105 patients with oral squamous cell carcinoma. Total 7 patients showed level Ia lymph node metastasis.

It is important to evaluate relation between site of primary tumor and lymph node metastasis. In present study, we evaluated site of primary tumor in patients who had level Ia lymph node metastasis. we found that highest percentage of level Ia lymph node metastasis with site of primary tumor was lip (50%) followed by alveolus (30%), buccal mucosa (23.52%), tongue (20%) and gingiva-buccal sulcus (16.66%) respectively. A prospective study conducted by Patil LS¹⁴ in 2018 of histologically proven oral carcinoma patients. Pathological level Ia lymph node metastasis was found in 5 patients among which 2 patients had primary lesion at buccal mucosa, 2 patients had at retromolar trigon region and 1 patient had in floor of mouth.

In present study, we further evaluated the relationship between size of primary tumor (based on TNM staging) and level Ia lymph node metastasis. T4b lesions showed highest prevalence (50%) in patients with level Ia lymph node metastasis followed by T4a lesion (35.71%), T2 lesion (25%) and T3 lesion (15.15%). None of the patients of T1 lesion showed level Ia lymph node metastasis. **Murakami R et al.**¹³ in 2017 performed retrospective study to check the prognostic impact of the level of nodal involvement in patients with advanced oral squamous cell carcinoma. On

comparison of tumor size and involvement of Level Ia lymph node, out of 7 patients, 5 patients had T4 lesion and 2 patients had T1-T3 lesion. Another study was conducted by Umeda M et al.¹⁵ in 1992 in which, out of 28 patients of OSCC with level Ia lymph node metastasis, 7 patients had T1 lesion, 13 had T2 lesion, 1 patient had T3 lesion and 7 patients had T4 lesion. Result of present study was inconsistent with the study done by Umeda M et al.¹⁵

We had further evaluated clinical and pathological correlation between lymph node involvements. In present study, among 15 patients with level Ia lymph node metastasis, 3 patients (13.04%) had clinically N0 nodal staging. 7 patients (28%) had N1, 3 patients (27.27%) had N2a, and 2 patients (25%) had N2b nodal staging. highest percent of Ia lymph node metastasis showed by patients with clinically neck node involvement was with N1 followed by N2a, N2b and N0 respectively. Lim YC et al.¹⁶ in 2004 studied relation between clinical and pathological lymph node involvement. Out of 24 patients who had been staged clinically N0, 5% showed pathological level Ia lymph node metastasis. These results are almost similar to results of present study.

In present study, final diagnosis was made on the basis of histopathological report of incisional biopsy. Analysis was done to correlate histologic findings and prevalence of lymph node metastasis, level Ia lymph node more precisely. In present study, 3 patients (13.63%) out of 22 with final histopathological diagnosis was well differentiated squamous cell carcinoma had level Ia lymph node metastasis, 10 patients (25%) out of 40 with moderately differentiated squamous cell carcinoma had level Ia lymph node metastasis, 2 patients (50%) out of 4 with poorly differentiated squamous cell carcinoma had level Ia lymph node metastasis. **Haksever M et al.**¹⁷ in 2012 studied the effect of tumor size, degree of differentiation, and depth of invasion on the risk of neck node metastasis in oral squamous cell carcinoma. Neck node metastasis was present in 8 of 21 cases of well-differentiated squamous cell carcinoma (38.1%), in 6 of 14 moderately differentiated tumors (42.9%), and in 4 of 5 poorly differentiated tumors (80.0%). These results were similar to present study in manner that low incidence is associated with well differentiated squamous cell carcinoma and high incidence was with poorly differentiated squamous cell carcinoma.

We further analysed relationship of level Ia lymph node with other cervical lymph node metastasis. In present study, among 15 cases of level Ia lymph node metastasis, 7 patients (46.6%) had level Ib lymph node metastasis along with level Ia metastasis, 5 patients (33.3%) had IIa lymph node metastasis along with level Ia metastasis, 3 patients (20%) had level IIb lymph node metastasis along with level Ia metastasis, 2 patients (13.3%) had level III lymph node metastasis along with level Ia metastasis, 3 patients (20%) had both level IV and level V lymph node metastasis along with level Ia metastasis. Most of the time whenever Ia lymph node metastasis was seen, some other cervical lymph nodes were found to be positive in the study. Level Ib and IIa had highest percentage of metastasis associated with

level Ia lymph node metastasis. Agarwal SK et al.¹⁸ in 2017 performed study to evaluate the incidence of level IIB and IV lymph node metastases in patients of oral carcinoma. Metastasis at level IIB was associated with metastasis at level IIA lymph node (100%) and with level IB lymph node metastasis (50%).

V. CONCLUSION

The present study depicted that level Ia lymph node metastasis was significant. Hence, level Ia lymph node dissection should be taken into the consideration in patients with OSCC. Clearance of involved lymph node is of priority, so Ia lymph node should be cleared in all type of oral squamous cell carcinoma cases. However, more research is required with large sample size considering different demographic areas to assess involvement and surgical removal of level Ia lymph node in cases of OSCC.

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