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Clinical Paper
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Evaluation of incidence of metastatic involvement of level IIb subgroup lymph nodes in squamous cell carcinoma of the oral cavity

Abstract

Background: To determine the overall incidence of level IIb lymph node metastases in N0/N+ neck and whether level IIb node removal is necessary in oral squamous cell carcinoma (OSCC) patinets.

Material and methods: A prospective analysis of 182 biopsy proven OSCC patients who underwent surgical excision of the primary lesion with safe margins. Based on the site, nodal involvement etc the planned neck dissection has been performed. Resected primary lesion and different levels of removed lymph nodes was marked and sent for histopathological examination. 26 (14.3%) patients underwent bilateral neck dissection and unilateral in remaining 156 patients (85.7%).

Results: 22 patients in our study specifically had metastases in level IIb, representing 22 out of 182 patients (12%) and 22 out of 208 neck dissection specimens (10.5%), combining pathologically N0 necks and clinically node-positive necks. 31 patients reported with a local recurrence at 1-year follow-up period, whereas remaining 151 patients had no loco regional residual disease at 1 year follow up. All the patients with recurrent disease were provided palliative treatment.

Conclusions: Our results indicate the importance of always dissecting level IIb nodes in case of high metastatic rate of patients with clinically positive neck nodes, exclusively staged as N2b or greater. However, for a therapeutic neck dissection, level IIb clearance should always be done if there are positive lymph nodes at level IIa clinically or intra-operatively on frozen section.

Keywords: OSCC, level IIb, neck dissection

Volume 11 Issue 6 - 2020

Birsubhra Roy,[1] Anshuman kumar,[2] Rahul Kashyap,[3] Garima Rawat[4]
[1]M.D.S. Oral & Maxillofacial Surgery, India
[2]MRCS (Edinburgh) UK, M.Ch (Oncosurgery), Director, Surgical Oncology, Clinical Lead- Academic Services, Dharamshila Narayana Superspeciality Hospital, India
[3]M.D.S. Oral & Maxillofacial Surgery, Professor, ITS Dental College and Hospital, India
[4]M.D.S. Oral & Maxillofacial Pathology, Senior Resident, Department of Pathology, Dharamshila Narayana Hospital, India

Correspondence: Birsubhra Roy, M.D.S. Oral & Maxillofacial Surgery, 33, India Moon City, Indirapuarm, Ghaziabad, UP-201014, India, Tel 91-9818694153, Email bir.ronie@gmail.com

Received: October 21, 2020 | **Published:** December 03, 2020

Introduction

Oral squamous cell carcinoma (OSCC) is a life-threatening disease which accounts for a burden of 32-40% of all the head and neck cancers (HNC).[1] In the Asian sub-continent oral cancer is the most common malignant tumor accounting for about one-third of all malignancies within the subcontinent and it accounts for approximately 30-40% of all cancers in India.[2]The high incidence of oral cancer and oral potentially malignant disorders in India has been linked with the habit of betel nut and tobacco chewing which is a major cause of mortality.[3] Neck dissection have thus become the standard of care in the treatment of squamous cell carcinoma of head and neck at earliest stage due to the high percentage of node metastasis.[4] One of a significant prognostic factor for survival in squamous cell carcinoma (SCC) of the oral cavity is the presence or absence of a cervical metastasis. Thus, management of cervical lymph nodes becomes a vitality important component of the overall treatment strategy for patients with cancers of the head and neck. Specific regional lymph node groups should be appropriately addressed in treatment planning for a given primary site.[5]

The Head and Neck Center at Memorial Sloan-Kettering Cancer Center has described a labelling system of cervical lymph nodes (Table 1). This system divides the lymph nodes in the lateral aspect of the neck into five nodal groups or levels. In addition, lymph nodes in the central compartment of the neck are assigned Levels VI and VII.

One of the more technically difficult aspects of neck dissection in the posterior region of level II is dissection of the upper inner jugular vein and the SAN lymph nodes. This area is known as supra-retro spinal recess and sub muscular recess (SMR), labelled as level IIb.[6] Complications followed by level IIb neck dissection include spinal accessory nerve dysfunction; leads to denervation and atrophy of the trapezius and sternocleidomastoid muscle with the onset of shoulder disability; patients show shoulder droop, pain, weakness and limited range of motion and thus has a poor impact on standard of health and quality of life.[4] To overcome this difficulty, avoiding the dissection of level IIb has been put forward.[1]

Table 1 Levels of cervical lymph nodes

	Submental group
Level II	Upper jugular group
Level III	Mid jugular group
Level IV	Lower jugular group
Level V	Posterior triangle group
Level VI	Central compartment group
Level VII	Superior mediastinal group

Thus, the main objective of this prospective study was to ascertain the prevalence of level IIb metastasis in oral squamous cell carcinoma in order to evaluate whether level IIb dissection should be performed or may be avoided in the management of this disease.

Materials and methods

This prospective study was conducted on 182 patients with histopathologically proven Oral Squamous Cell Carcinoma (OSCC), reporting to the Tertiary care hospitals of Gurgaon and Delhi. The study included males and females in the mean age group of 56 years at the time of surgery with T1-T4a status of the primary tumour & N0-N2b status of the lymph nodes with a follow-up period up to 6 months to 1 year. Exclusion criteria includes locoregionally advanced disease not suitable for surgical resection; history of any previous surgery or Radio therapeutic treatment of the head and neck; patients not available for follow up, T4b tumours and N2c and N3 status of neck nodes.

Methodology

Prior to undertaking any procedure, a detailed medical as well as dental history of the patient was taken. Diagnosis of all lesions was confirmed histopathologically before treatment. Tumours were staged asT1, T2, T3 and T4 and the clinical staging of the lymph node metastasis was based on AJCC Guidelines, 8th edition. Depending on the site of lesion, wide excision was done along with 5mm-1cm clear margins in all the planes (Figure 1). Depending on neck status of the patient, type of neck dissection was decided. If SOHND was done, then level I to III was cleared and in cases of MRND level I to V was dissected (Figure 2). All lymph nodes segregated and labelled. Appropriate reconstruction was done depending on the type of resection i.e., soft tissue or soft tissue with hard tissue (Figure 3). All the specimens-primary and labelled lymph nodes were sent for histopathological examination. Patients were then called on a regular follow up visit after 1 month, 3 months and 6 months for clinical evaluation of recurrence (local and regional metastasis) (Figure 4). Descriptive statistical analysis was used to compare demographics and p-values were calculated to establish the significance level.

A

B

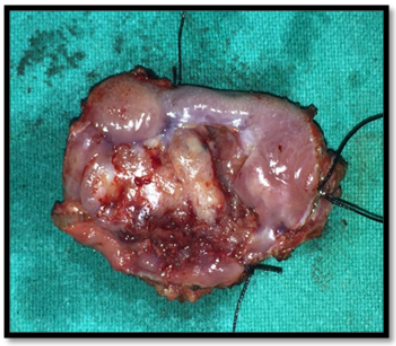

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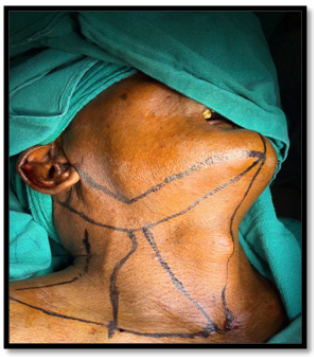
Figure 1 Primary Site; (A) Intraoral photograph showing primary site with markings on left side of tongue. (B) Defect after primary excision. (C) Excised primary lesion.



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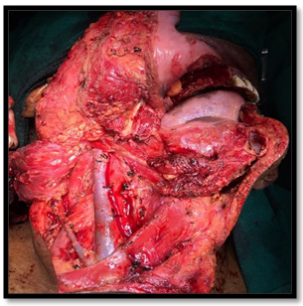

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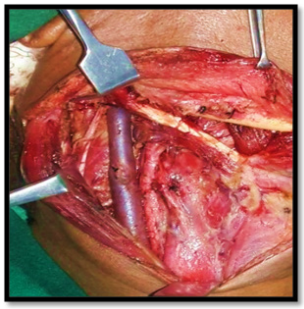

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Figure 2 Neck dissection. (A) Markings for neck dissection (modified schobinger incision). (B) Modified radical neck dissection. (C) Location of level IIb in neck.

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A

B

C

Figure 3 Reconstruction. (A) Reconstruction of primary defect with platysmal myocutaneous flap. (B) Maxillectomy defect repair with buccal pad fat and SSG.

Results

Demographic data with primary site

A total of 182 patients were operated with age ranging from 30 to 80 years with mean age of 56 years out of which 151(83%) were males and rest 31(17%) were females. 219 tumour sites were recorded in 182 patients out of which primary site of the tumour accounts mostly for buccal mucosa (35.2%) and tongue (29.2%).

Clinical treatment

Clinical cTNM staging (Primary tumour (cT) & Regional lymph node (cN) was done in 182 patients according to AJCC Guidelines 8th edition. 208 neck dissection was performed, out of which 140 (76.9%) and 15 (8.2%) patients underwent Modified Radical Neck Dissection (MRND I-III) and Supra Omohyoid Neck Dissection (SOHND) respectively. However, 26 (14.3%) patient underwent bilateral ND and one patient underwent Radical neck dissection (RND).

Pathological analysis

Primary tumour (pT) in patients confirmed histopathologically after surgery and the pathological staging of the lymphatic metastasis (pN) was done in 182 patients where majority of patients shows pathological TNM staging as T2N0M0.

Level IIb Status

Only 22 patients had metastasis in level IIb (12.0%) out of 182 patients and 208 neck dissections undertaken, combining cN0 necks and cN1 necks. Of the 65 necks pathologically classified as N+, only 22 patients revealed metastases at level IIb (33.9%,). Metastases at level IIb without the involvement of other lymphatic chains was not observed in any other cases (Table 2 & Chart 1).

Follow up and Recurrence

Postoperatively clinical parameters studied were recurrence (local & regional) in which 31 patients (17%) (p= <0.001) (09 patients with N0 neck and 22 patients with N+ neck) reported with a local recurrence at 1 year follow-up period whereas remaining 151 patients had no loco regional residual disease at 1 year follow up.

Out of 22 patients with N+ presented with recurrence, 13 patients had IIB involvement (p= 0.002) (Chart 2). Patients with recurrent disease underwent palliative treatment. 125 patients underwent Post OP CTRT within 1-3 months however, 4 patient denied post OP RT.

In our study, 151 patients had disease free survival however, 31 patients (28 males and 03 females) had loco-regional recurrence and undergoing treatment for the same. The overall survival score is 177, as 5 patients expired during follow up period. Survival curves were plotted using the Kaplan-Mier method and the mean survival time was 14.9 (males= 14.8; females=14.9) (Chart 3).

Table 2 Level IIb metastases ratios by lymph node status, tumour stage and site

		Level IIB		Pearson chi square/Fisher exact test	p-value
		Uninvolved n / %	Involved n / %		
N	N0	117 (64.3%)	00 (0%)	45.05	<0.001
	N+	43 (23.7%)	22 (12%)		
T	T1	34 (18.7%)	02 (1%)	7.16	0.067
	T2	43 (23.7%)	02 (1%)		
	T3	40 (30%)	08 (4.4%)		
	T4	43 (23.7%)	10 (5.5%)		
Site of tumor	Tongue	54 (84.3)	10 (15.7)	3.12	0.078
	Other sites	143 (92.2)	12 (7.8)		

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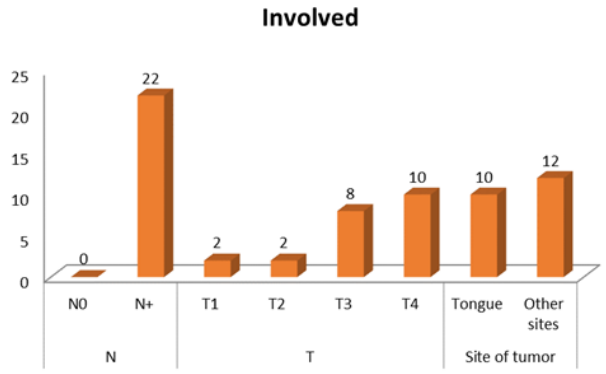

Chart 1 Histopathological evaluation of level IIb node metastases.

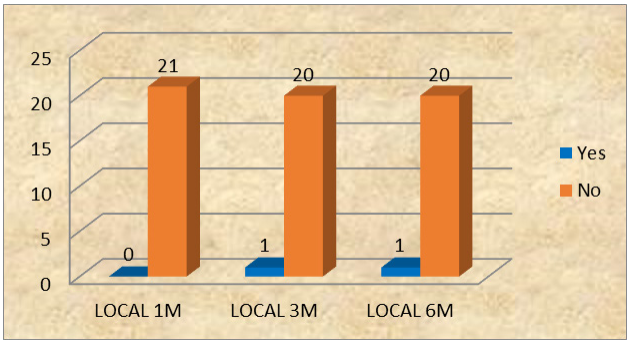

Chart 2 Distribution of local and regional recurrence of metastases in patients at 3 & 6 months.

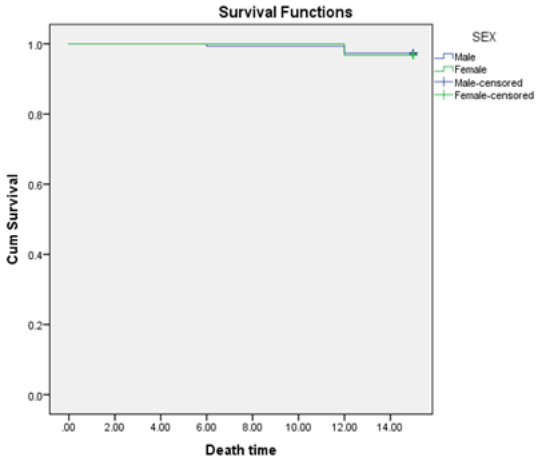

Chart 3 Survival curve using kaplan-mier method.

Discussion

Literature suggests oral squamous cell carcinoma accounts 4% of all malignancies in men and 2% of all malignancies in women and comprises about 3% of all cancer deaths.[7] Management of the neck is mandatory if metastases to the cervical lymph nodes are clinically evident at diagnosis. Regional metastases of OSCC were generally located in levels I, II, and III as reported by Shah et al.[8] Level IIB lymph node dissection has been performed as a part of Elective Neck Dissection (END) after Byers[9] reported its advantage and Schuller et al.[10] demonstrated the high nodal metastasis rate near the spinal accessory nerve, although level IIA and IIB nodes were not distinguished. However, efforts have been made to preserve level IIb lymph nodes by studying the metastasis rate to level IIb after following the reports on shoulder dysfunction 4–12 months postoperatively in 8– 44% of patients who underwent END as a result of lymph node dissection in order to reduce such complications without risking oncologic safety.[11] In the present study, a total of 182 patients were included, belonging to an age range of 30-80 years, mean age being 56 years which is in conjugation with study of S Elangakumaran et al.,[12] who gave an incidence of age ranging 30-74 years with mean age of 56.21 years. In an epidemiological study conducted by R. Sankaranaryana3 revealed buccal mucosa to be the most common site (50% of all cancer within the oral cavity), which is similar with our study where buccal mucosa (n=77) was the most frequently involved site followed by tongue (n=64) (35.2% and 29.2%, respectively).

"The size of the lesion may reflect the social conditions of the population and their ability to obtain healthcare". [13] In the present study, AJCC TNM staging 8th edition was used for classification of primary tumour, lymph node status and regional and distant metastases. Carcinoma of oral cavity has great potential for metastatic spread to lymph nodes, with the incidence reported to be 34-50%.[14] Therefore, clinical presentation and location of nodal metastases can be correlated with the primary tumour.

With the development of the various modifications of neck dissection, there has been a proliferation of terms to describe these various procedures. To facilitate communication and to ensure standardization, the American Head and Neck Society and American Academy of Otolaryngology- Head and Neck Surgery has proposed a classification plan for neck dissection.[15] In this present study, 156 (85.7%) patients underwent unilateral ND and 26 (14.3%) patient underwent bilateral ND.

After extirpation, primary lesion and neck dissection specimens were stored according to the neck level (Level IIb separately) and then sent for histological examination. Out of 182 patients, 117 patients had pN0 neck node status (64.3%) whereas remaining 65 patients (35.7%) had pN+ neck node status. Similar results can be seen in the study by Talmi YP et al.[16] where pathologic staging of the neck specimen was commonly pN0 (61%).

Recent studies reported that the chance of metastasis in Level IIb is very low. The probability of lymph node metastases in Level IIb is greater for tumours in the oropharynx as compared with oral cavity. Thus, it is likely not essential to dissect Level IIB for tumours in the absence of clinical nodal disease in Level IIa. It is predictable that leaving Level IIB dissected will result in a minimum amount of degenerative effect on the SAN as well as minimizes the operative time.[17] Of the 208 necks taken up for surgery irrespective of clinical N stage, the overall incidence of level IIb positivity pathologically was 22 (10.5%) as 22 patient out of 182 patients (12%) revealed metastases at level IIB (p=0.001) , which was comparable with study by Dabholkar et al.[18] who gave an incidence of level IIB metastases as 10.44% and Maher et al.[19] in their study had level IIB incidence of 14.5%. However, de Vicente JC et al.[1] found metastasis to Level IIB as 1.8%. Pugazhendi et al.[20] found that Level II was the most involved site (63.3%) in the patients with SCC of the oral cavity. We found that the most involved site in the neck was Level IB followed by Level IIa. However, in case of the tumour site, only 10 (15.7%) tumour located in the tongue (p value=0.739) showed metastasis in the level IIB lymph nodes, while the remaining 12 (7.8%) primary tumour site shows association with level IIB involvement.In OSCC follow-up after curative treatment depends largely on certain parameters such

as whether a feasible treatment for recurrent disease is available, whether early detection improves patient survival, and whether there is a proper diagnostic test (eg, good sensitivity/specificity) to rule out recurrent disease.[21]

31 patients (09 patients with N0 neck and 22 patients with N+ neck) reported with a loco-regional recurrence at 1 year follow-up period (17%) (p=<0.001), and given palliative treatment, whereas remaining 151 patients had no loco regional residual disease at 6 months follow up. Out of 22 patients with N+ presented with recurrence, 13 patients had IIb involvement (p=0.002). All the patients with local recurrence received adjuvant radio therapeutic management. Liu TR et al.[22] found that age, occult cervical metastases and tumour recurrence were independent factors affecting DFS, while age and tumour recurrence were independent factors for OS. In this study, 151 of 182 patients (83%) remained disease-free postoperatively during follow-up and the overall survival score was 177, as 5 patients expired during follow up period. Survival curves were plotted using the Kaplan-Mier method based on overall survival and the mean survival time was 14.8. The primary shortcoming of our study is the statistical power due to the relatively small number of patients, as well as the limited follow-up. The percentage of metastasis at level IIB in N0 cases was 0%. 22 of 182 patients with OSCC had lymph node metastases at level IIB in with a prevalence of 12%. However, when compared with the current literature, this is a low prevalence, and further we did not find any association between clinical variables and metastases at level IIb. Nevertheless, we have obtained some relevant results despite of the sample size. In our study, majority of patients with positive lymph nodes at level IIa also had metastasis at levels I and IIa. Thus, after achieving a statistically significant finding, it is recommended that the incidence of metastasis to Level IIb is very rare and is remarkably associated with metastasis to Level IIa.[1]

Conclusion

The findings of our study are consistent with previous studies, which suggest that in low incidence of level IIb nodal metastases in OSCC, exploration of Level IIb is not mandatory when performing an elective neck dissection in cN0 cases, but should be undertaken whenever there is extensive involvement of Level IIa clinically, which can significantly influence the post-operative morbidity of neck and shoulder.

Our results indicate that 22 patients were diagnosed with sublevel IIb metastases however additional research is required for the extrapolation of the findings. Thus, it confirms the recommendation given by various authors to always dissect level IIb in case of high metastatic rate of patients with clinically positive neck nodes, exclusively staged as N2b or greater.[23] However, for a therapeutic neck dissection, level IIb clearance should always be done if there are positive lymph nodes at level IIa clinically, or intra-operatively on frozen section.[18]

As it was very troublesome to find study in published English literature pertaining to Level IIb metastasis in OSCC conducted in India, it was our sincere effort, though in a small sample size to bring out an issue, which lacks in research from this particular part of world despite having majority of patients with oral carcinomas.

Funding

None.

Acknowledgments

None.

Conflicts of interest

The authors declare that there is no conflict of interest to declare.

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