ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

Removal of level IIB nodes during extended supraomohyoid neck dissection (I-IV) for oral tongue carcinoma

Prabu NP*, Vivek Muthulingam, Swarapriya R, Banu Sargunar, and Shamugapriyan.

Department Of Oral And Maxillofacial Surgery, Sree Balaji Dental College And Hospital, Chennai, Tamil Nadu, India

ABSTRACT

The aim was to correlate the incidence of metastasis to Level IIB of neck lymph nodes (LNs) for oral tongue carcinomas with the site, size, and histological grade of tumor. Settings and Design :Total 15 patients of either sex, with biopsy-proven oral tongue squamous cell carcinoma of any subsite, size or histologic grade, but N0/N1 were taken for selective neck dissection (SND).Materials and Methods:15 patients who underwent SND for oral tongue carcinoma were analyzed for the relation of the sub- site, size, and histological grade of malignancy with metastatic involvement to Level IIB nodes. Level IIB nodes were dissected separately and sent for histopathological examination.Results:Only 2 of 15 patients had the involvement of Level IIB neck nodes. There was no relation between the site, size, and histologic grade of primary tumor with the metastasis to Level IIB. The Level IIA nodes were positive in both the positive cases of Level IIB.Conclusions:For tumors in oral tongue (N0/N1), while performing elective or therapeutic SND the dissection of Level IIB nodes could be omitted as it will provide significant decrease in operative time and also less of spinal accessory nerve trauma-related complications.

Keywords: Level IIB nodes, neck dissection, oral cancer, site, and size of tumor

Corresponding author

ISSN: 0975-8585

INTRODUCTION

The most important prognostic factor in the management of squamous cell carcinoma (SCC) of the oral cavity is still the presence of cervical nodal metastasis, as a century ago. Once the tumor involves neck nodes, survival drops by almost 50%.[1] Improvements in surgical modalities and functional results over the last 10 decades have been based on technical and on philosophical considerations.

In spite of advancement in science, molecular medicine and target therapies, surgical treatment of metastasis using different techniques, from selective neck dissection (SND) to extended radical neck dissections, form a major part in the management of neck metastasis. This is due to the fact that, so far, there is no treatment more effective for resectable neck metastasis, than surgery.

Kocher in 1880 was the first person to present a conceptual approach for removing nodal metastasis.[2] George in 1906, presented a series of 132 neck dissections, and described the classic technique of the radical neck dissection.[3] Originally, this technique included removal of the submandibular salivary gland, internal jugular vein, greater auricular and spinal accessory nerves (SANs), as well as the digastric, stylohyoid, and sternocleidomastoid muscles.

Suen and Goepfert further subdivide areas of differing lymphatic drainage within certain levels.[4] The subzones IA, IB, IIA, IIB, IVA, IVB, VA, and VB which were not part of the original description of the levels of the neck were thus included. Increased knowledge of the regional spread of tumors and a desire to minimize operative morbidity have led to the widespread use of SND as a staging or therapeutic procedure in the management of cancer patients.[5,6]

This has enabled us to adopt modified and SNDs which have ultimately led to a dramatic reduction in morbidity and almost eliminated mortality due to neck dissection.[7] Depending on the site of the primary tumor, the subzones may have biological significance and can guide decision-making in determining which nodal levels should be addressed surgically. By removing only those nodal groups considered high risk for metastasis based on the primary tumor site and by preserving key non-lymphatic structures, SND retains the oncological effectiveness of the radical neck dissection but avoids much of the associated morbidity.

Patient survival and regional control following SND are comparable to those of more extensive neck dissections in the clinically N0 or in some instances, the node-positive neck.[8]

One of the more technically difficult aspects of SND is a dissection of the upper jugular and spinal accessory LNs in the posterior region of Level II. This area has been previously referred to as Level IIB,[4] the supraretrospinal triangle, the supraspinal accessory LN pad, and more recently, the submuscular recess (SMR).[9]

The concept of sublevels is clinically relevant since LN metastasis to Level IIB are quite rare.[10] Limiting unnecessary dissection of nodal sublevels unlikely to harbor metastatic disease results in greater preservation of function of important clinical structures in the neck, particularly the SAN. Minimal dissection and skeletonization of the SAN provides the best functional results.

This study is an analysis along with systematic review of literature in the same direction, involving a series of consecutive patients undergoing neck dissection to further characterize the prevalence of nodal metastasis in the SMR or Level IIB in Indian population.

Metastatic involvement of the Level IIB as it relates to the primary tumor site, tumor size, and histologic grade of malignancy are also discussed.

MATERIALS AND METHODS

A total of 15 cases with histopathologically proven oral tongue SCC (OSCC) classified according to AJCC 2005 (sixth edition) with preoperative neck status (N0 or N1) were undertaken for the study. All the procedures were carried out under general anesthesia wherein the patients were intubated using the nasotracheal intubation.

ISSN: 0975-8585

The neck was dissected first and the nodes from Level I-IV (Therapeutic and elective, Nodes dependent) were resected *en bloc* along with the primary tumor inside the oral tongue carcinoma trying to keep at least 2 cm clear margins all around. Level IIB was dissected exclusively and nodes were excised, labeled, and later sent for histological examination separately from the rest of the specimen

The study included 15 patients which were in the age group of 25–45 years. There were 11 male patients and 4 female patients.

The distribution of patients according to primary sub- site and size of tumor was according to tongue site, 11 patients had tumor lateral border of tongue m, 1 patients had tumor at tip of the tongue,3 patients had tumor at ventral region of the tongue. According to the size of primary tumor, 6 patients had primary of size T1, 6 had primary of size T2, 2 had primary of size T3, and 1patient had primary of size T4a.

RESULTS

The site of tumor when co-related with positive nodes at different levels in neck for their role in influencing the metastasis pattern was non-significant except for tumors at the tip of the tongue which had significant co-relation with the pattern of drainage to Level IA [Table 1].

Table 1:Number of positive nodes according to the site of primary tumor

Site of primary tongue	IA	IB	IIA	IIB	III	IV
LATERAL REGION	8	10	2	2	2	2
VENTRAL REGION	4	6			1	
TIP OF THE TONGUE	6	8				
total	18	24	2	2	3	2

The size of primary tumor when co-related with positive nodes at different levels in the neck for their role in influencing the metastasis pattern was again non-significant on statistical analysis for any particular tumor size [Table 2].

Table 2 Number of positive nodes according to the size of the primary tumor

Size of the tumor	IA	1B	IIA	IIB	III	IV
T1	4	3				
T2	6	3			1	
T3	3	7	1	1	1	1
T4a	5	12	1	1	1	1
total	18	24	2	2	3	2

While co-relating the histologic grade of malignancy and pattern of metastasis to a different level of nodes in neck, all the patients showed metastasis limited to Level I and II. Level III was involved only in 3 cases which were well-differentiated OSCC of lateral tongue. All the patients had histologic Grade I or II of malignancy [Table 3].

Table 3: correlation of histologic grade with positive levels

Primary site	Histologic grade	Positive nodal level				
Lateral region	Well differentiated	Level IB	Level IIA	Level III	Level III	
Tip of the tongue	Well differentiated	Level IIA				

Ventral region	Well differentiated	Level IA	LevelIIA	LevelIII		
Lateral region	Well differentiated	Level IB				
Lateral region	Moderately differentiated	Level IB	Level IIA	Level IIIB		
Ventral region	Well differentiated	Level IB	Level IIA			
Ventral region	Well differentiated					
Lateral region	Well differentiated	Level IB				
Lateral region	Moderately differentiated	Level IA		Level IB	Level IIA	Level IIB
Lateral region	Well differentiated	Level IB				Level IV
Lateral region	Well differentiated	Level IA				
Lateral region	Well differentiated					
Lateral region	Well differentiated	Level IB				Level IV
Lateral region	Well differentiated	Level IB				

The most significant result of the study was found while co-relating the incidences of metastasis to Level IIA with Level IIB., it was suggested that there was no incidence of isolated metastasis to Level IIB without the evidence of metastasis to Level IIA.

DISCUSSION

Squamous cell carcinoma of the oral cavity accounts for 4% of all malignancies in men and 2% of all malignancies in women, and constitutes almost 3% of all cancer deaths.[11] A cervical LN metastasis is one of the most significant prognostic factors in patients with SCC of the oral tongue. The surgical options for managing neck metastasis include a classic radical neck dissection, a modified radical neck dissection, and a SND. Shah[6] reported that regional metastasis of SCC of the oral cavity was generally located in Levels I, II, and III. In addition, they reported that the risk of skip metastasis to level IV in oral tongue cancer. Therefore, extended supra omohyoid neck dissection (LEVEL I-IV) is becoming increasingly popular and acceptable for elective treatment in managing clinically N0 necks in patients with SCC of the oral tongue.

In the present study, the lateral boder of the tongue was the most frequently involved site. while the tip of the tongue was the least commonly involved site These regional differences may be attributed to the exclusive use of chewing tobacco in the Indian subcontinent compared to smoking in the West.[12]

In our study, we observed mostly lesions with a size T2 and T3and less frequently of size T1 and T4a) which can be compared to the work of Luciana S. Marocchio *et al.*, and Oji and Chukwuneke.[13] Recently, the general indications for performing extended SOHND for SCC of the oral tongue have been extended to therapeutic lymphadenectomy in conjunction with postoperative radiotherapy for a minimal nodal metastasis confined to the first echelon of the lymphatic drainage (N1) as well an elective lymphadenectomy in patients with clinically negative nodal disease (N0) at high risk for cervical metastasis.

There may be various postoperative morbidities after a extended SOHND, and one of those is postoperative shoulder dysfunction, which occurs less but frequently, as compared to radical neck dissection.

Shoulder syndrome because of radical neck dissection was first described by Nahum *et al.*[14] Findings of this syndrome are shoulder pain, restricted abduction, a normal passive range of motion, pathoanatomical changes (shoulder drop, muscle atrophy, wing scapula), and abnormal electroneuromyographic changes. Shoulder syndrome is considered to be a result of SAN injury.[15,16] The area in neck, which during dissection is most likely to cause damage to SAN, is Level IIB. The boundaries of

Level II extend from the level of the skull base superiorly to the level of the lower border of the hyoid bone inferiorly. The anterior (medial) boundary of Level II is the posterior belly of digastric/stylohyoid muscle and the posterior (lateral) boundary is the posterior border of the sternocleidomastoid muscle. The levator scapula and splenius capitis muscles form the bed of this anatomical area[4,17].

Level II LNs are located around the upper third of the internal jugular vein and have a close relationship with the SAN. It crosses surgical neck Level II obliquely in a superoinferior and mediolateral direction dividing it into two parts, the posterosuperolateral part of which has been termed sublevel IIB[4].

The latest classification of neck dissection by the American Head and Neck Society and the American Academy of Otolaryngology – Head and Neck Surgery recommended dividing Level II into sublevels A and B.[17] The nodes within sublevel IIA are located anteriorly to the vertical plane defined by the SAN, while those in sublevel IIB are located posterior to this plane. Sublevel IIB has been reported to contain a median of 4.2 nodes per specimen.

Similarly in our study, we found the mean number of nodes harvested from Level IIB was >4. A clear association between the extent of the dissection and the number of harvested LNs was observed.

"The quality of life after neck dissection is significantly improved if the function is preserved. Morbidity can be prevented by SND in selected cases."[17] It has recently been reported that the probability of metastasis in Level IIB is very low.[20]

Technical descriptions reported by a number of other studies stressed the importance of including Level IIB LNs during extended SOHND.[5]

In our study, we co-related the incidence of metastasis to various levels of neck with the sub-site and size (T) of primary oral tongue tumor in the oral cavity.

When co-relating with the site of primary tumor, we found that the lateral border of the tongue have significant correlation with the drainage pattern to Level IB When co-relating with size of primary tumor, we found that size of primary tumor does not affect the pattern of drainage to any specific level which was comparable to the studies by Umeda *et al.*,[21] and Akhter *et al.*,[22] who stated that the prevalence of neck metastasis was not significantly co-related with the primary site and T stage [Figure 2]. Number of positive nodes according to the size of the primary tumor

The risk of nodal disease in Level IIB is greater for tumors arising in the oropharynx compared with the oral cavity and larynx. Thus, in the absence of clinical nodal disease in Level IIA, it is likely not necessary to include Level IIB for tumors arising in these latter sites. It is probable that leaving Level IIB undissected will result in a minimal deteriorative effect on the SAN as well as decrease the operative time.

None of the patients showed metastasis to Level IV and Level V during follow-up and imaging studies which were in conjunction with the findings of Shah.[6]

We found that the most common involved site in the neck was Level IB followed by Level IIA, which was comparable to study done by Pugazhendi *et al.*,[27] who also concluded with the same results as ours. The studies not in conjunction with our results were the studies by Tao *et al.*,[28] and Vartanian *et al.*,[29] who stated that Level IIA is the most commonly involved site in metastasis.

Furthermore, in both the patients with positive Level IIB nodes there were always positive nodes in Level IIA. There was a significant correlation between the incidence of metastasis to Level IIB and Level), which means that the metastasis to Level IIB is always associated with Level IIA and never independent of it which was comparable to studies by Lea *et al.*,[26] Elsheikh *et al.*,[30] and Chone *et al.*[20] All of them suggested that there are no incidences of isolated metastasis to Level IIB and if metastasis to Level IIB is there then it is always in conjunction with Level IIA

We were able to efficiently co-relate the said parameters and found no significant relation of site and size of tumor to the nodal drainage except for tumors at lateral border which showed definite pattern of metastasis to Level IB.

We also found a definite co-relation between the histologic grade of malignancy and the extent of neck nodal metastasis, which was comparable to the studies done by Umeda *et al.*,[21] and Akhter *et al.*[22] According to them patients with Grade I-II histologic malignancy showed limited metastases that involved LNs in Levels I-II. On the other hand, patients showing Grade III-IV histologic malignancy often had metastases that extended beyond Level III, regardless of T stage.

In our study ,result was achieved suggesting that the incidence of metastasis to Level IIB is very rare and is significantly associated with metastasis to Level IIA.

CONCLUSION

Exploration of Level IIB is not mandatory in all cases, but should be undertaken whenever there is extensive involvement of Level IIA clinically which will greatly influence the postoperative morbidity of neck and shoulder.

As it was very difficult to find any study in published English literature pertaining to Level IIB metastasis in neck and oral tongue carcinomas 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 in spite of having the maximum number of patients with oral tongue carcinomas.

Further, more prospective and multi-institutional studies are required especially pertaining to exclusive cases of oral tongue malignancies and their biological behavior.

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