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RESEARCH ARTICLE

RECENT TREND OF LEVEL IIB NODAL METASTASES IN ORAL AND LARYNGEAL CANCERS: PROSPECTIVE STUDY AND SYSTEMIC REVIEW OF LITERATURE

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ABSTRACT

To determine positivity of lymph nodal metastases at level IIb in patients with oral and laryngeal cancers undergoing neck dissection
Design: Prospective study
Setting: Academic tertiary care referral center
Patients: 50 patients undergoing neck dissection for oral and laryngeal cancer between June 2, 2008 and November 30, 2010, were prospectively analyzed. Patients with a history of neck dissection or whose pathology reports did not clearly distinguish the level IIb from other nodal levels were excluded from study.
Interventions: Patients underwent neck dissection based on primary tumor site and well established regional lymphatic drainage patterns.
Main outcome measure: Presence of histopathologically proven nodal disease at level IIb
Results: Fifty patients underwent 61 neck dissections, 11 of which were bilateral. The prevalence of metastases at level IIb was 0% (0/23) in clinically No necks and 15.79% in clinically node positive necks(6/38) with overall incidence of 9.8%(6/61).there was no isolated metastases at level IIb .There was a stastically significant association between level IIa and IIb metastases(p=0.00). No significant association observed between metastases at level IIb and primary tumor site (p=0.398) and clinical N stage (p=0.075)
Conclusion: The results of present study suggest that positivity of level IIb nodal metastases is rare in patients of oral and laryngeal cancer who underwent neck dissections.

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INTRODUCTION

The increased understanding of regional spread of head and neck tumors and a desire to minimize operative morbidity have led to the widespread use of selective neck dissection (SND) as a staging or therapeutic procedure in the management of head and neck cancer patients. It is likely that the accessory nerve can be subjected to traction injury and segmental devascularization. Prospective studies (Laverick *et al*., 2004). have shown that SND causes a small, but significant impairment to shoulder function. Spinal accessory nerve divides level II into 2 parts, posterosuperolateral part of which was named level IIb by Suen and Goepfert (Suen *et al*., 1987). and was named the submuscular recess by Calearo and Teatini (Calearo *et al*., 1983) and Talmi (Talmi, 1998) *et al*. One of the more technically difficult aspects of SND is dissection of the upper jugular and spinal accessory lymph nodes in the posterior region of level II. This area has been referred to as level IIb, the supraretrospinal triangle, the supraspinal accessory lymph node pad, and the submuscular recess (SMR). It corresponds to the node bearing tissue bordered deeply by the fascia overlying the splenius capitus and levator scapulae muscles, anteriorly and inferiorly by a plane at the level of the SAN, superolaterally by the inferior border of the posterior belly of the digastric muscle, superiorly by the skull base, and posterolaterally by the sternocleidomastoid muscle However, some patients who have undergone selective neck dissection experience postoperative shoulder syndrome, despite preservation of spinal accessory nerve. The reason for this may be that, although the spinal accessory nerve is only minimally dissected in selective neck dissection, this procedure can cause some injury to the spinal accessory nerve during the removal of level IIb lymph node groups because of the neuropraxia resulting from traction and elevation. The aim of study was to identify positivity of level IIb lymph nodes in cases of oral and

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laryngeal cancer and also to find necessity for dissection of lymph node IIb in cases of oral and laryngeal cancers. So it is important to know the positivity of level IIb lymph nodes in oral and laryngeal cancers to prevent from spinal accessory nerve dysfunction and also this area is surgically difficult to dissect so minimizing operative time by excluding this area in neck dissection.

MATERIAL AND METHODS

This consists of 50 cases of carcinoma of oral cavity and larynx that previously untreated requires surgery for primary along with neck dissection. The American Joint Committee[5] on Cancer TNM staging system was used for classification of the primary tumor and regional metastases. For purpose of this study, the contents of lymph nodes at level IIb were dissected, labeled and processed separately from remainder of level II (designated at level IIa) and the main neck dissection specimen (FIG II, III, IV)and oriented appropriate nodal levels for subsequent histopathological evaluation. Level IIb was defined (FIG I) as the node bearing tissue bordered deeply by fascia overlying splenius capitus and levator scapulae muscles, anteriorly and inferiorly by a plane at the level of the spinal accessory nerve, superolaterlly by inferior border of posterior belly of diagastric muscle, superiorly by skull base and posterolaterally by sternocleidomastoid muscle. All specimens submitted for histopathological diagnosis. The lymph nodes with metastatic disease were determined for level IIa &IIb. The positivity of level II b noted Prevalence of level II b positivity according to stage and site will be found. The number of neck dissections with histologically positive nodal metastases at level IIa and IIb was determined and is presented according to primary site. Appropriate stastically tool used for statistical analysis. The univariate association between level IIb metastasis and associated risk factors were assessed using Fisher Exact test .Because of small number of neck dissections with positive nodal disease in level IIb, no multivariate analysis was performed.

RESULTS

50 patients selected in this study, out of which from oral cavity consists of 40 patients (80%) and from larynx (20%). Different primary subsites in oral cavity according to the distribution of patients included buccal mucosa 40 %(16), tongue 27.5 % (11), alveolus 25 % (10) and remaining floor of mouth, Upper lip and retromolar trigone contributed 2.5% each. In laryngeal cancers, different primary subsites in larynx included supraglottis 90 % (9) and 10% (1). Clinically N0 patient were 14(28%) and N+ were 36(72%). Distributions for clinically N+ stage were N0 14 (28%), N1 22 (44%), N2a 1 (2%), N2b 8 (16%) and N2c 5 (10%). Majority patients in study population were from clinically N+ node status disease. 50 patients underwent 61 neck dissections, out of 50patients, 11 were bilateral. Out of 61, 23 underwent elective neck dissections. Majority patient underwent therapeutic neck dissection (62.3%) In 61 neck dissections, nodes at level IIa and IIb dissected and sent separately for histopathological analysis. The number of lymph nodes positive for metastasis at level IIa was 10 (16.4%). There was no evidence of metastasis at level IIa in 51 neck dissection (83.6%). The prevalence of nodal metastasis at level IIa was 16.4%. Only 6 were positive for metastasis at level IIb. The prevalence of nodal metastasis at level IIb was 9.8 % (6/61). The prevalence of metastasis at level IIb was 0% in clinically N0 necks (0/23) and 15.79% in clinically node positive necks (6/38).

DISCUSSION

The presence of nodal metastasis is estimated to decrease determinate survival by about 50% (Shah *et al*., 1995; Puri *et al*., 2003). Nevertheless; ND is a surgical procedure with remarkable sequelae that can influence the residual quality of life. Shoulder disability is one of the most important morbidities traditionally associated with radical ND characterized by shoulder drop, scapular flaring, pain, and weakness.

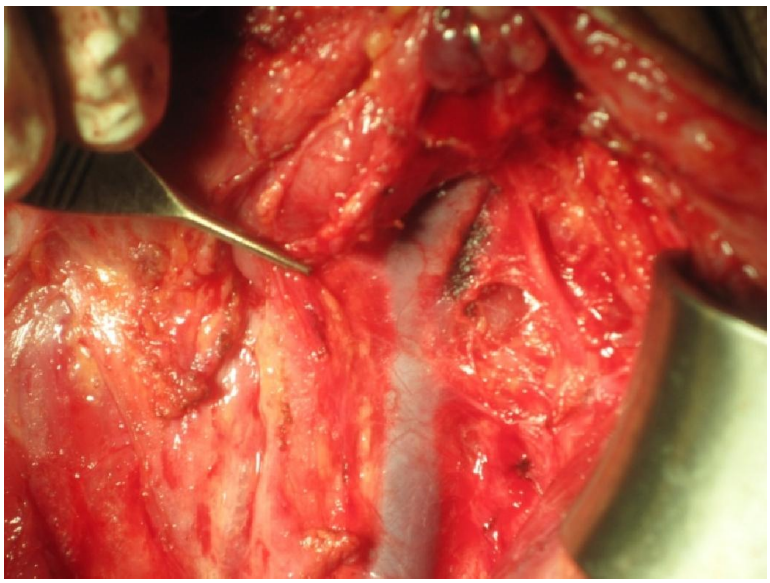

Fig. 1. Level II B Lymph node

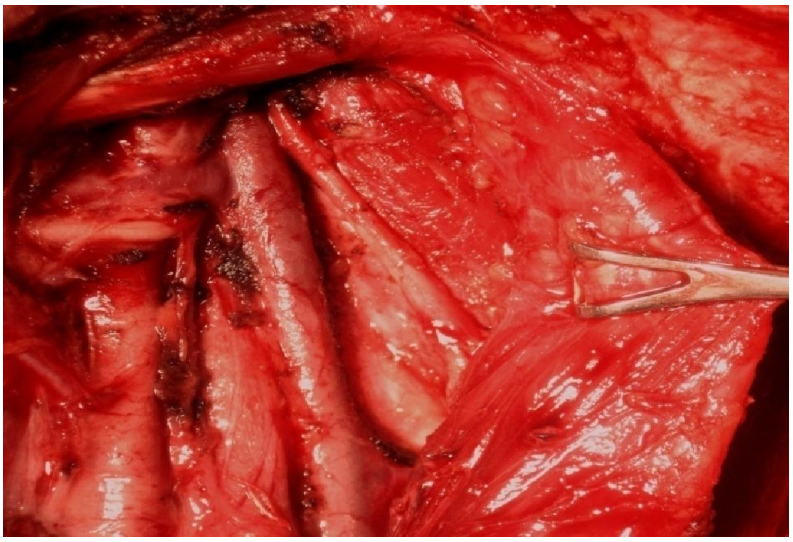

Fig. 2. Clearance of Level II B lymph node

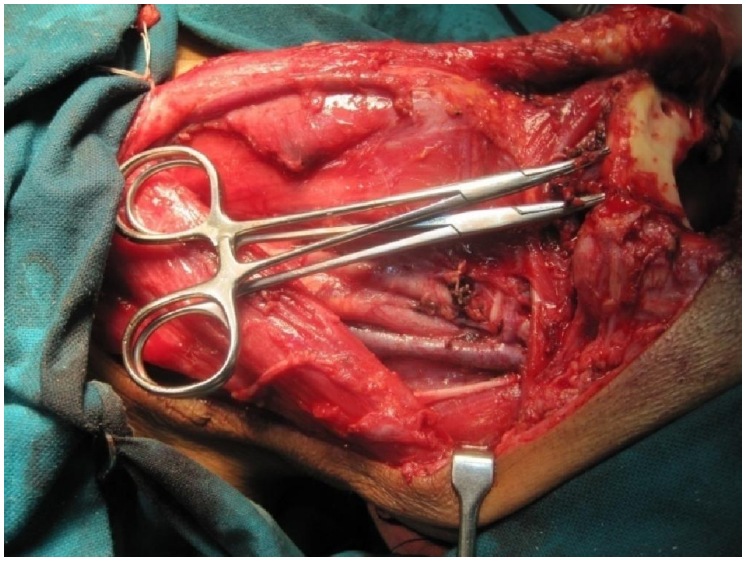

Fig. 3. Clearance of Level IIA & B clearance and ligation of superior thyroid artery

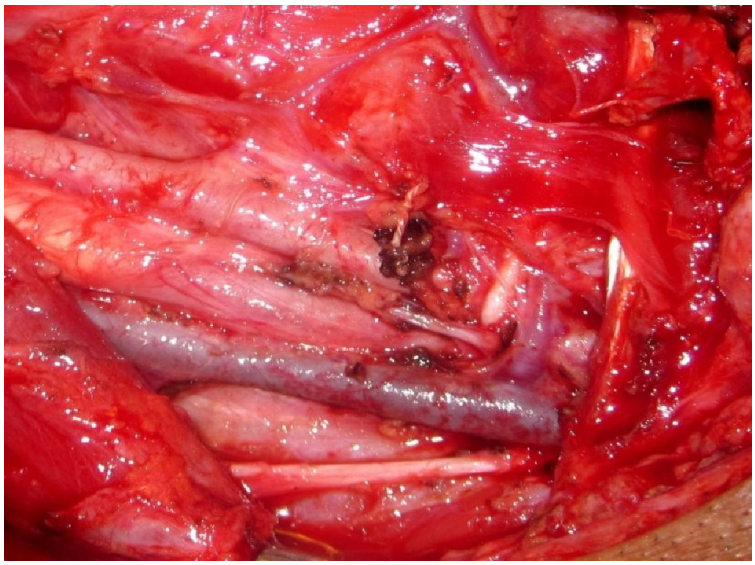

Fig 4. Neck dissection with clearance of LEVEL II Lymph nodes with the bed showing internal and external carotid arteries, Internal jugular vein

Site of primary tumor(n=50)	Major tumor subsite	No of patients	Neck dissections(n=61)
Oral cavity(n=40)	Buccal mucosa	16	16
	Oral tongue	11	11
	Alveolus/mandible	10	11
	Floor of mouth	1	1
	Retromolar trigone	1	1
	Upper lip	1	1
Larynx (n=10)	Supraglottis	9	18
	Glottis	1	2

Distribution of primary site and tumor stage Number of patients by T classification

Primary site	T1	T2	T3	T4
Oral cavity	1	12	10	17
Larynx	0	0	6	4
Total	1(2%)	12(24%)	16(32%)	21(42%)

N+ neck stage
No of patients by clinical N classification

N stage	N0	N1	N2a	N2b	N2c
Oral cavity	9	20	0	7	4
Larynx	5	2	1	1	1
Total	14(28%)	22(44%)	1(2%)	8(16%)	5(10%)

Case no	Site of primary	Clinical TNM stage with level IIb positivity
1	Tongue	T3N2bM0
2	Alveolus	T4N2cM0
3	Alveolus	T4N2cM0
4	Supraglottis	T3N1M0
5	Supraglottis	T3N2bM0
6	Supraglottis	T4N2aM0

Source of study	Remarks
Kraus *et al*. 1996	No isolated level IIb metastasis, positive node from tonsil primary, 3 contralateral N0 neck.
Chone *et al*. 2000	Significant relationship between level IIb metastasis and level IIa-III metastasis. No isolated level IIb metastasis, positive node from floor of mouth, 11 contralateral N0 necks.
Talmi *et al*. 2001	100% cases of level IIa metastasis also reported metastasis at level IIb
Koybasioguet *et al*. 2002	25 contralateral N0 necks
Silverman *et al*. 2003	Significant correlation between IIb stage and high pN status Significant correlation between IIb metastasis and level IIa metastasis. No isolated level IIb metastasis, no contralateral neck.
Coskun *et al*. 2004	59 contralateral N0 necks.
Lim *et al*. 2004	No isolated level IIb metastasis, positive node from tongue primaries, 45 bilateral neck N0 necks.
Elsheikh *et al*. 2005	No isolated SMR metastases, Positive nodes from tongue primary, 26 contralateral N0 necks.
Lim *et al*. 2006	No isolated SMR metastases, 56 contralateral N0 necks Significant correlation between IIa and cN+status and Between IIb metastasis and presence of other metastatic Lymph nodes.
Villaret *et al*. 2006	Significant correlation between IIb metastasis and cN +status and IIb metastasis and the site of primary tumor.
Paleri *et al*. 2007	Isolated SMR metastasis, positive node from floor of mouth, 11 contralateral N0 necks
Our study	No isolated level IIb metastases. Significant correlation with level IIa metastases

A large spectrum of different procedures is presently available for treatment of LN metastasis, but the anatomic preservation of the spinal accessory nerve is not always associated with normal shoulder function. In fact, only 70% to 75% of patients who underwent to nerve sparing dissections did not report any shoulder disability (Leipzig *et al*., 1983; Cappiello *et al*., 2005). The clearance of the submuscular recess inevitably causes mechanical traction and ischemic trauma on the cranial portion of the spinal accessory nerve running from the skull base to its entrance into the sternocleidomastoid muscle.

Morbidity caused by nerve injury is a greater source of persistent problems than the other 2 structures. the sternomastoid muscle, and the internal jugular vein The accessory nerve is important in supplying motor function to the trapezius in the majority of patients, and sacrifice of this nerve causes significant shoulder dysfunction and pain hence if prevalence for level IIb positivity for metastasis low, we can simply avoid it by carefully eliminating dissection at level IIb. When comparing our study for prevalence of level IIb metastasis with recent published studies. The prevalence was 9.8% which was still consistent with published results. Majority of our study population were clinical N+ status disease and published results had majority from clinically N0 status patients. The overall prevalence was rare as in recent published studies (Talmi *et al*., 1998; Silverman *et al*., 2008; Lim *et al*., 2008; Elsheikh *et al*., 2005; Lim *et al*., 2006; Andrea Bolzoni Villaret, 2007; Vinidh Paleri, 2008; Chone

et al., 2008; Talmi *et al*., 2001; Koybasioglu *et al*., 2002and Elsheikh *et al*., 2006). All patients who were positive for metastasis at level IIb were also positive for metastasis at level IIa. There was significant correlation between level IIb and level IIa in this study (p=0.0) Chone[15] *et al* in 2000 found Significant correlation between IIb metastasis and IIa-III metastasis (P<0.5).Talmi[16] *et al* in 2001 was found similar result as our study ,as all cases with level IIb positive for metastasis also positive for metastasis at level IIa. Silverman[8] *et al* in 2003 was concluded that there was significant correlation between levels IIa with level IIb metastasis especially with advantage of disease. There were no isolated level IIb metastasis in studies conducted by Kraus (1996), Chone, (2000), Silverman, (2003), Lim (2004&2006) (200&2006), Correlette (2005) as in this study. There was no significant association of level IIb metastasis and site of primary (p=0.398). There were no significant correlation between level IIb metastasis and type of dissection performed (therapeutic /elective). (P=0.075). Neck dissection performed for elective purpose (23/61), no metastatic disease found positive at level IIb. All metastasis at level IIb were found positive when procedure done for therapeutic purpose. Numbers of therapeutic neck dissection were also high in study. Sample size was not adequate for showing relationship between level IIb metastasis and type of neck dissection especially for elective neck dissection

Conclusion

The prevalence of level IIb lymph nodes in oral and laryngeal cancers was 9.8 % (6/61). The prevalence of metastasis at level IIb was 0% in clinically N0 necks (0/23) and 15.79% in clinically node positive necks (6/38). There was no isolated metastasis at level IIb. All cases with positive metastasis at level IIb also had positive metastasis at level IIa. There is statistically association between level IIa and level IIb metastasis (p value <0.05)) in this study. No significant association observed between metastasis at level IIb and primary tumor site (p=0.398) and clinical N stage (p=0.075). It is important to recognize that these findings are based on small number of level IIb positive neck dissections (6/61). The prevalence of metastasis at level IIb was low. The overall prevalence of metastasis at level IIb in published recent studies was rare.

On the basis of this study, very little to be gained by dissecting at level IIb. Dissection at level IIb may be avoided in patients with a clinically N0 neck or limited nodal disease not involving level IIa. The use of frozen section histopathologic analysis at the time of neck dissection facilitates accurate and timely recognition of nodal disease in this patients. on cologically safe dissection can be achieved without dissecting level IIb nodes particularly for N0 necks clinically or limited disease not involving IIa with proper frozen section control at time of neck dissection. The recent trend of published studies explains the rarity of involvement of level IIb nodal metastasis which is consistent with this study, larger data needed to prove association of involvement of level IIb nodal metastasis in head and neck cancer patients for it's appropriate prevalence so that morbidity due to nerve injury can be avoided while achieving oncologically safe neck dissection.

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