Metastases to Level IIB in Oral Cavity Cancers: Is there a Possibility of Super Selective Neck Dissection?

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Abstract:
Background: One of the common problems associated with supraomohyoid neck dissection (SOHND) is shoulder syndrome due to spinal accessory nerve (SAN) dysfunction. This prospective study investigated the incidence of cervical node metastasis in sublevel IIB lymph nodes to determine the oncologic safety of preserving these nodes during SOHND for oral cavity cancers (other than cancer tongue) with clinically negative neck (cN0), thus avoiding associated morbidity related to SAN dysfunction.

Materials and Methods: A total of 101 oral cancer patients (other than cancer tongue) with cN0 who underwent SOHND (Levels I-III) between March and December 2010 were studied. Intraoperatively, sublevels IIB and IIA were dissected separately, labeled and subjected to histopathology to reveal the presence of sublevel IIB metastasis. The clinicopathological characteristics, such as perineural, perivascular and perilymphatic invasion, and tumor depth, were also recorded. Postoperatively, the patients were tested for signs of shoulder syndrome clinically.

Results: Number of nodes per patient varied from 0 to 9 and the mean value was four. Of the 101 patients, the histopathology reports of 95 patients showed reactive nodes. Only six patients (6%) demonstrated malignancy of which one presented with the perinodal spread. Postoperatively, none of the patients presented with signs of shoulder syndrome.

Conclusion: Of the total patients assessed, only 6% of the cases presented metastasis to sublevel IIB lymph nodes. Though the percentage of cases showing metastasis was very less, the benefits of preserving functions of SAN has to be weighed against possibly reduced oncological control. Since the primary goal of any cancer resection surgery is the oncological clearance and safety, sublevel IIB remains an important region to be incorporated in elective neck dissections for primary oral cavity cancers.

Key Words: Metastasis, shoulder dysfunction, sublevel IIB, supraomohyoid neck dissection

Introduction
Supraomohyoid neck dissection (SOHND) is the choice of the management in oral cancers with the clinically negative neck (cN0). SOHND is a selective cervical node dissection that refers to the removal of Level I-III lymph nodes. It removes the contents of submental and submandibular triangles (lymph node Level I), the jugulodigastric and juguloomohyoid lymph nodes, and the tissues bearing lymph nodes located anterior to the cutaneous branches of the cervical plexus and above the omohyoid muscle (lymph node Levels II and III).

The boundaries of Level II extend superiorly from the skull base to the lower border of the hyoid bone inferiorly. Posterior border of digastic/stylohyoid muscle forms the medial boundary and the posterior border of the sternocleidomastoid muscle, the lateral boundary. Level II nodes, located around the upper third of internal jugular vein, are closely related to spinal accessory nerve (SAN) which crosses surgical neck Level II obliquely in superoinferior and mediolateral directions dividing them (as recommended in revised classification of neck dissection by the American Head and Neck Society and the American Academy of Otolaryngology-Head and Neck Surgery) into sublevel IIA, located anterior to the vertical plane defined by the SAN and Level IIB, located posterior to this plane.

In contrast to a radical neck dissection (RND), SOHND can preserve various functionally important anatomic structures namely, the sternocleidomastoid muscle, the internal jugular vein, and the SAN, while preserving oncologic safety. However, a variety of morbidities associated with SOHND have been reported in post-operative patients, one of which is shoulder dysfunction which may be due to traction, elevation or electrocautery injury to the SAN during dissection of sublevel IIB or due to ischemia of the nerve caused by the ligation of the occipital artery or one of its branches supplying the nerve.

Neck dissection per se was considered a morbid procedure until the concept of selective neck dissection was popularized by Shah and Andersen.2 Evidence-based trials with a large number of cases can justify the idea of super selective neck dissection which is presently a futuristic concept. One such concept led to investigate the role of preserving sublevel IIB nodes during SOHND for oral cavity cancers (other than cancer tongue).
with cN0 to prevent SAN related injury.\textsuperscript{3-6} Being aware that the cervical lymph node metastasis is an important prognostic factor in oral cavity cancers, the incidence of an occult regional lymph node metastasis in Level IIb has been shown to vary from 15\% to 31\%.\textsuperscript{3} On this basis, a few studies have attempted to investigate the incidence of lymph node metastases to this site in head and neck cancers and have questioned the necessity of removal of these nodes. Thus, the aim of this study was to assess the incidence of Level IIb lymph node metastasis and the percentage of post-operative shoulder syndrome, so as to determine whether this region could be excluded in SOHND for patients undergoing an elective neck dissection for oral cavity cancers.

Materials and Methods

101 patients with squamous cell carcinoma (SCC) of the oral cavity with a cN0, who underwent SOHND between March and December 2010 at Kidwai Memorial Institute of Oncology, Bengaluru, India, were prospectively enrolled into this study. The mean age of patients was 56.2 years, ranging from 30 to 74 years. The distribution of the primary lesions was as follows: Lower gingivo-buccal sulcus (51), floor of the mouth (2), buccal mucosa (35), retromolar trigone (10), upper gingivo-buccal sulcus (1) and lip (2) (Table 1).

All diagnoses were confirmed histopathologically before treatment. The primary tumor was staged according to the 2002 version of the Classification of the American Joint Committee on Cancer. Tumors were staged T1, T2, T3, and T4, and the clinical staging of the lymphatic metastases was based on physical examination. Basic pre-operative investigations, including chest X-ray, complete blood count, microbiology and biochemistry values, and orthopantomogram, were done.

SOHND was performed immediately before the excision of the primary tumor. All the neck dissections were performed similarly through the lateral utility approach for all the necks (Figures 1 and 2). Identification of SAN was done, and the dissection of Level III and sublevel IIA nodes was done below the SAN. The sublevel IIB nodes were approached by a uniform gentle retraction by the 3\textsuperscript{rd} surgical assistant using two medium sized Langenbeck retractors, one placed below the digastric belly and the other retracting the sternocleidomastoid above the SAN. The dissection was first done below the digastric belly and then medial to the internal jugular vein, and the SAN was freed totally at the skull base level. Finally, the sublevel IIB nodes were cleared from the bed, the splenius capitis, and levator scapula muscles. Subsequently, sublevels I and IB were dissected. The specimens were retrieved by medial to lateral approach fashion. All SOHNDs were performed in a standard fashion with the preservation of all neurovascular structures (Figure 3).

In the surgical specimen, the dissected lymphatic chains were labeled separately according to the level (ranging from I to III), with the neck Level II being divided into IIA and IIB. Surgery on the primary site was then performed as indicated. The
specimens were then sent to the Department of Pathology for histopathologic analysis. The histopathological examination of the specimen included size, number and location of the nodes containing metastatic disease, and the presence or absence of extracapsular spread.

Postoperatively, all the patients were clinically assessed for shoulder dysfunction at time periods 2nd, 3rd, and 4th weeks. None of our patients reported or presented with shoulder dysfunction (Figure 4a and b).

**Results**

Number of sublevel IIB nodes per patient varied from 0 to 9 and the mean value was 4 (Table 2). Of the 101 patients, the histopathology reports of 95 patients showed reactive nodes (Table 3). Only six patients (6%) demonstrated malignancy, the primary sites being the floor of the mouth (1), retromolar trigone (2) and lower gingivobuccal sulci (3). Of these six patients, one presented with the perinodal spread. None of the patients presented with shoulder dysfunction 2, 3, and 4 weeks postoperatively (Figure 4).

**Discussion**

The surgical options for managing neck metastasis include classical RND, modified RNDs and selective neck dissection. Shah et al. reported that regional metastases of SCC of the oral cavity were generally located in Levels I, II, and III, with extremely low risk of metastasis to Levels IV and V. Therefore, SOHND is popular in the treatment of cN0 in oral cavity cancers. Currently, the general indications of SOHND for SCC of the oral cavity have been extended to therapeutic lymphadenectomy in conjunction with post-operative radiotherapy for a minimal nodal metastasis confined to the first echelon of the lymphatic drainage (N1) as well as an elective lymphadenectomy in patients with clinically negative nodal disease (N0) at high risk for cervical metastasis.

SOHND has become the standard elective procedure in many institutions to overcome the functional and cosmetic complications associated with classical and modified RNDs. However, there are various post-operative morbidities after the SOHND, one of those being shoulder dysfunction, which occurs even less frequently than in a RND. Sobol et al. reported trapezius abnormalities in addition to alterations in daily activities of dressing and grooming compared to those undergoing type I modified RND, even with preservation of SAN. Kraus et al., reported that 50% of the patients who underwent SAN-sparing procedures experienced shoulder drop and 30% with a minimal SAN dissection experienced pain and shoulder dysfunction. This may be due to traction and elevation of SAN during the dissection of the supraspinal recess, which involves the dissection of the fibrofatty tissues located medial to the upper end of the sternocleidomastoid muscle, and above and behind the segment of the SAN that is located between the skull base and its entrance into the sternocleidomastoid muscle. In addition, ischemia and neuropraxia of the SAN caused by the ligation of the occipital artery may occur during SOHND procedure which can result in the limited abduction of the shoulder and pain, a full passive range of motion, and anatomic deformities including scapular flaring, drooping and protraction observed predominantly in patients undergoing a classical RND.

Cervical lymph node metastasis being one of the critical prognostic factors in SCC of the oral cavity, the percentage of metastasis to sublevel IIB nodes has been studied. The first specific study on sublevel IIB lymph node metastasis was conducted by Kraus and colleagues in 1996. Their prospective analysis was performed in patients with N0 oral cavity and oropharynx cancers. Their results showed that sublevel IIB demonstrated metastasis in 2% of the patients. In 1998, Talmi and colleagues prospectively studied the pattern of metastasis to sublevel IIB in clinically node negative and node positive neck. The authors suggested that dissection of this area can be omitted during elective neck dissection, limiting injury to the SAN without compromising the removal of lymph nodes at the risk of cancer involvement. Seventeen cases of laryngeal cancers (10 supraglottic and 7 glottic) were assessed, and the submuscular recess was not metastatic in any of these patients. Silverman and colleagues demonstrated that sublevel IIB was only involved in cases where sublevel IIA nodes were pathologically positive.

The present study was conducted to determine, first the incidence of occult metastasis at sublevel IIB in oral cavity cancers (other than tongue cancers) with cN0 and second, to access shoulder dysfunction clinically during the 2nd, 3rd, and 4th week postoperatively. Of the 101 patients, only 6 patients had node positivity and none showed signs of

**Figure 4:** (a and b) Shoulder dysfunction assessments showing no signs of morbidity.

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<th>Table 2: Mean number of sublevel IIB nodes.</th>
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<td><strong>Level</strong></td>
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<th>Table 3: Distribution of pathological negative and positive nodes.</th>
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<td><strong>Total number of cases</strong></td>
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shoulder dysfunction. Though the percentage of cases showing metastasis was very less, the benefits of preserving functions of SAN has to be weighed against possibly reduced oncological control. Nonetheless, this scenario of risk versus benefit in handling this ‘submuscular recess’ can be discussed with the patient and relatives in preoperative settings. In our study, as the patients were primarily of poor socio-economic status with few of them lacking literacy, surgery was an one-time option and hence we chose to perform complete SOHNDs including sublevel IIB.

Since the primary goal of any cancer resection surgery is the oncological clearance and safety, sublevel IIB remains an important region to be incorporated in elective neck dissections for primary oral cavity cancers. Thus, we suggest that inclusion of sublevel IIB dissection can improve overall oncological safety, while meticulously handling by the head and neck surgical team can decrease the surgical morbidity associated with SAN.

Conclusion
The oncologic therapeutic benefit of Level IIB clearance in the SOHND, though small, is worth considering for oncological control and safety of the patients. Though the choice can be offered to patients in pre-operative settings, inclusion of sublevel IIB nodes will benefit patients in terms of oncologic safety and overall survival, while meticulously trained hands will help minimize or avoid shoulder dysfunctions related to SAN injury.

References