Preserving Level IIb Lymph Nodes in Elective Supraomohyoid Neck Dissection for Oral Cavity Squamous Cell Carcinoma

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Objective: To determine whether level IIb lymph nodes can be saved in elective supraomohyoid neck dissection (SOHND) as a treatment for patients with squamous cell carcinoma of the oral cavity.

Design: Prospective analysis of a case series.

Setting: University hospital.

Patients and Interventions: From 1997 to 2001, 74 patients with squamous cell carcinoma of the oral cavity and with no palpable lymph nodes at the neck who underwent an elective SOHND were prospectively studied.

Main Outcome Measures: The incidence of pathological metastasis to level IIb lymph nodes and the regional recurrence within this area after elective SOHND was performed were evaluated.

Results: Of the 74 patients, 24 (32%) had lymph nodes positive for microscopic metastatic squamous cell carcinoma. Four (5%) of the 74 patients had involvement of level IIb lymph nodes. There was no instance of isolated metastasis to level IIb lymph nodes without involvement of other nodes in the SOHND specimens. There were 6 cases of the ipsilateral neck recurrences, and of these, 2 patients (3% of all patients) developed recurrences in the level II lymph nodes.

Conclusions: Level IIb lymph node metastasis was rare in this study, and nodal recurrence in this area after SOHND in squamous cell carcinoma of the oral cavity was infrequent. Therefore, this region may be preserved in elective SOHND in patients with squamous cell carcinoma of the oral cavity.

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The presence or absence of a cervical metastasis is an important prognostic factor for survival in squamous cell carcinoma (SCC) of the oral cavity. The incidence of an occult regional lymph node metastasis in this site varies from 15% to 31%. Although conflicting rationales exist regarding the most appropriate therapeutic management of a clinically negative neck, a supraomohyoid neck dissection (SOHND) is being increasingly used by many surgeons for detecting clinically occult cervical metastatic disease in oral cavity cancer.

An SOHND is a selective cervical node dissection that removes the contents of the submental and submandibular triangles (lymph node level I), the jugulodigastric and jugulo-omohyoid lymph node groups, and the lymph node-bearing tissues located anterior to the cutaneous branches of the cervical plexus and above the omohyoid muscle (lymph node levels II and III). The surgical neck level II in SOHND is composed of the level IIa and IIb lymph nodes along the spinal accessory nerve, and the neck level IIb lymph nodes, the so-called supraskinginal recess lymph nodes, are the lymph node pad superior to the spinal accessory nerve.

In contrast to a radical neck dissection, SOHND can preserve the various functionally important anatomic structures, including the sternocleidomastoid muscle, the internal jugular vein, and the spinal accessory nerve, while preserving oncologic safety. However, some patients who have undergone SOHND experience postoperative shoulder syndrome, despite preservation of the spinal accessory nerve. The reason for this may be that, although the spinal accessory nerve is only minimally dissected in SOHND, this procedure can cause some injury to the spinal accessory nerve during the removal of the level IIb lymph node group because of the neuropraxia resulting from traction and elevation. Therefore, a few studies have attempted to investigate the incidence of lymph node metastases to this site in head
and neck cancers, and have suggested that dissection of this lymph node group is not necessary. However, the sample size of the primary lesion site was too small to assess the incidence of level IIb lymph node metastases. In addition, even if they had a sufficient sample size, those studies did not evaluate nodal recurrence in this area.

The aim of this study was to identify the incidence of level IIb lymph node metastasis and to evaluate the nodal recurrence in this group to determine whether this region could be excluded in SOHND for patients undergoing an elective dissection for SCC of the oral cavity.

### METHODS

Between January 1, 1997, and December 31, 2001, 74 previously untreated consecutive patients with SCC of the oral cavity with a clinically N0 neck, who underwent SOHND at Yonsei University, Severance Hospital, Seoul, Korea, were prospectively enrolled into this study. The patients’ ages ranged from 9 to 74 years (median, 56.2 years). There were 64 males and 10 females. The distribution of the primary lesions was as follows: oral tongue, 51 patients; floor of the mouth, 15; buccal mucosa, 4; retromolar trigone, 2; gingiva, 1; and lip, 1 (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; 14 tumors were staged T1, 35 T2, 19 T3, and 6 T4. The clinical staging of the lymphatic metastases was based on a physical examination and a preoperative computed tomographic scan.

In 74 patients, 119 SOHNDs were performed (29 unilateral and 45 bilateral). A bilateral neck dissection was performed if there was a central lesion, an advanced primary lesion above T3, or a lesion that significantly crossed the midline. The SOHND was performed immediately before the excision of the primary tumor. Postoperative radiotherapy was applied to 40 patients. This was indicated when multiple metastases or the extracapsular spread of the metastases was detected on the histopathological evaluation of the material from the SOHND; it was also used when the histopathological evaluation of the resected primary tumor demonstrated a positive margin, perineural invasion, or a lymphatic or vascular neoplastic embolus. A 4 million–eV linear accelerator was used for 6 consecutive weeks. The mean dose was 56.0 Gy (range, 39.6–63.0 Gy) with a daily dose of 2 Gy at 5 fractions per week.

The SOHND was performed in a standardized fashion with the preservation of all neurovascular structures. In the surgical specimen, the dissected lymphatic chains were separately labeled as the levels 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.

Surgical specimens were sent to the Department of Pathology for an analysis of the permanent section. A histopathological examination of the metastases included the size of the lymph node, the number and location of the nodes containing metastatic disease, and the presence or absence of the extracapsular spread. The incidence of level IIb lymph node metastasis in SCC of the oral cavity and neck recurrence were evaluated. A neck recurrence was defined as a lymph node metastasis that is compatible with a previously treated tumor but without any new primary lesion in the head and neck area.

The follow-up period ranged from 5 to 90 months (mean follow-up, 35 months). The patients were followed up for the duration of the study or until death or the time of the last known follow-up.

### RESULTS

The total number of lymph nodes collected in the SOHND specimens varied from 11 to 39, with the average being 22.2. The mean number of lymph nodes harvested by level was as follows: 3.8 (range, 0–11) at level I, 7.7 (1–28) at level IIa, 3.6 (0–8) at level IIb, and 7.1 (1–19) at level III (Table 2). Of the 74 patients who underwent SOHND electively, 24 (32%) who had been staged as clinically N0 had pathologically positive nodes (Table 3). In these 24 patients, 30 ipsilateral pathological nodes were found; 9 were level I, 14 level IIa, 4 level IIb, and 3 level III. There was one case of bilateral lymph node metastases. The patient presented with a T4 N0 floor-of-mouth cancer with metastasis to bilateral level I lymph nodes.

Of the 24 patients who had pathologically positive nodes, 18 patients had a single positive node (4 patients at level I, 13 at level II, and 1 at level III). The other 6 patients had positive nodes at multiple neck levels (all ipsilateral in 5 and bilateral neck level I in 1). Of the 5 patients who had ipsilateral positive nodes at multiple neck levels, 3 patients had positive lymph nodes at levels I and II, 1 patient at levels II and III, and 1 patient at levels I, II, and III.
The prevalence of metastases at level IIb was 5% (4 of 74). All patients who had positive lymph nodes at level IIb also had a positive neck node at level IIa. Of these, 3 patients had an additional positive neck node at level I and 1 patient had an additional positive neck node at level III.

A total of 6 regional recurrences (8%) were documented, and all developed in the dissected ipsilateral neck (Table 4). Three of these patients received postoperative radiotherapy. Five of the ipsilateral recurrences involved the lymph node levels that had been previously removed, whereas 1 recurrence was observed outside the levels dissected (level V). Of the 5 cases of ipsilateral neck recurrences within the dissected area, the locations of the neck recurrence were as follows: 2 at level II, 2 at level I, and 1 on multiple skin areas around levels I, II, and III. Therefore, the incidence of the regional recurrence at level II was 3% (2 of 74). The one patient who developed neck recurrences at level V was secondarily treated with a radical neck dissection and survived. The other 5 patients who received radiation or palliative measures died of uncontrolled neck tumors.

### Table 4. Distribution of Nodal Recurrence by Level

<table>
<thead>
<tr>
<th>Level</th>
<th>No. of Recurrences</th>
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<tbody>
<tr>
<td>I</td>
<td>2</td>
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<tr>
<td>II</td>
<td>2</td>
</tr>
<tr>
<td>V</td>
<td>1</td>
</tr>
<tr>
<td>Skin</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
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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. A cervical lymph node metastasis is one of the most significant prognostic factors in patients with SCC of the oral cavity. The surgical options for managing neck metastasis include a classic radical neck dissection, a modified radical neck dissection, and a 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. In addition, they reported that the risk of a level IV or V lymph node metastasis was extremely low. Therefore, SOHND is becoming increasingly popular and acceptable for elective treatment in managing clinically N0 necks in patients with SCC of the oral cavity. Recently, the general indications for performing SOHND for SCC of the oral cavity 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 as an elective lymphadenectomy in patients with clinically negative nodal disease (N0) at high risk for cervical metastases.

The SOHND has become the standard elective procedure in many institutions to overcome the functional and cosmetic complications that follow a classic modified radical neck dissection. However, there may be various postoperative morbidities after a SOHND, and one of these is postoperative shoulder dysfunction, which occurs even less frequently than in a radical neck dissection. Sobol et al reported abnormalities of trapezius function, albeit temporary and variably severe, in 22% of their patients undergoing SOHND, and the patients who underwent SOHND had similar strength, as well as alteration in daily activities of dressing and grooming, compared with those undergoing type 1 modified neck dissection and radical neck dissection, even with preservation of the spinal accessory nerve. Leipzig et al concluded that there may be a degree of shoulder dysfunction associated with any type of neck dissection, even when the spinal accessory nerve is minimally dissected or stretched. Kraus et al reported that 50% of patients who underwent spinal accessory nerve–sparing procedures experienced shoulder drop and 30% of patients who underwent a minimal spinal accessory nerve dissection had pain and shoulder dysfunction. This may be due to traction and elevation of the nerve during dissection of the supraspinal recess, which involves dissection of the fibrofatty tissues located medial to the upper end of the sternocleidomastoid muscle, and above and behind the segment of the spinal accessory nerve that is located between the skull base and its entrance into the sternocleidomastoid muscle. In addition, ischemia and neuropraxia of the spinal accessory nerve caused by the ligation of the occipital branch of the external carotid artery may develop during the SOHND procedure. This may result in shoulder pain, limited abduction of the shoulder, a full passive range of motion, and anatomic deformities including scapular flaring, drooping, and protraction, observed predominantly in patients undergoing a classic radical neck dissection.

Technical descriptions reported by a number of other studies stressed the importance of including level IIb lymph nodes during SOHND. However, there are few reports of the incidence of lymph node metastasis to the level IIb lymph node pad. Kraus et al reported that 6.7% of patients with positive nodes who underwent elective SOHND had an involved level IIb lymph node pad. Talmi et al reported that a level IIb lymph node was involved with a positive node in 2 (6%) of 33 patients with oral cavity cancers who underwent elective cervical lymphadenectomy. However, there was a limitation in their studies in that the sample size of the primary lesion site was too small to assess the incidence of level IIb lymph node metastases. In addition, even if they had a sufficient sample size, neither the specific primary lesion of the metastasis to the level IIb lymph node nor the evaluation of the recurrence of this nodal group was considered.

In the current study, the incidence rate of occult positive lymph nodes in patients who underwent an elective SOHND for SCC of the oral cavity was 32% (24 of 74). In 4 of the 24 patients with positive nodes, a level IIb lymph node was involved. Therefore, the overall incidence rate of metastases to level IIb during SOHND in SCC of the oral cavity was 5% (4 of 74). This result was comparable to those in other reports. Four patients with a positive level IIb lymph node had a T2 N0 tongue cancer in which the location of the primary site was the lat-
eral border of the oral tongue. It is characteristic that there was no instance where an isolated metastasis to the level IIb lymph node occurred without the involvement of other nodes in the SOHND specimen. All patients with positive neck level IIb lymph nodes had positive level IIa lymph nodes. Of these, 2 patients had an additional positive level I lymph node and 1 patient had an additional positive level III lymph node.

In this study, 6 patients (8%) developed a neck recurrence within 5 years. Of these, 5 cases occurred in the dissected necks. In contrast, 1 case developed beyond the dissected area. Byers et al\textsuperscript{16} retrospectively analyzed the regional recurrence rate of 284 SOHNDs in 229 formerly untreated patients with SCC of the oral cavity and oropharynx. In their study, the regional recurrence rate in SOHND was 4.5% in the dissected area and 2.1% outside it. Carvalho et al\textsuperscript{17} reported a 4.5% recurrence rate in 154 supraomohyoid neck dissected sites, and these occurred either beyond (3 cases) or inside (4 cases) the limits of the dissection. Although there is a limitation in their studies in that the specific site of the neck recurrence was not described as being level I, level II, or level III, but only as being in the dissected area or not, the recurrence of the level II nodal group may be rare given the overall incidence of a regional recurrence and the sites of the neck recurrences, ie, in the dissected area or beyond the limits of the SOHND.

In conclusion, a recurrence in neck level II was extremely rare, and only 2 cases developed. Therefore, when other reports and this study on the nodal recurrence rate are considered, although the recurrence in level Ia or level IIb could not be distinguished, a recurrence in neck level IIb may be extremely rare after a conventional SOHND procedure in SCC of the oral cavity, and this region may be preserved in elective SOHND in patients with SCC of the oral cavity.

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