ROUTINE INCLUSION OF LEVEL IV IN NECK DISSECTION FOR SQUAMOUS CELL CARCINOMA OF THE LARYNX: IS IT JUSTIFIED?

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Abstract: Background. Dissection of levels II–IV as part of an elective or therapeutic neck dissection is common practice during laryngectomy for laryngeal squamous cell carcinoma (SCC). The necessity of routine dissection at level IV has recently been questioned. The purpose of this study was to find the incidence of level IV metastases in patients with transglottic and supraglottic SCC who underwent neck dissections.

Methods. The charts of 71 suitable patients were reviewed. Forty-two had supraglottic primary cancers, and 29 had transglottic primary tumors. Levels II–IV had been removed in them all, and their neck specimens were marked according to the levels of the neck. The surgical specimens were pathologically diagnosed.

Results. Of 43 patients who underwent elective lateral neck dissection, the only one (2.3%) with level IV metastases also showed metastases at level II. Nine (32%) of the other 28 patients with clinical adenopathy had level IV metastases.

Conclusions. Dissection of level IV as part of a therapeutic neck dissection for supraglottic and transglottic SCC is recommended for patients with clinically enlarged lymph nodes, but its necessity in the absence of detectable adenopathy is challenged. © 2004 Wiley Periodicals, Inc. Head Neck 26: 309–312, 2004

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The treatment of the neck in patients with head and neck squamous cell carcinoma (HNSCC) has changed considerably since Crile’s first description of a radical neck dissection in 1906.1 The routine application of radical neck dissection for patients with HNSCC declined with the increasing popularity of more conservative modified radical and selective dissections, especially when the procedure was elective. The rationale for performing selective neck dissections is based on the predictable patterns of lymphatic spread of SCC of the upper aerodigestive tract, allowing treatment to commence with the removal of the first echelon of lymphatic drainage. If this echelon(s) does not harbor metastatic disease, the incidence of metastases in other levels of the neck is then believed to be extremely low, and thus the value of elective treatment at those levels of the neck is less clear. As part of this continuing trend, Shah2 studied the patterns of cervical node metastases from SCC of the larynx in 262 radical neck dissection speci-
mens from 247 patients. Occult positive adenopathy occurred in 37% of the patients, mainly at levels II–IV, whereas levels I and V were rarely involved (ie, 14% and 7%, respectively). He recommended lateral neck dissection of levels II–IV as the preferred elective treatment in these patients. Li et al5 studied 384 neck dissection specimens by serial sections and found that most of the metastatic nodes in patients with laryngeal carcinomas (n = 74) occurred at levels II–IV, whereas other levels were involved mainly if enlarged nodes were present at levels II–IV. Recently, the Brazilian Head and Neck Cancer Study Group4 prospectively compared selective lateral neck dissection (levels II–IV) with type III modified radical neck dissection as part of elective treatment for patients with supraglottic and transglottic SCC of the larynx. In their study, the selective neck dissection was converted to a modified radical neck dissection if nodal frozen section analysis of suspicious lymph nodes performed during the surgical procedure confirmed the presence of metastatic SCC. After a mean follow-up of 42 months, the authors found no difference in the outcome between patients treated with either modality. Their study further supports the use of lateral neck dissection that includes levels II–IV as an effective treatment for patients with T2–4 SCC of the transglottic and supraglottic larynx. Consequently, lateral neck dissection that includes levels II–IV of the neck is considered the elective treatment of choice for patients with laryngeal cancer.5

The incidence of metastases at level IV has not been determined, despite the recognized morbidity associated with it, such as chyle leak and injury to the phrenic nerve. The purpose of this study was to estimate the incidence of occult metastases occurring at level IV in patients with SCCs of the transglottic and supraglottic larynx, with the intent of contributing more information to the controversy of whether dissection of level IV is indicated in every patient with these tumors.

MATERIALS AND METHODS
The medical records of 71 patients with transglottic (n = 29) or supraglottic (n = 42) laryngeal SCC comprised the source of data for this study. They all had advanced (T3/T4 or extensive T2b lesions) or recurrent tumors after radiotherapy. Thirty-eight of them had a total laryngectomy together with an ipsilateral neck dissection that was tailored to the extent of the nodal metastases: a lateral neck dissection including levels II–IV of the neck was performed for patients with a clinically negative neck, whereas a radical or a modified radical neck dissection was performed for the ones with clinically positive adenopathy. The other 33 patients underwent a total laryngectomy in combination with a bilateral neck dissection for primary tumors that crossed the midline or for bilateral nodal metastases. The patients with clinical evidence of nodal metastases underwent a radical or a modified radical neck dissection: the internal jugular vein, sternocleidomastoid muscle, and the spinal accessory nerve were removed when they were directly involved with tumor or when they obscured the surgical field, thus making the total resection of the tumor more difficult. In selected patients with single metastases measuring less than 2 cm in diameter that did not involve neighboring structures, a lateral neck dissection was still the therapeutic choice followed by postoperative radiation to the neck.

Immediately after resection, the neck specimen was sent for pathologic analysis, and the coinciding levels of the neck were marked. The neck dissection specimen was sectioned in a routine manner and studied by a head and neck pathologist. The incidence of nodal metastases was reported according to the various levels of the neck.6

RESULTS
The 71-patient cohort was composed of 66 men and five women, whose ages ranged between 40 and 85 years (mean, 62 years). Of them, 17 had undergone radiotherapy with a curative intention, but none had undergone previous surgery for HNSCC. Forty-three patients had no clinical evidence of nodal metastases before surgery, and nine (20.9%) of them had ipsilateral occult metastases. Sixteen patients underwent a bilateral neck dissection, and two (12.5%) of them were found to have occult metastases in the contralateral side of the neck. Occult metastases were located in levels II or III of the neck in eight patients. Only one (2.3%) of 43 patients who was initially seen with a transglottic primary cancer and with no evidence of clinically enlarged nodes (N0) was found to have an occult metastasis at level IV, as well as another metastatic node at level II. Overall, 59 neck dissections were performed for patients with no clinical adenopathy, with occult metastases at level IV being detected in one (1.7%) of the specimens. Wide-field radiation therapy for curative intent including the neck was delivered before surgery to five of these patients. When they were
extracted, the rate of occult metastases (in the other 38 previously untreated patients) was 21% (8 of 38). These patients had 53 elective neck dissections, and only one of them had metastases at level IV. Metastases at level IV in patients who were initially seen with no clinically enlarged cervical lymph nodes and who did not receive elective preoperative radiation therapy to their neck occurred in 2.6% of the patients or 1.9% of the neck dissection specimens (Table 1). Because of the low rate of metastases at level IV, no significant differences were found between transglottic and supraglottic cancers in term of their propensity to metastasize to level IV.

Twenty-eight patients with clinically enlarged nodes in the neck at presentation were treated with a therapeutic ipsilateral neck dissection (ie, a modified radical or a radical neck dissection). Seventeen of these patients also had a contralateral neck dissection (17 of 28, 60%). Nine patients (9 of 28, 32%) were found to have metastases at level IV on the ipsilateral side in addition to involved nodes in other levels of the neck. Four patients with a contralateral clinically negative neck (4 of 17, 23%) were found to have occult metastases, none of which had occurred at level IV. Preoperative radiation therapy to the larynx and neck for patients with tumors located at the supraglottic larynx was delivered to seven of these 28 (7 of 28, 25%) patients. The rate of occult metastases to the contralateral level IV of the neck in untreated patients was thus 0% (Table 1).

**DISCUSSION**

Elective dissection of the lymph nodes at levels II–IV has become a common practice for patients with laryngeal cancer, but the necessity of dissecting level IV and putting the patient at possible risk for the associated morbidity was recently questioned by several investigators. Vanderbrouck et al suggested that occult positive lymph nodes at levels IV–V occurred in only 4% of the patients with endolaryngeal tumors that showed no evidence of metastases at levels II–III. Likewise, Ambrosch et al reported their experience with selective neck dissections shortly after laser resections of various head and neck carcinomas. Among these were 404 patients with laryngeal, oropharyngeal, and hypopharyngeal tumors that were treated with an elective neck dissection including levels II–III only. When suspicious nodes or pathologically positive nodes (by frozen section analysis) were found at levels II–III during surgery, the neck dissection was extended to include the lymph nodes at level IV. The conclusion of their study was that level IV does not need to be routinely resected as part of an elective treatment in patients with oropharyngeal, hypopharyngeal, and laryngeal carcinomas.

A similar approach was recently reported by Xavier et al, who performed 145 selective neck dissections at levels II–III in 79 patients who were surgically treated for laryngeal carcinomas. A more extensive neck dissection that included levels IV–V was performed in all the patients with nodal metastasis pathologically proven by intraoperative frozen section analysis. Pathologic assessment of the neck dissection specimen revealed nodal metastases at level IV in only two patients (2.5%). After a follow-up of at least 24 months, no patient had recurrent disease at level IV. The conclusion of their study was that level IV does not need to be routinely resected as part of an elective treatment in patients with oropharyngeal, hypopharyngeal, and laryngeal carcinomas.

Tu recently reported 155 patients who had supraglottic laryngeal cancer with no clinical evidence of cervical metastases whose treatment consisted of an elective dissection limited to level II. The specimen was sent for pathologic assessment, and a radical neck dissection was performed if micrometastases were found. Only 10 patients had recurrence at the ipsilateral neck after a minimal follow-up (by mail) of 5 years.

The results of these three latter studies support the contention that elective dissection of level IV may not be indicated for all patients with laryngeal SCC.

### Table 1. The rate of metastases to level IV in previously untreated patients with supraglottic or transglottic squamous cell carcinoma.

<table>
<thead>
<tr>
<th>Patients with clinically negative neck</th>
<th>Patients with clinically positive ipsilateral adenopathy</th>
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<tr>
<td>Ipsilateral neck</td>
<td>2.6%</td>
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<tr>
<td>Contralateral neck (cN0)</td>
<td>0%</td>
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Table 1. The rate of metastases to level IV in previously untreated patients with supraglottic or transglottic squamous cell carcinoma.
The results of this study further support a more selective dissection, limited to levels II–III, as the primary elective treatment of the neck for patients with cancer of the larynx involving the supraglottis (transglottic and supraglottic). In agreement with previous studies, none of our patients who had no evidence of metastases at levels II–III were found to have positive adenopathy at level IV, indicating that selective dissection of levels II–III may suffice as an elective staging procedure. A similar approach was recently reported by Khafif et al for patients with early cancer of the oral tongue. An elective suprhomohyoid neck dissection including levels I–III was suggested; if, however, enlarged or hardened nodes were found during surgery at levels II–III, the authors then recommended dissection of the lymph nodes at level IV.

The algorithm of a limited staging neck dissection for patients with no evidence of cervical metastases followed by postoperative radiation therapy for the patients who had pathologically involved nodes was previously reported as a safe clinical practice in other sites in the head and neck region. This practice seems acceptable for patients with supraglottic and transglottic laryngeal cancer, although prospective studies are needed to determine its safety in the clinical setting. For patients with clinically positive adenopathy at levels II–III, the performance of a more extensive neck dissection (radical or modified radical neck dissection) would be sound policy.

Finally, one may argue that dissection of level IV in combination with a total laryngectomy is a minor supplement to the surgical procedure. However, injuries to the thoracic duct and the phrenic nerve may still occur; thus, if not indicated, dissection of level IV should not be performed.

In conclusion, occult metastases to level IV rarely occur in patients with SCC of the supraglottic and transglottic larynx with no previous evidence of nodal metastases. There is compelling evidence to indicate that dissecting this region as part of an elective neck dissection for these patients is not necessary.

REFERENCES