Importance of Routine Evaluation of the Thyroid Gland Prior to Open Partial Laryngectomy

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Objectives: To determine the incidence and presentation of synchronous thyroid lesions in a patient population undergoing open partial laryngectomy (OPL), and to determine whether routine preoperative evaluation of the thyroid gland prior to OPL is useful to identify synchronous thyroid lesions in order to reduce the need for reoperation in this complex patient population.

Design: Retrospective medical chart review.

Setting: Academic institution.

Patients: Sixty-seven consecutive patients with laryngeal tumors who had undergone OPL from 1996 to 2005.

Interventions: Charts of 67 consecutive patients with laryngeal tumors who underwent OPL in 1996 to 2005 have been reviewed for synchronous thyroid lesions. For all patients, reports of (1) complete preoperative examination findings, (2) inpatient course, (3) postoperative follow-up, and (4) postoperative final histopathologic findings were reviewed. For patients with synchronous thyroid lesions, reports of (1) thyroid evaluation and imaging and (2) preoperative (fine-needle aspiration), (3) intraoperative (frozen section), and (4) postoperative (final) histopathologic results for the thyroid lesions were reviewed.

Main Outcome Measures: Incidence of synchronous thyroid lesions and laryngeal cancer in patients undergoing OPL.

Results: Eight (11.9%) of 67 (95% confidence interval, 5.3%-22.2%) patients with laryngeal tumors who underwent OPL had evidence of synchronous thyroid lesions. All 8 patients had squamous cell carcinoma of the larynx and underwent either supracricoid or supraglottic laryngectomy. In these 8 patients, synchronous thyroid lesions were incidentally detected. Four patients had papillary thyroid carcinoma, 1 had squamous metaplasia, and 3 had follicular thyroid tissue that was negative for malignancy on final pathologic examination. In 2 patients, the thyroid lesions were detected preoperatively (prior to OPL); in another 2 patients, thyroid masses were detected intraoperatively; and in 4 patients, the thyroid disease was identified postoperatively on histopathologic examination of excised cervical lymph nodes. In 2 patients, thyroidectomy was performed as a second operation after the OPL, and 1 of them had transient vocal fold paralysis for 2 months. Thyroid ultrasonography was performed in 4 patients. In 3 patients, the ultrasonography was performed after the OPL final pathologic findings indicated the presence of metastatic thyroid disease in cervical lymph nodes. Ultrasonography revealed intrathyroidal lesions in all 3 patients.

Conclusions: Patients with laryngeal tumors who will be undergoing OPL might have occult synchronous thyroid lesions. Thyroid surgery in patients with previous OPL may have an increased potential for complication owing to postsurgical changes in the central neck region. Routine preoperative evaluation of the thyroid gland, especially with ultrasonography, to screen for occult synchronous thyroid lesions is recommended for all patients with laryngeal tumors who will be undergoing OPL. Eradication of any thyroid cancer detected preoperatively by fine-needle aspiration should be performed at the same time as OPL. Pros and cons of total thyroidectomy for indeterminate thyroid nodules should be discussed with this patient population.
Table 1. Criteria for Our Series of 67 Patients

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Those Without STLs</th>
<th>Those With STLs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of STLs</td>
<td>59</td>
<td>8</td>
</tr>
<tr>
<td>Age, mean, y</td>
<td>60</td>
<td>59</td>
</tr>
<tr>
<td>M/F</td>
<td>47/12</td>
<td>7/1</td>
</tr>
<tr>
<td>Open partial laryngectomy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical</td>
<td>18</td>
<td>0</td>
</tr>
<tr>
<td>Supracricoid</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>Supraglottic</td>
<td>25</td>
<td>2</td>
</tr>
<tr>
<td>Previous radiotherapy</td>
<td>15</td>
<td>2</td>
</tr>
</tbody>
</table>

Abbreviation: STLs, synchronous thyroid lesions.

This is a retrospective study. Reports of 67 consecutive patients with laryngeal tumors who underwent OPL at our institution from 1996 to 2005 were reviewed for any reported synchronous thyroid disease. Data were collected through an electronic database after obtaining the approval for this study from the institutional review board. Patients included 54 men and 13 women (age range, 37-88 years). Patients were divided into 2 main groups: those without synchronous thyroid lesions and those with synchronous thyroid lesions (Table 1).

For the entire study group, reports of final laryngeal histopathologic findings, complete preoperative examination, in-patient course, and postoperative follow-up were reviewed. For patients with synchronous thyroid lesions, we reviewed reports of preoperative, intraoperative, and postoperative thyroid gland evaluation and imaging. In addition, we reviewed preoperative (fine-needle aspiration [FNA]), intraoperative (frozen section), and postoperative (final) histopathologic examination reports for the thyroid lesions. Confidence intervals for observed frequencies were calculated using exact binomial methods with Stata statistical software (version 8.0; Stata Corp, College Station, Tex).

RESULTS

Eight (11.9%) of 67 patients (95% confidence interval, 5.3%-22.2%) with laryngeal tumors who underwent OPL had evidence of synchronous thyroid lesions. Thyroid disease was incidentally detected in all 8 patients. None of the patients presented with any signs or symptoms related to thyroid disease during the preoperative evaluation of the laryngeal tumor. Also, among those 8 patients, 6 (75.0%) had primary laryngeal surgery, 1 patient underwent salvage OPL for persistent laryngeal cancer after primary radiotherapy, and another patient received previous neck radiotherapy for non-Hodgkin lymphoma 3 years prior to the detection of laryngeal cancer. Similarly, of 59 patients who were without signs or symptoms of synchronous thyroid lesions, 44 (74.6%) had primary laryngeal disease, whereas 15 (25.4%) had undergone previous radiotherapy for their laryngeal cancer.

All 8 patients with synchronous thyroid lesions had squamous cell carcinoma (SCC) of the larynx and underwent either supracricoid or supraglottic laryngectomy. Thyroid histopathologic findings were as follows: 4 patients had papillary thyroid carcinoma (PTC), 1 had squamous metaplasia, and 3 had follicular thyroid tissue negative for malignancy. Preoperative computed tomographic (CT) scans detected intrathyroidal disease in 2 of 8 patients. Thyroid ultrasonography (US) was performed in 4 patients; in 3 of them, it was performed after the detection of metastatic thyroid disease in cervical lymph nodes following OPL, and it identified intrathyroidal lesions in these 3 patients (Table 2).

REPORT OF CASES

CASE 1

A 55-year-old man had a primary laryngeal cancer. A thyroid nodule was incidentally detected during the open supraglottic laryngectomy (OSGL). Frozen section examination revealed squamous metaplasia. Total thyroidectomy was performed at the time of laryngeal surgery.

CASE 2

A 54-year-old man had a primary laryngeal cancer. Following a supracricoid laryngectomy (SCL) with left neck dissection, final pathologic findings revealed multiple lymph nodes positive for metastatic PTC. Postoperative thyroid US showed a 1-cm left thyroid lobe nodule. During thyroidectomy (6 months after the SCL), the surgeon (R.P.T.) encountered significant scarring and noted difficulty in identifying and preserving the RLN. A left thyroid lobectomy was performed, instead of total thyroidectomy, to avoid RLN injury on the right side.

CASE 3

A 72-year-old man had a primary laryngeal cancer. A firm thyroid nodule was incidentally detected during an SCL. Frozen section examination revealed PTC. Total thyroidectomy was performed at the time of OPL.

CASE 4

A 58-year-old man had a primary laryngeal cancer. Following SCL, the final pathologic findings revealed 1 stage III lymph node with foci of thyroid follicular tissue, and the possibility of metastatic thyroid cancer could not be ruled out. This patient refused further evaluation and treatment for this finding. No thyroidectomy was performed.
A 71-year-old man had a recurrent laryngeal cancer after primary radiotherapy. The findings from a CT scan, done prior to an SCL, showed a hyperattenuated lesion in the right lobe of the thyroid. Two thyroid nodules were detected intraoperatively, and a frozen section examination revealed follicular thyroid tissue with no evidence of malignancy. No thyroidectomy was performed.

CASE 6

A 48-year-old man had a primary laryngeal cancer. A thyroid lesion was suspected on findings from a preoperative CT scan prior to SCL. Thyroid US showed a left thyroid lobe nodule. Preoperative US-guided FNA revealed an indeterminate thyroid nodule. Frozen section examination revealed follicular tissue with no evidence of malignancy. No thyroidectomy was performed.

CASE 7

A 47-year-old man had a primary laryngeal cancer. Following SCL, the final pathologic findings revealed 1 central or Delphian lymph node that was positive for metastatic PTC. Postoperative thyroid US showed 1 to 3 nodules in the left thyroid lobe, none larger than 1 cm. At the time of this writing, the patient was scheduled to undergo further work-up.

CASE 8

A 70-year-old woman had a primary laryngeal cancer. She had a medical history of neck radiotherapy for follicular mixed lymphoma 3 years prior to detection of the laryngeal cancer and had received a total of 34 Gy of radiation delivered to the neck. Following OPL, the final pathologic findings revealed minute foci in bilateral lymph nodes that were positive for metastatic PTC. Postoperative thyroid US showed a single 1-cm left thyroid lobe nodule. Total thyroidectomy was performed 6 months after the OPL. The patient had postoperative transient right vocal fold paralysis for a period of 2 months secondary to difficulty in dissecting the nerve in the scarred central neck bed.

We recommend routine preoperative evaluation of the thyroid gland and encourage thyroid US for all patients with laryngeal tumors undergoing OPL. This is based on the incidence of occult synchronous thyroid lesions that we found in patients with laryngeal tumors who underwent OPL (8 cases, and in 4 of them patients had PTC). In addition, 3 patients had PTC detected on the histopathologic examination of the lymph nodes excised with OPL. Subsequently, US detected thyroid nodules in all 3 of these patients. Our finding is supported by the study by Resta et al,6 who reported 8 cases of synchronous head and neck SCC and occult thyroid carcinoma, and in 6 of them the SCC was in the larynx. Pitman et al7 reported 7 cases, and in 4 of them the SCC was in the larynx. It has also been reported8 that autopsy studies have found that occult thyroid carcinoma has a 6% to 35% general prevalence rate. Although we focused on patients who underwent OPL, our finding is considered significant when compared with an earlier report9 that claimed there was no incidence of synchronous laryngeal and thyroid disease.

There is significant difficulty in identifying and preserving the RLN when attempting thyroidectomy after previous OPL. Postoperative changes cause anatomical alteration in the central neck. This is more pronounced in SCL and OGL laryngectomies compared to vertical laryngectomy because the laryngotracheal complex is mobilized and pulled up to the hyoid bone (SCL/OGL) or tongue base (OSGL). Reliable landmarks for identification of the RLN are not readily apparent. In 1 patient (case 8), the total thyroidectomy was complicated by transient vocal fold paralysis for 2 months. In another patient (case 2), a left thyroid lobectomy was performed, instead of total thyroidectomy, to avoid RLN injury on the right side when the surgeon (R.P.T.) encountered significant tissue scarring as well as difficulty in preserving the RLN. In these 2 cases, PTC was discovered in the

Table 2. Summary of Patients With Synchronous Thyroid Lesions (STLs)

<table>
<thead>
<tr>
<th>Case No./Sex/Age, y</th>
<th>Type of Laryngeal Surgery</th>
<th>Final Laryngeal Pathologic Finding</th>
<th>Pathologic Findings of STLS</th>
<th>STL Detection Method</th>
<th>Time of Detecting STL</th>
<th>Thyroid Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/M/55 OSGL</td>
<td>SCC</td>
<td>SM</td>
<td>FS</td>
<td>Intraop (TN)</td>
<td>No</td>
<td>Total thyroidectomy in the same operation</td>
</tr>
<tr>
<td>2/M/54 SCL</td>
<td>SCC, WD</td>
<td>PTC</td>
<td>FPF</td>
<td>Postop (LNM)</td>
<td>Yes</td>
<td>Thyroid lobectomy in a second operation</td>
</tr>
<tr>
<td>3/M/72 SCL</td>
<td>SCC, MD</td>
<td>PTC</td>
<td>FS, FPF</td>
<td>Intraop (TN)</td>
<td>No</td>
<td>Total thyroidectomy in the same operation</td>
</tr>
<tr>
<td>4/M/58 SCL</td>
<td>SCC, MD</td>
<td>FT</td>
<td>FS, FPF</td>
<td>Postop (LNM)</td>
<td>No</td>
<td>NP</td>
</tr>
<tr>
<td>5/M/71 SCL</td>
<td>SCC, MD</td>
<td>FT</td>
<td>FS, FPF</td>
<td>Preop (TN)</td>
<td>No</td>
<td>NP</td>
</tr>
<tr>
<td>6/M/48 SCL</td>
<td>SCC, MD</td>
<td>FT</td>
<td>FS, FPF</td>
<td>Preop (TN)</td>
<td>Yes</td>
<td>NP</td>
</tr>
<tr>
<td>7/M/47 SCL</td>
<td>SCC, WD**</td>
<td>PTC</td>
<td>FPF</td>
<td>Postop (LNM)</td>
<td>Yes</td>
<td>Further treatment pending</td>
</tr>
<tr>
<td>8/F/70 OSGL</td>
<td>SCC, MD</td>
<td>PTC</td>
<td>FPF</td>
<td>Postop (LNM)</td>
<td>Yes</td>
<td>Total thyroidectomy in a second operation</td>
</tr>
</tbody>
</table>

Abbreviations: FPF, final pathologic findings; FS, frozen section; FT, follicular tissue; intraop, intraoperative; LNM, lymph node metastasis; MD, moderately differentiated; NP, no procedure was performed; OSGL, open supraglottic laryngectomy; postop, postoperative; preop, preoperative; PTC, papillary thyroid carcinoma; SCC, squamous cell carcinoma; SCL, supracricoid laryngectomy; SM, squamous metaplasia; TN, thyroid nodule; TUS, thyroid ultrasonography; VF, vocal fold; WD, well differentiated.

*Verrucous.
lymph nodes on the final histopathologic findings after OPL, and the thyroid surgery was performed 6 months afterward. The surgeon preferred not to immediately perform the thyroid surgery, in order to maintain the structural integrity of the recent OPL, and not to interfere with functional rehabilitation. To our knowledge, although no reports discussing thyroid surgery after OPL exist in the literature, it has been recommended to avoid or diminish the need for thyroid bed reoperation in persistent or recurrent thyroid cancer because RLNs are usually encased in fibrotic tissue, with a higher rate of RLN injury in secondary thyroidectomy.9

In this study, 2 patients (cases 5 and 6) demonstrated thyroid nodules during preoperative assessment; in both, findings from a frozen section taken at the time of OPL did not demonstrate malignancy, and the surgeon preferred to avoid thyroidectomy. Frozen section has allowed surgeons to obtain a rapid intraoperative diagnosis of excised specimens, but its exact role in the management of thyroid nodules remains controversial.10 11 Some authors12 argue that its value remains with positive aspirates and that it is not helpful with negative or benign aspirates. This controversy further indicates the need for the preoperative detection of occult synchronous thyroid lesions in order to develop a definitive management plan for the thyroid at the time of OPL. This renders the preoperative patient counseling more consistent. It becomes easier to fully inform the patients about their disease process and to explain the risks of RLN injury if a future operation for the thyroid is necessary. The patient will also be involved in the decision for total thyroidectomy or observation for an indeterminate FNA result.

In our study, thyroid follicular tissue found in 1 patient (case 4) on final histopathologic examination of 1 stage III lymph node was excised with OPL. No thyroidectomy was performed in this patient. The actual presence of aberrant thyroid tissue in lymph nodes has been an ongoing controversy.13 Even if lymph nodes are known to represent the site of various aberrant tissues (eg, salivary glands or nevus cells), in the case of thyroid inclusions, cautious judgment is necessary when considering whether it is aberrant tissue or metastatic disease. Some authors14 argue that the presence of metastasis should be considered when most of the lymph node is involved or when multiple lymph nodes are affected. This patient refused further evaluation and treatment for this finding.

We suggest thyroid US as an inexpensive, fast, and reliable tool to preoperatively screen for occult synchronous thyroid lesions in this patient population. In our study, thyroid US was performed in 4 patients; and in 3 of them it was performed after metastatic thyroid disease was detected in cervical lymph nodes following OPL. Thyroid US identified intrathyroidal lesions in all 4 patients whereas preoperative CT scanning detected intrathyroidal disease in only 2 of 8 patients. Thyroid US is widely accepted as the first-choice imaging modality for evaluating thyroid nodules. Conventional and multislice CT scans are inferior to US for the differential diagnosis of thyroid nodules.14 The purpose of performing CT examination is largely limited to the preoperative evaluation of goiter cases to assess the presence of extracapsular or mediastinal invasion.14 Thyroid US-guided FNA has been proven to be a useful diagnostic tool for thyroid nodules that are 1 cm or larger because the percentage of its unsatisfactory results has been found to be unrelated to the size of the nodule.15 Therefore, it should be performed when possible to help counsel patients undergoing OPL about surgical treatment for the concurrent thyroid disease.

The relative risk for thyroid cancer–related death significantly increases in patients with advanced-stage disease. This supports early detection and treatment of thyroid malignancies.7 10 16 17 It is therefore expected that routine preoperative thyroid evaluation prior to OPL will allow for early detection and treatment of thyroid malignancy while eliminating the risk inherent with later thyroid surgery in this patient population. The size of our study group is consistent with previous studies discussing OPL. Our study has the bias of retrospective studies, especially in the identification of the thyroid nodules by US after detecting metastatic thyroid disease following the OPL, in which the diagnosis or suspicion of thyroid cancer has already been considered. Also, our report lacks follow-up for some of the patients.

In conclusion, patients with laryngeal tumors who are undergoing OPL might have occult synchronous thyroid lesions (11.9% in our series of patients had them). The complicated reconstruction after OPL, especially SCL or OSGL, may lead to anatomical distortion and scarring in the region of the RLN and an increased risk of RLN paralysis on attempting a second central neck operation for the thyroid. In this setting, thyroidectomy jeopardizes the delicate neolaryngeal functional outcome in these patients. Routine preoperative US evaluation of the thyroid gland for potential occult synchronous lesions is recommended for all patients with laryngeal tumors undergoing either SCL or OSGL. Eradication of any FNA-detected thyroid malignancy should be performed at the same time as OPL. Those synchronous thyroid lesions that are read as indeterminate on FNA pose a treatment dilemma. Careful counseling regarding total thyroidectomy vs observation must be employed.

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Acquisition of data: Farrag, Cummings, Flint, and Tufano.

Analysis and interpretation of data: Farrag, Lin, Cummings, Sciuabella, Koch, Flint, and Tufano.

Drafting of the manuscript: Farrag, Cummings, Sciuabella, Flint, and Tufano.

Critical revision of the manuscript for important intellectual content: Farrag, Lin, Cummings, Sciuabella, Koch, Flint, and Tufano.

Statistical analysis: Farrag, Lin, and Tufano.

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REFERENCES


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