Regional Tumor Recurrence After Supraomohyoid Neck Dissection

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Objective: To evaluate the recurrence of lymphatic metastases in patients with squamous cell carcinoma of the oral cavity treated with supraomohyoid neck dissection with and without postoperative radiotherapy.

Design: A nonrandomized retrospective study.

Setting: Department of Otolaryngology and Head and Neck, State University of Campinas, São Paulo, Brazil, a tertiary referral center.

Patients: Thirty-two patients with squamous cell carcinoma of the oral cavity without previous treatment and a minimum follow-up period of 2 years were studied. There were 36 supraomohyoid neck dissections, of which 31 were elective (clinically negative nodes) and 5 therapeutic (clinically positive nodes).

Intervention: Resection of the primary tumor and supraomohyoid neck dissection, with or without postoperative radiotherapy.

Main Outcome Measures: Evaluation of neck tumor recurrence according to clinical and histopathological findings in the neck and use of postoperative radiotherapy.

Results: The overall recurrence rate was 6% (2 patients). Recurrences were seen in 1 clinically negative neck (3%) and 1 clinically positive neck (20%). The presence of clinically or histopathologically positive nodes, number of positive nodes, and use of adjuvant radiotherapy did not influence the rate of neck tumor recurrence with a statistically significant difference.

Conclusions: Neck tumor recurrence in procedures with clinically positive nodes was 6.3 times greater than in those with clinically negative nodes. There was no difference in regional recurrence of histopathologically positive node necks with or without the addition of postoperative radiotherapy. Neck tumor recurrence was not statistically influenced by clinically and histopathologically positive nodes, multiple positive nodes, and use of postoperative radiotherapy.

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THE PRESENCE of lymphatic neck metastases in patients with squamous cell carcinoma of the upper aerodigestive tract is one of most important risk factors for survival. Surgical techniques have been developed for the treatment of neck metastases. Crile in 1906 was the first to describe the technique of radical neck dissection, with removal of levels I to V, the sternocleidomastoid muscle, internal jugular vein, and accessory nerve. To decrease surgical morbidity, the sternocleidomastoid muscle, internal jugular vein, and accessory nerve could be preserved in neck dissections. Also, the lymphatic chains resected in radical neck dissection could be preserved on the basis of the lymphatic pattern according to the site of primary tumor.

Supraomohyoid neck dissection (SOHND) is a type of selective neck dissection that dissects levels I, II, and III. The boundaries of the dissection are the mandible superiorly, the contralateral anterior belly of the digastric muscle anteriorly, the posterior border of the sternocleidomastoid muscle posteriorly, and the omohyoid muscle inferiorly. This neck dissection has achieved greater importance in the treatment of neck metastases in primary tumors of the oral cavity (OC) as an elective staging procedure and even therapeutically in selected cases of necks with clinically positive nodes. The use of postoperative radiotherapy is determined according to the histopathological status of the neck specimen. We evaluated regional tumor recurrence in patients with primary tumors of the OC who underwent SOHND. The influence of clinical and histopathological variables and postoperative radiotherapy on recurrence was reviewed.
Medical charts of 123 patients who underwent neck dissections at the Department of Otolaryngology and Head and Neck, State University of Campinas, São Paulo, Brazil, between June 1, 1988, and February 28, 1997, were analyzed. Only patients with histopathologically established squamous cell carcinoma in the OC without previous treatment were included. The neck dissection was performed immediately before the primary tumor resection. Eighty-two patients with primary tumors in other sites and 9 patients with previous treatment were excluded.

Thirty-two patients with OC primary tumors who underwent 36 SOHNDs were included. Our SOHND was performed according to the American Academy of Otolaryngology–Head and Neck Surgery and American Society for Head and Neck Surgery classification.2 The staging system used was the TNM system from the American Joint Committee on Cancer, 1997.3 The term cN0 indicates clinically negative nodes; cN+, clinically positive nodes; pN0, histopathologically negative nodes; and pN+, histopathologically positive nodes.

The lymphatic chains of the neck were classified in levels according to the Memorial Sloan-Kettering Cancer Center description4 and the American Academy of Otolaryngology–Head and Neck Surgery and American Society for Head and Neck Surgery classification.2 The clinical staging of lymphatic metastases was based on physical examination.

In all SOHNDs in this study, the accessory nerve, sternocleidomastoid muscle, and internal jugular vein were preserved. Therapeutic SOHND was performed in necks staged as cN1 and cN2b (all metastases measured ≤3 cm and were in the center of the operative field). Adjuvant postoperative radiotherapy was indicated when multiple metastases or extracapsular spread of metastases was detected on histopathological evaluation of material from SOHND. Adjuvant treatment was also used when histopathological evaluation of the resected primary tumor demonstrated positive margins, perineural invasion, or lymphatic or vascular neoplastic embolus. A 4-million–eV linear accelerator was used in 5 consecutive weeks to deliver a total dose of 50 Gy. A shrinking-field technique was used to boost the dose at the primary site and lymph nodes to 60 Gy. The spinal cord was always protected at doses greater than 40 Gy.

The dissected lymphatic chains were separately indicated in the surgical specimen by levels from I to III. In case of bilateral neck dissection, each side of the neck was considered separately.

The average duration of follow-up was 46 months (range, 24-116 months). All selected cases had the primary tumor controlled until enrollment in this study. We calculated the overall neck recurrence rate and recurrence in cN0 and cN+ necks.

The influence of postoperative radiotherapy in neck recurrence was studied by comparing recurrences between the following categories of neck dissections: (1) cN0 necks with and without radiotherapy; (2) cN+ necks with and without radiotherapy; (3) cN0 and cN+ with and without radiotherapy; (4) pN0 necks with and without radiotherapy; and (5) pN+ necks with and without radiotherapy.

The influence of clinically detected neck metastases on neck recurrence was evaluated by comparing neck recurrences between the following groups: (1) cN0 and cN+ necks, both with no radiotherapy; and (2) cN0 and cN+ necks, both with radiotherapy.

The influence of histopathologically detected neck metastases on neck recurrence was calculated by comparing neck recurrences between the following groups: (1) pN0 and pN+ necks, both with no radiotherapy; and (2) pN0 and pN+ necks, both with radiotherapy.

The rate of neck recurrence was evaluated between clinically negative and positive necks and also between histopathologically negative and positive necks. The influence of number of positive nodes (1 vs ≥2) detected at clinical or histopathological evaluation on the neck recurrence was also reviewed. The rate of neck recurrence was calculated and compared between patients treated only with SOHND and those given combined treatment for pN0, pN1, and pN2 necks for evaluation of effect of postoperative radiotherapy on neck recurrence in these neck stages.

All comparisons were done with Fisher exact test or χ² test, and P values less than .05 were considered significant.

Thirty-two patients who underwent 36 SOHNDs were included in this study. The procedure was bilateral in 4 of them (11.1%). There were 31 cN0 necks (86%), in which SOHND was performed electively, and 5 cN1 necks (14%), in which the procedure was therapeutic. Twenty cN0 necks (65%) and 4 cN+ necks (80%) received postoperative radiotherapy (P = .34).

Twenty-six SOHNDs (72%) were histopathologically negative for metastases and 10 (28%) were positive (8 [22%] pN1 and 2 [6%] pN2b). Fifteen pN0 necks (58%) and 9 pN+ necks (90%) received postoperative radiotherapy (P = .06), also without significant difference. All pN+ necks with multiple positive nodes received postoperative radiotherapy.

The overall rate of neck recurrence was 6% (2 SOHNDs). For the SOHND-treated group without radiotherapy (12 SOHNDs) this rate was 8% (1 case), and for the combined treatment group (24 SOHNDs) it was 4% (1 case) (P = .46). The neck recurrence rate in cN0 necks was 3% (1 SOHND) and in cN+ necks it was 20% (1 SOHND) (P = .25). This difference was not statistically significant, but the rate was 6.3 times greater in cN+ necks. In pN0 necks the recurrence rate was 8% (2 cases) and in pN+ it was 0%. This difference was not statistically significant either (P = .52).

The rate of neck recurrence in 31 cN0 and 5 cN1 necks was 1 (3%) and 1 (20%) (Table 1), respectively. Histopathologically, there were 26 pN0, 8 pN1, and 2 pN2b necks. No cases recurred in pN1 and pN2b necks.

Neck recurrences were found in 2 SOHNDs during the follow-up period, one in a cN0 neck without adju-
vant treatment and another in a cN1 neck treated with adjuvant radiotherapy with 51 Gy. These neck recurrences were in level II in both necks, and both were staged as pN0 (Table 1). No pN+ necks had recurrences.

The neck recurrence rate was not statistically different according to the presence of clinical or histopathological metastases. The studied comparisons of neck recurrence between cN0 and cN+ necks, both with no radiotherapy; cN0 and cN+ necks, both with radiotherapy; pN0 and pN+ necks, both with no radiotherapy; and pN0 and pN+ necks, both with radiotherapy all demonstrated no significant difference. The use of postoperative radiotherapy (Table 2 and Table 3) and the number of positive nodes with clinical or histopathological evaluation (Table 4) also did not demonstrate significant influence on neck recurrence in this study population.

Our study demonstrated no difference in neck recurrence based on clinical (cN0, cN1, and cN2b; P > .05) or histopathological (pN0, pN1, and pN2b; P > .05) staging of the neck. The adjuvant radiotherapy did not influence neck recurrence for pN0, pN1, and pN2b (Table 5).

## Table 2. Statistical Evaluation of Regional Tumor Recurrence Between SOHND With and Without Postoperative xRT According to Neck Tumor Staging

<table>
<thead>
<tr>
<th>Neck Stage</th>
<th>No. of Patients</th>
<th>No. Postoperative xRT</th>
<th>Postoperative xRT</th>
<th>P Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>cN0</td>
<td>31</td>
<td>1/11 (9)</td>
<td>0/20</td>
<td>.36</td>
</tr>
<tr>
<td>cN+</td>
<td>5</td>
<td>0/1</td>
<td>1/4 (25)</td>
<td>.80</td>
</tr>
<tr>
<td>pN0</td>
<td>26</td>
<td>1/11 (9)</td>
<td>1/15 (7)</td>
<td>.51</td>
</tr>
<tr>
<td>pN+</td>
<td>10</td>
<td>0/1</td>
<td>0/9</td>
<td>&gt; .99</td>
</tr>
</tbody>
</table>

Abbreviations: cN0, clinically negative nodes; cN+, clinically positive nodes; pN0, histopathologically negative nodes; pN+, histopathologically positive nodes; SOHND, supraomohyoid neck dissection; xRT, radiotherapy.

*P values were not significant.

## Table 3. Statistical Evaluation of Regional Tumor Recurrence Between Different Neck Tumor Stages According to the Use of Postoperative xRT

<table>
<thead>
<tr>
<th>Examination</th>
<th>Postoperative xRT</th>
<th>No. of Patients</th>
<th>Recurrence Rate, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Negative Nodes</td>
</tr>
<tr>
<td>Clinical</td>
<td>No</td>
<td>12</td>
<td>1/11 (9)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>24</td>
<td>0/20</td>
</tr>
<tr>
<td>Histopathological</td>
<td>No</td>
<td>12</td>
<td>1/11 (9)</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>24</td>
<td>1/15 (7)</td>
</tr>
</tbody>
</table>

Abbreviation: xRT, radiotherapy.

*P values were not significant.
fluence neck recurrence in these necks with histopathological evaluation. These results are in agreement with the literature.\(^6\)\(^-\)\(^8\)\(^,\)\(^10\)\(^-\)\(^12\)\(^,\)\(^14\)\(^-\)\(^16\)\(^,\)\(^18\)\(^-\)\(^20\)\(^,\)\(^22\)\(^-\)\(^24\)\(^,\)\(^26\)\(^-\)\(^28\) but previous reports demonstrated a significantly higher neck recurrence rate in cases with multiple histopathologically positive nodes. This rate of neck recurrence decreased with the use of postoperative radiotherapy.\(^6\)\(^,\)\(^8\)\(^.\)\(^18\)\(^-\)\(^20\)\(^,\)\(^22\)\(^-\)\(^24\)\(^,\)\(^26\)\(^-\)\(^28\) Our neck dissections with multiple histopathologically metastases (pN2b) had a smaller recurrence rate than that reported in the literature possibly because of our small sample size of positive necks and also because all of them received postoperative radiotherapy. This might demonstrate the effectiveness of radiotherapy in decreasing the neck recurrence in our pN2b necks, as demonstrated by other authors in cases of necks with multiple positive nodes.\(^6\)\(^,\)\(^8\) It is possible that pN1 necks also benefited from postoperative radiotherapy, as 88% of these necks received adjuvant treatment. This benefit in pN1 necks might be demonstrated with more assurance with a larger sample size of neck dissections. The benefit of postoperative radiotherapy in cases with multiple histopathologically positive nodes is difficult to demonstrate, as this is a definite indication for combined treatment, and to withhold combined treatment in these patients as a control group is ethically unacceptable. Perhaps the difference in neck recurrence among the clinical or histopathological neck stages could not be demonstrated in our study because of our small sample size. The rate of neck recurrence in cN0 and pN0 necks and the overall rate was in agreement with findings of other authors.\(^6\)\(^-\)\(^8\)\(^,\)\(^10\)\(^-\)\(^12\)\(^,\)\(^14\)\(^-\)\(^16\)\(^,\)\(^18\)\(^-\)\(^20\)\(^,\)\(^22\)\(^-\)\(^24\)\(^,\)\(^26\)\(^-\)\(^28\) and comparable with that observed in radical and radical modified neck dissections.\(^20\)\(^,\)\(^26\)\(^-\)\(^28\) Despite the lack of a difference in neck recurrence rates between pN0 and pN+ observed in this study, as also demonstrated by Pitman et al.\(^28\) and Spiro et al.,\(^11\) the rate of neck recurrence for pN+ necks in our study was very low, in agreement with data of Pitman et al.\(^28\) but in disagreement with other results.\(^6\)\(^-\)\(^8\)\(^,\)\(^10\)\(^-\)\(^12\)\(^,\)\(^14\)\(^-\)\(^16\)\(^,\)\(^18\)\(^-\)\(^20\)\(^,\)\(^22\)\(^-\)\(^24\)\(^,\)\(^26\)\(^-\)\(^28\) The presence of clinical or histopathological metastases and the use of postoperative radiotherapy did not influence the neck recurrence rate. Although the presence of histopathological metastases and the need for postoperative radiotherapy are signs of locoregional aggressive disease, the neck recurrence rate in this group of unfavorable neck dissections was not high. Thus, the use of SOHND, even in cN+ necks, seems to be safe when neck metastases are 3 cm or smaller and in the center of the operative field. Under these conditions, SOHND effectively selected the patients for combined treatment. The use of postoperative radiotherapy in pN+ necks was 90%, with only one without adjuvant treatment, and 58% in pN0 necks. This difference showed a shift toward a statistically significant value (P = .06), demonstrating the aggressiveness of disease when neck metastases are present, with the need for postoperative radiotherapy. However, the rates of neck recurrence in these 2 groups of neck dissections were not significantly different. The combined treatment in pN+ necks might be important for regional disease control in our study. Two neck dissections in different patients resulted in recurrences inside the operative field (both in level II) and were staged as pN0. Fifty percent to 100% of neck recurrences have been demonstrated inside the operative field and ipsilateral to it.\(^6\)\(^-\)\(^11\)\(^,\)\(^19\)\(^-\)\(^20\)\(^,\)\(^28\) Perhaps these recurrences resulted from histopathological understaging of surgical specimens, without a complete search for metastases in every cutting of all lymph nodes found. This fact might explain the recurrence in pN0 necks even when radical neck dissection is performed. Strong\(^28\) observed a decreased neck recurrence rate when postoperative radiotherapy was used in pN0 necks.

Our findings show that SOHND in squamous cell carcinoma of the OC and oropharynx is a safe procedure even in cN+ necks, according to the above-mentioned criteria. The use of postoperative radiotherapy could be relevant in the regional control of disease in our group of pN+ necks, as its recurrence rate was similar to that observed in the group of pN0 necks.

The neck tumor recurrence rate in cN+ necks was 6.3 times greater than in cN0 necks. The use of SOHND adequately selected the patients for combined treatment. The use of postoperative radiotherapy, presence of positive metastases (clinically or histopathologically identified), and multiple histopathologically positive nodes did not influence neck recurrence.

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