Selective vs Modified Radical Neck Dissection
and Postoperative Radiotherapy vs Observation
in the Treatment of Squamous Cell Carcinoma
of the Oral Tongue

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Objectives: To assess the role of selective neck dissection in patients with squamous cell carcinoma (SCC) of the oral tongue with advanced nodal disease, and to assess the role of postoperative radiotherapy in patients with SCC of the oral tongue with pathologically N1 necks.

Design: Retrospective study of the medical records of all patients who underwent neck dissection for SCC of the oral tongue from January 1, 1980, to December 31, 1995. Median follow-up was 5.7 years.

Setting: The University of Texas M. D. Anderson Cancer Center, Houston, a tertiary care cancer hospital.

Patients: A total of 220 patients with SCC of the oral tongue who received surgical treatment of both the primary tumor and the neck and who had an identifiable type of neck dissection, no synchronous or metachronous lesions, and no evidence of local recurrence.

Interventions: All patients underwent resection of the primary tumor and neck dissection. The extent of neck dissection was determined by surgeon preference. Some patients received radiotherapy to the neck as well.

Main Outcome Measures: Clinical and pathological nodal status, type of neck dissection, and use of radiotherapy. The end points evaluated included the regional control rates.

Results: For clinically N+ patients, 5 of 45 treated with selective neck dissection and 1 of 19 treated with radical or modified radical neck dissection had recurrences in the ipsilateral neck. If only patients with significant tumor burden on final pathological examination (clinically N+/pathologically N2) are considered, 4 (25.0%) of 16 patients undergoing selective neck dissection had recurrences in the neck, while none of the 14 patients treated with radical or modified radical neck dissection had recurrences in the ipsilateral neck (P=.07). Of the 50 patients who had pathologically N1 disease, 25 received postoperative radiotherapy and 25 did not. Of the latter, 2 had recurrences in the neck, while none of the 25 patients who received radiotherapy had recurrences in the neck (P=.24).

Conclusions: Selective neck dissection may be sufficient for many N+ patients with SCC of the oral tongue, but some patients with extensive nodal disease may benefit from more aggressive treatment of the neck. Radiotherapy may be beneficial for all of the node-positive patients, but further studies are needed. Prospective, randomized clinical trials will be useful in further defining the role of selective neck dissection in the clinically N2 neck and radiotherapy in the N1 neck for patients with SCC of the oral tongue.


T HE TREATMENT OF THE NECK in oral cavity cancer has undergone numerous changes during the past 50 years. Radical neck dissection was first described by Crile in 1906 and popularized by Martin et al, and it was the main surgical treatment of cervical lymphadenopathy secondary to squamous cell carcinoma (SCC) until the last third of the 20th century. The cosmetic and functional defects associated with radical neck dissection prompted the search for less morbid alternatives. According to Ferlito and Rinaldo, Suárez suggested a modified dissection preserving the jugular vein, sternocleidomastoid muscle, and spinal accessory nerve, based on an understanding of the fascial planes and lymphatic anatomy of the neck. Bocca and Pignataro subsequently presented this procedure in the English-language literature, and Ballantyne pioneered its use in the United States. Modified radical neck dissection, which is often oncologically equivalent to radical neck dissection but with a significant improvement in postoperative mor-
Many studies, including one performed prospectively, showed levels I and II to be the main sites of drainage for SCC of the oral tongue, with levels IV and V playing a lesser role. Work by Lindberg, Byers, and Shah et al further elucidated the patterns of lymphatic drainage most common for SCC of the oral tongue, establishing the rationale for selective neck dissections of specific lymph node levels initially developed by Suárez. One particular selective neck dissection, that of levels I to III—also known as the supraomohyoid neck dissection—has been commonly used in the management of the clinically node-negative neck in patients with SCC of the oral tongue. Many studies, including one performed prospectively, have shown that the supraomohyoid neck dissection provides control rates similar to that of modified radical neck dissection for patients with N0 oral cavity SCC.

The role of selective neck dissection in patients with clinically evident nodal disease (cN+) is more controversial. Medina and Byers suggested supraomohyoid neck dissection for patients with N0 disease and select patients with N1 disease, while Shah and Andersen recommended supraomohyoid neck dissection for patients with N0 disease, but modified radical neck dissection with sacrifice of the sternocleidomastoid muscle and the internal jugular vein for patients with nodal disease. More recent articles have suggested that selective neck dissection is adequate surgical treatment for certain patients with N2 disease. However, no prospective clinical studies exist to prove the efficacy of supraomohyoid neck dissection compared with modified radical neck dissection in patients with SCC of the oral tongue with node-positive necks.

The role of postoperative radiotherapy in treatment of the neck in patients with SCC of the oral tongue also continues to evolve. Studies by Meoz et al and Leborgne et al show that radiotherapy is a viable modality for elective treatment of the neck. There is evidence that postoperative radiotherapy to the neck improves locoregional control, and adjuvant radiation is often used after neck dissections for patients with significant nodal disease. The criteria for neck radiation are not well established, and radiation can be given postoperatively on the basis of either characteristics of the primary tumor or pathological features of the neck dissection specimen. Radiotherapy is often given to patients with advanced-stage disease, close or inadequate surgical margins, unfavorable histologic findings including lymphovascular invasion or perineural spread, multiple or large lymph node metastasis, or the presence of extracapsular spread. The role of radiotherapy for the N1 neck without extracapsular spread, however, is not well established.

Given the lack of information on the role of selective neck dissection in patients with SCC of the oral tongue with advanced nodal disease, and the potential benefit of postoperative radiotherapy in patients with SCC of the oral tongue with pathologically N1 (pN1) necks, we reviewed our experience with these interventions for patients with tongue cancer treated at our institution from 1980 to 1995.

### METHODS

We reviewed the medical records of all patients treated at The University of Texas M. D. Anderson Cancer Center, Houston, for SCC of the oral tongue from January 1, 1980, through December 31, 1995. We identified 266 patients who underwent surgery that included a neck dissection. Patients who had an unspecified type of neck dissection, had synchronous or metachronous lesions, or experienced local recurrence were eliminated from the study. Of the 266 patients with SCC of the tongue, 220 met the foregoing criteria.

The major variables examined were the clinical and pathological nodal status, type of neck dissection received, and use of radiotherapy. The end points evaluated included the regional control rates. Follow-up time was calculated from the patient’s initial visit at M. D. Anderson Cancer Center for treatment of the primary tumor until the date of last contact or death. The use of preoperative imaging was dependent on surgeon preference. Ninety-six (36.1%) of 266 patients underwent preoperative imaging. Approximately 90% (86/96) of these patients were treated after 1990. Differences in the proportions of patients who developed disease recurrences were tested by the Pearson χ² test. If there were 10 or fewer patients in a group, the 2-tailed Fisher exact test was used. The χ² tests were performed with the assistance of the Statistica statistical software application (StatSoft, Tulsa, Okla).

### RESULTS

We reviewed the records of the 220 patients with oral tongue cancer treated with resection of the primary tumor and neck dissection with or without adjuvant treatment and found that 22 patients (10.0%) had recurrences in the neck alone (Table 1). Of these patients, 13 (5.9% of the 220) had recurrences in the ipsilateral neck.

To determine the impact of the type of neck dissection on regional failure in patients treated for oral tongue cancer, we noted that 195 underwent selective neck dissections...
and 12 (6.2%) of these had disease recur in the ipsilateral neck, while 1 (4.0%) of 25 patients who underwent radical neck dissection had disease recur in the ipsilateral neck (Table 2). These data suggest that excellent regional control could be obtained with either type of neck dissection.

Further examination of these results and their dependence on clinical nodal status showed differences in control dependent on the type of neck dissection selected. In the case of 150 patients without clinically evident nodal disease (cN0) who were treated with selective lymph node dissection of levels I to III or I to IV, 7 (4.7%) developed ipsilateral regional recurrence, indicating acceptable regional control with selective neck dissection for patients with cN0 disease (Table 3).

If data from only patients with clinically positive nodes are examined, then 5 (11.1%) of 45 patients (Table 3) treated with selective neck dissection and 1 (5.3%) of 19 patients (Table 4) treated with radical or modified radical neck dissection had recurrences in the ipsilateral neck. However, patients treated with radical or modified radical neck dissection more commonly were staged pN2. For patients with cN+ disease with advanced pathological staging (pN2), differences in regional control were seen according to neck dissection type. Of the 16 patients with clinically positive disease staged pN2b who were treated with a selective neck dissection, 4 (25.0%) had recurrences in the ipsilateral neck. All but 1 of the 16 patients received postoperative radiotherapy, and 10 of the 16 had extracapsular spread. Of the 14 patients with clinically positive disease and 2 or more disease-positive lymph nodes found on pathological examination that were treated with radical or modified radical neck dissection, none had recurrences in the ipsilateral neck ($P = .07$). All 14 patients received postoperative radiotherapy, and 10 of the 14 had extracapsular spread.

**IMPACT OF POSTOPERATIVE RADIOTHERAPY ON REGIONAL RECURRENCE**

Postoperative radiotherapy was administered to 69 (35.4%) of 195 patients who underwent selective neck dissections and 21 (84.0%) of 25 patients who underwent radical or modified radical neck dissections (Table 2), for a total of 90 (40.9%) of 220 patients. Radiotherapy was delivered to 17 (14.3%) of 119 patients with pN0 disease, 25 (50.0%) of 50 patients with pN1 disease, 42 (93.3%) of 45 patients with pN2病, and 6 of 6 patients with pN2c disease (Table 1). No patients had N2a or N3 disease. Of the patients who received postoperative radiotherapy, 7 (7.8%) of 90 had recurrences in the treated neck: 1 (5.9%) of 17 patients who had pN0 disease, 0 of 25 patients who had pN1 disease, 5 (11.9%) of 42 patients who had pN2b disease, and 1 (16.7%) of 6 patients who had pN2c disease (Table 1).

Of the 50 patients found to have pN1 disease after neck dissection, 47 had been treated with a selective neck dissection and 3 had undergone a radical or modified radical neck dissection. Among these 50 patients, 40 did not have extracapsular spread and 10 did. Half of the 50 patients did not receive postoperative radiotherapy and half did. We examined the impact of adjuvant radiotherapy in this group of patients; 2 (8.0%) of 25 patients who did not receive postoperative radiotherapy had ipsilateral regional recurrence, whereas 0 of 25 patients who received postoperative radiotherapy had recurrences in the neck ($P = .24$). Of the 40 patients without extracapsular spread, 2 (8.7%) of 23 who did not receive radiotherapy...
experienced ipsilateral regional recurrence, whereas 0 of 17 patients who received radiotherapy experienced regional recurrence. Although there was a lower incidence of regional recurrence for patients with pN1 disease without extracapsular spread who received postoperative radiotherapy vs those who did not receive postoperative radiotherapy, the difference was not statistically significant (P = .32) (Table 5).

**COMMENT**

The treatment of the neck for SCC of the oral tongue has undergone considerable refinement during the past 50 years. In the case of the N0 neck, selective neck dissection of lymph node levels I to III or I to IV has gained wide acceptance as management of the neck for patients with SCC of the oral tongue. The current study documents our observed regional recurrence rate of 7.3% (4.7% if only ipsilateral recurrence is considered) in 150 patients with cN0SCC of the oral tongue treated with selective neck dissection, which is in excellent agreement with regional recurrence rates reported by other investigators.12,13,21-24

The extent of neck dissection needed for patients with SCC of the oral tongue with positive cervical lymphadenopathy is more controversial than the management of the N0 neck. Kowalski and Carvalho15 suggested that selective neck dissection may be feasible in patients with N1 or N2a disease. However, their conclusion was based not on a comparison of selective and modified radical neck dissection but on the fact that no patient who underwent radical neck dissections had metastasis to level IV or V. Traynor et al16 examined 29 patients with upper aerodigestive tract SCC who presented with N1 or N2 disease and underwent a selective neck dissection. Only 1 of the 29 patients experienced recurrence in the neck, again suggesting that selective neck dissection may be effective in patients with N1 or N2 disease. Andersen et al15 looked at 106 patients with N1 or greater disease treated with selective neck dissection and found a control rate of 94.3%. However, only 31% of these patients had N2a or N2b disease.

We initially studied all patients with cN+ disease, concentrating on the differences in regional control among patients who underwent radical or modified radical neck dissection or selective neck dissection. For the patients in this study, there was no significant difference in regional recurrence between patients with cN+ disease receiving selective and radical or modified radical neck dissection. However, the patients undergoing radical or modified radical neck dissection had a substantially higher disease burden on final histologic examination. Of the 19 patients with cN+ disease treated with radical or modified radical neck dissection, 15 (78.9%) were staged as N2b or higher, whereas only 18 (40.0%) of the 45 patients with cN+ disease treated with selective neck dissection were staged as pN2b or higher. In addition, only 36.1% of patients involved in this study underwent preoperative imaging. Because computed tomography is a more sensitive method of determining nodal status than physical examination in patients with SCC of the oral tongue,25 clinical staging does not accurately represent discernible tumor burden for the patients in this study. Because our goal was to investigate the extent of neck dissection needed for patients with significant nodal disease, the use of preoperative radiotherapy (chemotherapy or radiotherapy), may be needed in patients with significant tumor burden.

For patients with intermediate nodal stage (N1) with or without extracapsular spread, the type of neck dissection performed is probably less critical for regional control, and the role of postoperative radiotherapy appears less clear. Although numerous studies have supported the efficacy of postoperative radiotherapy in cancer of the head and neck,26 few have concentrated on the role of radiation specifically for patients with cancer of the oral tongue. However, the use of radiotherapy for the adjuvant treatment of SCC of the oral tongue has increased in many institutions.27 Indications are not standardized, but postoperative radiotherapy is often used for patients with advance-stage disease, close or inadequate surgical mar-

**Table 5. Ipsilateral Regional Recurrence in All Neck Dissections for Pathologically N1 Disease With or Without Radiotherapy**

<table>
<thead>
<tr>
<th>pN1 Disease</th>
<th>No Radiotherapy</th>
<th>Radiotherapy</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No extracapsular spread</td>
<td>2/23 (8.7)</td>
<td>0/17</td>
<td>2/40 (5.0)</td>
</tr>
<tr>
<td>Extracapsular spread</td>
<td>0/2</td>
<td>0/8</td>
<td>0/10</td>
</tr>
<tr>
<td>Total</td>
<td>2/25 (8.0)</td>
<td>0/25</td>
<td>2/50 (4.0)</td>
</tr>
</tbody>
</table>

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In our data were not statistically significant (P = .24). In the 23 patients without extracapsular spread who did not receive radiotherapy, 2 experienced recurrences in the ipsilateral neck, whereas none of the 17 who received radiotherapy had recurrences. This difference was not statistically significant (P = .32). Because there are no known reports of prospective or retrospective studies in the literature that explore the need for radiotherapy for patients with N1 disease with SCC of the oral tongue without extracapsular spread, these data are the first to suggest a potential benefit of adjuvant radiotherapy for patients with pN1 SCC of the oral tongue. A larger study group would be needed to establish the statistical significance of the difference in recurrence rate.

The use of selective neck dissection for patients with N0 disease has become standard practice, and postoperative radiotherapy is likewise widely used for patients with advanced primary lesions, lesions possessing peripheral or lymphovascular invasion, the presence of large (>3-cm) or multiple positive lymph nodes, and the presence of extracapsular spread. However, the extent of neck dissection needed for patients with significant tumor burden is not well established, nor is the role of postoperative radiotherapy for patients with pN1 disease. Our data suggest that patients with significant nodal disease (cN+/pN2) may benefit from more aggressive treatment of the neck, although the data are not statistically significant. Further studies need to be done to establish whether more extensive treatment is indeed needed for patients with significant tumor burden and, if so, whether this treatment should consist of more extensive surgery or more aggressive adjuvant therapy such as postoperative chemotherapy, radiotherapy, or both. In addition, patients with pN1 disease, even if they do not have extracapsular spread, may benefit from postoperative radiotherapy, although again our data were not statistically significant. Prospective trials comparing patients with cN2 disease treated with modified radical neck dissection and selective neck dissection, and comparing patients with pN1 disease without extracapsular spread treated with postoperative radiotherapy vs patients not receiving radiotherapy, would help to further resolve these issues but may not be feasible because of the large number of patients required.

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REFERENCES


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