Supraglottic Hemipharyngolaryngectomy

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Abstract: Background. We evaluated the functional and oncologic results of supraglottic hemipharyngolaryngectomy as treatment for T1 and T2 lateral laryngeal margin and piriform sinus carcinomas.

Methods. Eighty-seven patients underwent this surgical treatment. The disease was classified T1 in 14 of these cases (16.1%) and T2 in 73 cases (83.9%). The nodal status indicated 39 cases of N0 (44.8%), 18 cases of N1 (20.7%), 28 cases of N2 (32.2%), and two cases of N3 (2.2%). With regard to the N0 cases, 15 (38.4%) were positive at the histologic examination. Within the N+ group, 52.1% involved capsular rupture.

Results. Two patients died of complications during the postoperative period. The mean duration of nasogastric tube feeding was 20 days. Six patients (7.27%) had feeding resumption problems. All patients were decanulated after a mean period of 16 days. All patients underwent postoperative radiation therapy, except two with T1N0N– disease and three who had previously undergone this treatment. The 5-year actuarial survival rate was 60.3% (T1, 83.3%; T2, 49.9%). The rates of local and regional recurrence, second primary cancer, and metastasis were 19.5%, 24.1%, and 28.1%, respectively. The infringement of the pharyngoepiglottic fold was significantly correlated with locoregional recurrence. The survival rate was significantly correlated with the nodal status and extracapsular spread.

Conclusions. Initial staged cancers of the laryngeal margin and piriform sinus can be successfully managed with conservative surgery called supraglottic hemipharyngolaryngectomy combined with nodal neck dissection. Postoperative radiation therapy is still recommended in most cases because of the high recurrence potential and prevalence of secondary regional cancers. This combined treatment seems to be a suitable therapeutic choice in the treatment of patients with T1 and T2 carcinomas of the laryngeal margins and piriform sinus. © 2004 Wiley Periodicals, Inc. Head Neck 26: 701–705, 2004

Keywords: larynx; carcinoma; partial surgery

Supraglottic hemipharyngolaryngectomy (SGHPL) by the lateral approach is derived from the surgical strategy described by Alonso in 1947. This operation allows removal of a hemiportion of the laryngeal vestibule and the internal wall of the supraglottic pyriform sinus. This surgery, combined with postoperative radiotherapy, enables optimal control of limited laryngeal vestibule and piriform sinus lesions. Only a few reports specifically focused on this surgery. This article presents SGHPL and radiotherapy results for the treatment of patients with limited cancers of the laryngeal vestibule and piriform sinus.
PATIENTS AND METHODS

This retrospective study was conducted between 1981 and 1998. Eighty-seven patients (84 men and three women) underwent SGHPL for squamous cell carcinoma. The mean age was 59 years (range, 43–85 years).

The preoperative assessment consisted of a panendoscopy with esophagoscopy, cervical CT scan, hepatic echography, and a pulmonary radiologic checkup for all patients. Vocal cord mobility was evaluated in all cases.

The classification was established according to the 1997 Union Internationale Contre le Cancer (UICC) by clinical and radiologic evaluation (Table 1). Tumors were classified as T1 in 14 cases (16.1%) and T2 in 73 cases (83.9%). Several sub-sites were involved in T2 tumors. We noticed involvement of the lateral wall of the piriform sinus in 20 cases (22.9%) and the pharyngoepiglottic fold in 22 cases (25.3%).

The nodal status indicated 39 cases of N0 disease (44.8%), 18 cases of N1 disease (20.7%), 28 cases of N2 disease (32.2%), and two cases of N3 disease (2.2%). No metastasis was detected in any patients. The type of nodal therapy was decided on the basis of the clinical and paraclinical checkup results. Combined with the SGHPL, nodal areas were treated by ipsilateral selective neck dissection in 54 cases (62.1%) and radical neck dissection in 30 cases (34.5%). Three patients (3.4%) had been previously irradiated for a tumor at another location.

Among the 84 neck dissections, lymph nodes were invaded in 64 cases (76.2%) and unscathed in 20 cases (23.8%). Extracapsular spread was noted in 28 cases (34.3%). Considering the clinical nodal status, in the 39 cases of N0 disease, 15 (38.4%) were positive in the histologic examination (Table 2).

The histologic examination revealed inadequate surgical margins in seven cases (8.05%). Eighty patients underwent postoperative radiotherapy of the injured site and of the nodal site, with a maximum dose of 70 Gy.

### Table 1. Case distribution by UICC classification.

<table>
<thead>
<tr>
<th>T classification</th>
<th>No. cases by nodal status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N0</td>
</tr>
<tr>
<td>T1</td>
<td>3</td>
</tr>
<tr>
<td>T2</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
</tr>
</tbody>
</table>

### Table 2. Nodal clinical stage versus pathologic stage.

<table>
<thead>
<tr>
<th></th>
<th>N0</th>
<th>N1</th>
<th>N2</th>
<th>N3</th>
</tr>
</thead>
<tbody>
<tr>
<td>N+</td>
<td>15</td>
<td>17</td>
<td>28</td>
<td>2</td>
</tr>
<tr>
<td>N−</td>
<td>21</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>EC+</td>
<td>0</td>
<td>10</td>
<td>15</td>
<td>2</td>
</tr>
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</table>

Abbreviations: N+, positive node; N−, negative node; EC+, positive extracapsular spread.

Statistical Analysis. The Kaplan-Meier method was used to estimate the probability of recurrence or death. Death caused by the disease was treated as an endpoint for disease-specific survival; other deaths such as postoperative deaths were treated as censored observations. The subsequent period was defined as time from surgery to time of last follow-up or death (or recurrence when the studied event was a recurrence). All patients were followed until they died, or for a minimum 5-year follow-up period.

Comparisons of two or more groups for a prognostic factor were performed with the logrank test and Wilcoxon test. In all of the statistical analyses, *p* values of < .05 were considered significant. All statistical analyses were performed with the SAS software package (SAS Institute, Cary, NC).

RESULTS

Postoperative Complications. Two patients died in the postoperative period, one as a result of vascular disease and the other of a pneumopathy. The other complications included aspiration during deglutition in six cases (6.9%), dysphonia in one case (1.1%), dyspnea (medically treated) in one case (1.1%), tracheotomy after radiation in three cases (3.4%), and pharyngostomy in one case (1.1%). Postoperative radiotherapy caused osteoradionecrosis in two cases (2.2%).

Functional Results. All patients were decannulated. The mean duration of cannulation was 16 days (range, 6–82 days). Three patients required a new tracheotomy during radiotherapy to overcome respiratory complications from laryngeal edema.

Oral feeding was reinstituted after a mean period of 9 days (range, 5–62 days). Most patients achieved efficient deglutition after 6 days of re-education, and the nasogastric feeding tube was removed after a mean 20 days (range, 8–58 days). Six patients (7.1%) had prolonged swallowing problems. Two patients required endoscopic per-
cutaneous gastrostomy after 1 month, and they recovered their oral feeding capacity after 6 months of reeducation. One of them continued to have swallowing problems for 2 years. The mean duration of hospitalization was 24 days (range, 9–62 days; median, 22 days).

**Oncologic Results**

**Local and Nodal Recurrence.** Seventeen (19.5%) of 87 patients had a recurrence in their aerodigestive tract, 11 in the larynx, three in the hypopharynx, and three in the palatine tonsils. A nodal recurrence was associated in three cases. Eight patients were seen with local and metastatic recurrence. Recurrence occurred after a mean period of 29.5 months. Among these patients with a recurrence, two died before any treatment, five underwent a total pharyngolaryngectomy extended to the tongue in one case and associated with gastric pull up in one case. The other cases were treated by complementary chemotherapy. Nine patients were still alive after 3 years, and five were alive after 5 years.

The local recurrence rate was not significantly correlated with the nodal status ($p = .673$) or surgical margins ($p = .276$). Note that infringement of the pharyngeopiglottic fold was significantly correlated with locoregional recurrence ($p = .044$).

**Secondary Tumors.** The onset of a new cancer within 5 years of surveillance occurred in 21 cases (24.1%). Secondary tumors appeared in the lungs in nine cases (10.3%), in the esophagus in three cases (3.4%), in the contralateral larynx in six cases (6.9%), and in the gums in one case (1.1%). Secondary tumors were associated with metastasis in six cases. Eighteen patients (85.7%) were still alive after 5 years of follow-up. No factors (T classification, N classification, surgical margins) were significantly correlated with secondary tumor development.

**Distant Metastasis.** Twenty-five patients (28.7%) were seen with metastasis in the following sites within the 5-year follow-up period: lungs in 15 cases (17.2%), liver in five cases (5.7%), encephalon in two cases (2.3%), and several sites simultaneously in three cases (3.4%). Pulmonary metastases were significantly correlated with the nodal status ($p = .0378$).

**Postoperative Survival.** The follow-up period was 5 years. The number of patients alive at 5 years was 44 (50.6%). Forty-three patients (49.4%) died, 28 because of disease progression and 14 (16.1%) because of intercurrent disease. The actuarial survival rate at 5 years was 60.3%. Various factors influenced survival rate (Table 3). The survival rate was a 92.1% in the T1 group compared with 49.2% in the T2 group ($p = .0403$). The survival rate of patients with a localized tumor in the aryepiglottic fold was 83.3%, in the pyriform sinus it was 72.9%. These differences were not significant.

The survival rates at 5 years by nodal status were as follows: N0, 56.7%; N1, 50.2%; and N2/3, 44.8% ($p = .0477$) (Table 3). The survival rate at 5 years for patients with positive lymph nodes (N+) was 43.4% compared with 63.2% for those with N− disease ($p = .036$). The survival rate at 5 years for patients with nodal capsular rupture (CR+) was 36.5%, whereas that of CR− patients was 57.6% ($p = .044$).

**DISCUSSION**

The laryngeal margin is an anatomic zone bordering the pyriform sinus and the larynx. According to the 5th edition of the TNM classification of the UICC, the supraglottic level comprises the laryngeal vestibule subdivided into three subsites (infrahyoidian epiglottis, false vocal cords, and laryngeal ventricles) and the laryngeal margin, also called the laryngeal aditus or epilarynx. This anatomic area is also subdivided into three subsites: suprahyoaidian epiglottis (free border, lingual and laryngeal side), aryepiglottic fold, and arytenoid. Therefore, it is interesting from an anatomic, clinical, and therapeutic standpoint to individualize three zones in the epilarynx.
region: anterior laryngeal margin (suprahyoid epiglottis), lateral laryngeal margin, and the posterior larynx margin. The pharyngoepiglottic fold belonging to the hypopharynx is a frequent area of marginal carcinoma extension, especially aryepiglottic fold lesions.

Classification of these tumors is quite problematic because of their borderline location. When the tumor is discovered, it has frequently reached two subsites in the larynx or hypopharynx region. Laryngeal margin carcinomas are differentiated from supraglottic laryngeal lesions by their rapid propensity to extend into the hypopharynx and base of the tongue and by their higher nodal invasion frequency—these features make them closer to hypopharyngeal cancer.²

SGHPL concerns T1 and T2 vestibular lesions initially located in the pharyngoepiglottic fold or aryepiglottic fold and subsequently invading the upper part of the pharyngolaryngeal wall and/or the homolateral pyriform sinus. Limited extension to the hyothyroepiglottic space is not a contraindication, but the mobility of the vocal cords must be conserved. Considering the 1997 UICC classification of supraglottic cancers, some T3 supraglottic cancers originating on the aryepiglottic fold with extension into the piriform sinus and preepiglottic space can successfully be managed by SGHPL, but they were not included in this series of patients. Alonso³ was the instigator of this surgery in 1947. He described a lateral surgical approach that allows horizontal removal of the hemilarynx. This technique was later adapted to give rise to the surgical technique that uses a musculoperichondrial flap for the pharyngeal defect closure.² This surgical procedure allows resection of the lateral supraglottic portion of the larynx and hypopharynx between the glottic plane below and the pharyngoepiglottic fold above. Removal is focused on the aryepiglottic fold, the lateral portion of the endolarynx, the arytenoid, the pharyngolaryngeal wall, and the pyriform sinus. During endoscopic staging of the lesion, it is important to make sure that the lesion does not reach the superior border of the cricoid cartilage on the laryngeal side of the pyriform sinus, that the hemilarynx remains mobile, and that the superior extension does not reach the base of the tongue. Invasion of the external side of the pyriform sinus is not a contraindication for surgery, but lateral resection into the piriform sinus is then larger, and reconstruction and the postoperative period can be more difficult. When resection does not extend in the lateral wall of the piriform sinus, the pharyngeal defect can be closed with a local musculoperichondrial flap as we have done in all cases reported. When the excision is wide, a flap can be required to close the pharyngeal defect.⁴,⁵

Relatively wide arytenoid removal can be performed, with the superior part only or almost the entire arytenoid body. The only essential point is to conserve the arytenoid process, which maintains the glottic plane.¹

Functional recovery from the operation was relatively simple and rapid for most patients. Conservation of the arytenoids, vocal cord, and one piriform sinus enabled rapid recovery of laryngeal functions. Only six patients (7.1%) had feeding resumption problems. Two required a temporary gastrostomy after the start of radiation therapy. The swallowing recovery period was not very problematic for most patients, even though the hemilarynx was generally less mobile. If the ipsilaterial pyriform sinus is reduced, the controlateral sinus is still functional, and recovery of efficient swallowing is rapid. Nevertheless, the patient is exposed to the risk of a potentially dangerous pneumopathy.

Radiotherapy is still recommended during the postoperative period, considering the affinity of these lesions for lymphatic tissue and their local recurrence potential.⁶,⁷ Nodal invasion is quite common (even in patients with N0 disease), and the survival rate is highly dependent on the nodal status.⁷ In this study, the difference in survival rates seemed to differ significantly between N0 and N1 or N2 patients. The association of surgery followed by radiotherapy seems to improve locoregional control of T1 and T2 anterior and lateral margin tumors.⁶,⁸–¹⁴ In this series, only seven patients were not irradiated, either because they had already undergone radiotherapy or because it was a T1N0N₀ tumor (three cases). T1 tumors of the aryepiglottic fold are the only tumors for which postoperative radiation therapy seems unnecessary. Radiotherapy is required for all other cases, including nodal histologic invasion, consequent preepiglottic infringement, and extension into the piriform sinus.⁷ It is impossible to evaluate the impact of postoperative radiotherapy on survival when considering the conditions of this series of patients.

All published series report a relatively high locoregional recurrence rate, second primary tumor, and metastatic evolution rate.¹,⁹,¹¹,¹⁵ The prognosis is poor in cases of locoregional recurrence. After total pharyngolaryngectomy, possibly circular or extended to the oropharynx, disease
in only a limited number of patients can be controlled, with a frequently difficult postoperative period. Recurrence can occur at an irradiated site, and apparent extension of the lesion will not reflect the actual situation. Recurrence usually seems to occur in the piriform sinus at the resection margins. Local extension with recurrence is often considerable and needs extensive surgery. All published series have highlighted substantial intercurrent mortality and metastatic rates, as we report in this series of patients.\textsuperscript{1,11,15} The attitude of these tumors makes them closer to hypopharyngeal tumors rather than laryngeal tumors.\textsuperscript{2}

CONCLUSION

Initial staged cancers of the laryngeal margin and piriform sinus can be successfully managed with conservative surgery. Surgery such as SGHPL combined with nodal neck dissection usually achieves good functional results and minimal morbidity. Postoperative radiation therapy is still recommended in most cases because of the high recurrence potential and prevalence of secondary regional cancers. This combined treatment seems to be a suitable therapeutic choice in the treatment of patients with T1 and T2 carcinomas of the laryngeal margins and piriform sinus.

REFERENCES