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Partial vertical laryngectomy for recurrent glottic carcinoma

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Partial vertical laryngectomy for recurrent glottic carcinoma was performed in 61 patients according to stringent criteria. The great majority of the recurrent tumours appeared within 2 years of radiotherapy (80%). The mean follow-up after surgery was 79 months. At 5 years 85% of the patients were free of local recurrence. Nine patients (15%) developed a local recurrence; eight of them underwent total laryngectomy; one patient refused the operation and died. Seven patients died of other causes. The actuarial overall survival rate was 88% at 5 years. Post-operative complications were seen in 12 patients (20%); nine of these patients developed airway problems. One patient underwent total laryngectomy for severe aspiration, the others finally were decannulated. The results of this study indicate that partial vertical hemilaryngectomy for irradiation failures is a safe procedure with good results without undue morbidity.

Keywords partial vertical laryngectomy glottic carcinoma radiotherapy

Introduction

It is widely accepted that early stage squamous cell carcinoma of the vocal cord may be successfully treated by radiotherapy. The incidence of local recurrence after radiotherapy is of the order of 15%.1 4 Once a recurrence has been confirmed by histological examination the salvage procedure may be total or partial laryngectomy. Total laryngectomy has been the most frequent operation for radiation failure. It provides wide tumour margins, avoids the surgical exposure of irradiated cartilage and may simplify the problem of further follow-up. In a number of these patients, however, a vertical partial laryngectomy may be successful if strict criteria are observed. This 'conservation surgery' has two major advantages over a total laryngectomy, i.e. the normal airway remains intact and the glottic function will only be partially impaired, resulting in a hoarse voice. An argument given for avoiding vertical partial laryngectomy is that wide surgical margins are necessary after radiotherapy, because assessment of the extent of the recurrent tumour following radiotherapy is often difficult. The present study was performed to evaluate the results of partial vertical laryngectomy in a group of 61 patients who had previously received a full course of radiotherapy for 'early' glottic cancer.

Materials and methods

The medical records of 61 patients who underwent a vertical partial laryngectomy at the Free University Hospital in Amsterdam and the St Radboud Hospital of the University in Nijmegen for recurrent glottic carcinoma between 1973 and 1989 were reviewed. The mean age of the patients was 60 years (range 35-80 years) and only two patients were women. Classification of the original tumour before irradiation, according to the TNM classification of the UICC4 is shown in Table 1. All T1 tumours showed only subglottic extension. All tumours were initially treated with external irradiation to a total dose of approximately 6600 cGy, divided into daily fractions of 200 cGy in 6-7 weeks. At follow-up any suspect lesion was examined and biopsied by direct laryngoscopy and histological examination of the biopsy. In 49 patients (80%) recurrent disease was apparent within 24 months of completion of radiotherapy and in 36 of the patients (60%) within 12 months. Depending on the extent of the recurrent tumour a hemilaryngectomy was performed in 11 patients and a frontolateral laryngectomy in 50. All patients met the criteria set by Biller et al. for partial vertical laryngectomy.5 A tumour extension to the contralateral vocal cord should not exceed 3 mm.
Table 1. TNM classification (UICC) of the original tumour before radiotherapy

<table>
<thead>
<tr>
<th>Original tumour stage</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>2</td>
</tr>
<tr>
<td>T1 N0</td>
<td>12</td>
</tr>
<tr>
<td>T1a N0</td>
<td>1</td>
</tr>
<tr>
<td>T2 N0</td>
<td>5</td>
</tr>
<tr>
<td>T1b N0</td>
<td>1</td>
</tr>
<tr>
<td>T2a N0</td>
<td>40</td>
</tr>
<tr>
<td>T2b N0</td>
<td>1</td>
</tr>
<tr>
<td>T3 N0</td>
<td>1</td>
</tr>
</tbody>
</table>

2 The arytenoid, except for the vocal process, should be free of tumour.
3 Subglottic extension should not exceed 5 mm.
4 Supraglottic extension should extend no further than the lateral extension of the sinus of Morgagni.
5 The vocal cords should be mobile.
6 The cartilage should not be invaded.
7 The recurrence should correlate with the site and extent of the original primary tumour prior to radiotherapy.

The surgical technique of the vertical partial laryngectomy as described by Ogura and Biller is based on resection of the hemilarynx. Figure 1 shows the principle of the operation. In the frontolateral laryngectomy the anterior commissure is included in the specimen, whereas in the hemilaryngectomy the cartilage is cut in the midline. The extent of the posterior margin was dependent on the location of the tumour. In 17 patients it was necessary to remove the whole arytenoid. In the others it was sufficient to resect the vocal process of the arytenoid only. The external perichondrium of the thyroid cartilage was preserved and used for closure. No attempt was made to reconstruct the resected true vocal cord. All patients had a temporary tracheotomy, and a nasogastric feeding tube. Usually the tracheotomy tube could be removed within 2 weeks and soon after the feeding tube was removed if there were no aspiration problems. The actuarial risk of recurrence and survival curves were constructed using the Kaplan and Meyer method.

Results

The post-operative course was uncomplicated in 49 patients (80%). All these patients were decannulated and on an oral diet within 2 weeks after the operation. In two patients a fistula developed post-operatively, but closed spontaneously. One patient had a post-operative haemorrhage, which was controlled by exploration.

Nine patients (15%) had delayed post-operative complications mainly concerned with the airway. Three patients, in whom the arytenoid was removed had severe airway problems. One of them could not be decannulated due to persistent aspiration and finally underwent total laryngectomy. The other two patients were finally decannulated without surgical intervention. Six patients continued to have some dysphonia after decannulation due to oedema of the supraglottic region. This was treated by endoscopic CO2 laser surgery and all six patients eventually recovered completely.

The mean follow-up was 79 months (range 3–200 months). Nine patients (15%) developed a local recurrence. This in six cases occurred within a year of partial vertical laryngectomy. Eight patients underwent a total laryngectomy. One patient refused this operation and was the only patient who died of disease. Seven patients died of other causes. Figure 2 shows the actuarial risk of local recurrence at 5 years, which was 83%. The adjusted 5-year survival rate was 98%, whereas the overall 5-year survival rate was 88% (Figure 3).

Histological examination of the resection specimens showed that the margins were involved by tumour in 10 patients (Table 2). None of these patients received any immediate treatment. In five of these patients a local recurrence developed. Of the other five patients one died after 2 years of a non-tumour related cause; the other four are free of disease for 4, 6, 10 and 13 years.

Discussion

‘Conservation’ surgery for the salvage of radiation failure in early vocal cord cancer was first described in 1951. Since then many authors have claimed good results with the use

![Figure 1](a) Frontolateral laryngectomy in a horizontal plane. (b) Hemilaryngectomy in a horizontal plane.

![Figure 2](Risk of local recurrence within 5 years after partial vertical laryngectomy for irradiation failures (n = 61).
of vertical partial laryngectomy for recurrent disease after radiotherapy. The results of this retrospective study confirm that a good cure rate and conservation of function can be expected when vertical partial laryngectomy is used for recurrent glottic carcinoma. A prerequisite for this conservation surgery is that the extent not only of the recurrence after radiotherapy, but also of the original tumour before radiotherapy is begun whether the original extent of the tumour. Therefore it is of importance to assess before radiotherapy is begun whether the original tumour can be treated by partial vertical laryngectomy and this should be documented in the medical records. This assessment should preferably be done by an otolaryngologist who is familiar with the procedure of partial vertical laryngectomy. If the original tumour, on account of its extent, could not have been treated by partial vertical laryngectomy, its recurrence after radiotherapy cannot be treated by this procedure.

In order to detect recurrence at the earliest possible stage, stringent follow-up after radiotherapy is essential, especially for the first years because the great majority of recurrences occur in that period. Videolaryngostroboscopy at each follow-up visit has proved to be an important aid. The excellent magnification of the vocal cords and the recognition of any reduction of the mucosal wave pattern allows for early detection of recurrence.

The two main post-operative complications of partial vertical laryngectomy are dysphonia and aspiration. Dysphonia, the most common complication occurred in eight patients (13%) and is usually due to oedema of the supraglottic structures, especially the arytenoid, which can be treated by endoscopic CO₂ laser surgery. Aspiration is a rare complication. In this study it occurred in two patients. In both patients the arytenoid had to be removed at surgery. It may be valuable to reconstruct the posterior glottic space in some patients to avoid aspiration.

In general, positive surgical margins have an adverse effect on survival following surgery for squamous cell carcinoma of the head and neck. However, of the 10 patients in our study who had tumour at the surgical margins, only five developed recurrence. Bauer et al. found that in 82% of his patients who had tumour at the surgical margins, no local recurrence developed over a follow-up period of 5–12 years. It might be possible that, even with gross tumour at the margins, the last tumour cell was removed and that the only cancer around is that seen in the microscopic sections. Another explanation could be that the remaining cancer cells are dealt with by the host defense mechanism on the basis of stimulation, triggered by local development of granulation tissue. It is our contention that microscopic presence of tumour in the surgical margins does not warrant a total laryngectomy directly when no further tissue can be removed. A careful follow-up seems to be a justifiable policy. In conclusion, we believe that vertical partial laryngectomy is an effective salvage procedure in selected patients.

References