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ORIGINAL ARTICLE

Partial laryngectomy as salvage surgery after radiotherapy: Oncological and functional outcomes and impact on quality of life. A retrospective study of 20 cases

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KEYWORDS
Partial laryngectomy;
Post-radiotherapy;
Salvage

Summary The gold standard for the management of laryngeal squamous cell carcinoma in a previously irradiated patient is ''salvage'' total laryngectomy, but surgical management by partial laryngectomy can sometimes be proposed in selected patients.
Objectives: This study was designed to review the functional and oncological outcomes of patients treated by open partial laryngectomy for recurrent squamous cell carcinoma after failure of radiotherapy or involving previously irradiated tissues and to define prognostic criteria for the selection of patients eligible for this treatment strategy.
Materials and methods: In this retrospective study, 20 patients underwent partial laryngectomy between 2000 and 2011 for recurrence or second primary stage I or II laryngeal squamous cell carcinoma in an irradiated territory (11 vertical partial laryngectomies; 9 horizontal partial laryngectomies).
Results: The 3-year overall survival rate in patients with negative resection margins was 66%, with higher survival rates for tumours confined to the glottis, and the 2-year local control rate was 67%. Positive resection margins requiring total laryngectomy were observed in 20% of cases. The 3-year overall survival rate was 56% in these patients. Exclusive oral feeding was restored in 75% of patients after an average of 32 days. The tracheotomy tube was removed after an average of 18 days in 90% of patients. The disease-free functional larynx preservation rate was 45%.
Conclusions: Salvage partial laryngectomy in irradiated tissues is an alternative treatment option to total laryngectomy in selected patients.

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Introduction

Laryngeal cancer is the fifth most common cancer in men. France has one of the highest laryngeal cancer incidence and mortality rates in Europe [1].

Various treatment modalities are available for early stages: radiotherapy either alone or in combination with chemotherapy, endoscopic and open partial laryngectomies. Each treatment option presents specific advantages for each stage and provides comparable cancer control results [2], but the functional results, particularly in terms of voice preservation, are often considered to be better with radiotherapy [3,4].

Failure rates reported for exclusive radiotherapy range from 2 to 18% for stage T1 glottic tumours and up to 31% for stage T2 glottic tumours, with higher failure rates for supraglottic tumours (up to 25% and 35% for stage T1 and T2, respectively [5,6]). In parallel, the recurrence or second primary tumour rate after a first stage T1 or T2 laryngeal tumour is 20%, and 91% of these recurrences or second tumours occur at the site of the primary tumour [4]. Progressive disease or recurrence are treated surgically depending on the extent of the tumour: this post-irradiation surgery is called salvage surgery.

The primary objective of partial laryngectomy is preservation of upper aerodigestive tract function. Historically, partial laryngectomy is not indicated in previously irradiated tissues due to the risks of poor wound healing and poor recovery of speech, swallowing and respiratory functions. Endoscopic resection of resectable tumours gives good functional and oncological results [7]. Salvage total laryngectomy for stage T1 and T2 squamous cell carcinoma of the larynx ensures cancer control in 75% of patients [8].

This retrospective study, based on a series of patients undergoing open partial laryngectomy for squamous cell carcinoma confined to the larynx arising in irradiated tissues, was designed to evaluate the oncological and functional outcome of post-irradiation salvage partial laryngectomy.

Material and methods

Study population

This study retrospectively reviewed 20 patients treated by open partial laryngectomy in irradiated tissues at Nantes university hospital between September 2000 and May 2011. These patients presented squamous cell carcinoma not controlled by radiotherapy (recurrence or progressive disease) or a secondary primary squamous cell carcinoma in previously irradiated mucosa. Tumours were classified according to the 2002 TNM classification.

This population had a mean age of 64 years (range: 48 to 84 years) with a sex ratio of 9 (18 men for 2 women). Mean postoperative follow-up was 2.5 years ($\pm$ 1.9 years).

Treatment of the primary tumour consisted of exclusive radiotherapy at a mean dose of 67.5 Gy (range: 60 to 72 Gy). Primary tumour sites were essentially glottic (60%) and oropharyngeal (30%); only one tumour arose in the laryngeal vestibule and another arose in the oral cavity. All primary tumours were limited stage T1 ($n = 12$) or T2 ($n = 8$) tumours.

Patients were managed surgically after a mean interval of 5 years and 2 months ($\pm$ 5.3 years) following completion of radiotherapy. Most patients presented a recurrence or a second primary ($n = 17$), while three patients presented progressive disease.

All 20 patients were managed surgically after endoscopic and radiological assessment (contrast-enhanced CT examination of the neck and chest). Operative indications were discussed in multidisciplinary consultation meetings. None of the patients presented a contraindication to partial laryngectomy. No lymph node dissection was performed concomitantly with the laryngeal procedure (all patients were N0).

Statistical analysis

Data were collected retrospectively using Microsoft© Excel 2010 software to calculate the mean, standard deviation and correlation coefficients. Overall survival and disease-free survival rates were estimated by the Kaplan-Meier method using IBM© SPSS Statistics 19 software. Functional prognostic factors were identified by calculating Pearson's correlation coefficient. The results were considered to be statistically significant for $P < 0.05$.

Results

Oncological outcome

Fifteen (75%) of the 20 partial laryngectomies were considered to present negative resection margins (not requiring any adjuvant therapy). Four of the five cases with positive resection margins required total laryngectomy after a mean interval of 5.5 months ($\pm$ 6); two of these four patients initially refused this complementary surgery and one of them was re-irradiated. The mean 2-year overall survival rate for these five patients was 45% with a primary site disease-free survival rate of 60%. Positive resection margins for these five partial laryngectomy specimens were mainly inferior for vertical partial laryngectomies (2/2), and anterosuperior for horizontal partial laryngectomies (2/3). The 3-year overall survival rate for this series of 20 patients was 56% (Fig. 1).

Fifteen patients therefore underwent partial laryngectomy with negative resection margins (8 vertical partial laryngectomies with epiglottic reconstruction [VPLER], 5 horizontal supraglottic partial laryngectomies [SPL], 1 horizontal supracricoid partial laryngectomy [SCPL], and 1 supraglottic hemipharyngolaryngectomy). Histological examination of these 15 operative specimens revealed 1 pT3 tumour, 7 pT2 tumours and 7 pT1 tumours. The mean 3-year overall survival rate was 66% (Fig. 1) and the mean 3-year disease-free survival rate was 52% for these 15 patients.

The local recurrence rate for these 15 patients was 20% ($n = 3$) with a mean recurrence-free survival of one year (range: 5 to 16 months). The 2-year local control rate was 67% and the main causes of local failure were recurrence or second primary (oropharyngeal tumour for 2 patients). Only one patient presented postoperative lymph node recurrence concomitant with local tumour recurrence. No cases of metastatic disease were observed.