

Early glottic cancer: The influence of primary therapy on ultimate organ preservation

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With the aim to achieve better comparison of final treatment results between 44 primarily operated and 219 primarily irradiated patients with early glottic cancer, a retrospective identification of patients based on criteria of suitability for voice-sparing surgery was made. In patients, found to be suitable for organ preservation surgery, 10-years disease specific survival (DSS) of 94% vs. 92% in T1 and 94% vs. 87% in T2 tumors was estimated for primarily operated and irradiated patients respectively ($p=0.1$). If the overall treatment time in primary irradiated patients was shorter than 48 days, final preservation of the larynx was achieved in 97% and was identical with the primary surgery group. In patients with T2 tumors unsuitable for voice-sparing operation a significantly lower 10-years DSS, namely 71% vs. 65%, for primary surgery and radiotherapy respectively was found. If treated by primary surgery, all those patients would have needed total laryngectomy, however, with primary radiotherapy with an over-all treatment time < 48 days, the final preservation of voice succeeded in 87% of patients.

Key words: laryngeal neoplasms-surgery-radiotherapy; glottis

Introduction

Analyzing the results of two basic approaches to the treatment of early glottic cancer, i.e., primary radiotherapy and conservative surgery, patients treated with organ preservation surgery are generally compared with radiation therapy series in total.¹⁻⁴ The fact that certain proportion of primarily irradiated patients had lesions unsuitable for voice-sparing surgery has been usually disregarded.^{5,6} Recently, the significance of over-all treatment time in radiotherapy of laryngeal cancer was also recognized as an important factor influencing the final local control.^{7,8} Considering the above statements, the most reasonable analysis of ultimate therapeutic effect of both treatment modalities should be based on the evaluation of specific survival and the estimation of the proportion of total laryngecto-

mies needed, in really comparable groups of patients, regarding the eligibility for voice sparing surgery and taking into account the important prognostic factors in radiotherapy.

Materials and methods

Patients characteristics

Between 1976 and 1990, 263 previously untreated patients with T1N0 and T2N0 squamous-cell carcinomas of the glottis were treated. There were 248 men and 15 women, their median age being 59 years (range 23-86 years). Tumors were staged according to TNM classification (UICC, 1987): 187 (71%) were classified as stage I, and 80 (29%) as stage II. Laryngoscopy and biopsy were performed in all patients to evaluate tumor extent and histology. Out of 199 cases with histological grading assessed, there were 85 (43%) well differentiated, 95 (47%) moderately, and 19 (10%) poorly differentiated squamous cell carcinomas.

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To enable a better comparison between primarily operated and primarily irradiated patients, with respect to final voice preservation, a retrospective selection of patients as suggested by Dickens *et al.*⁵ was made. Using the criteria of suitability for a primary voice-sparing operation, among 219 patients treated by primary radiotherapy, 168 (143 T1 and 34 T2) were retrospectively found suitable, and 51 (25 T1 and 26 T2) unsuitable for chordectomy or hemilaryngectomy. The treatment outcome in these two groups was compared with corresponding groups of those patients who underwent primary surgical therapy.

The duration of follow-up ranged from 25-175 months (median 71 months).

Treatment

From a total of 263 patients studied, the primary treatment was radiotherapy in 219 cases (159 T1 and 60 T2), and surgery in 44 (28 T1 and 16 T2) patients.

1. *Radiotherapy* – during the observed period the radiotherapy technique remained unaltered. The patients were treated in supine position in most cases for immobilization plastic cast was used. All patients were irradiated on ⁶⁰Co megavoltage units using wedge filters, with continuous-course irradiation at 2 Gy per fraction, five fractions per week. The prescribed tumor dose was 60-74 Gy (median 65 Gy). Average total tumor doses received by T2 tumors were somewhat higher than those received by T1 tumors. In all patients the dose was prescribed to a 100% isodose line, using computer-generated dosimetry. The field size ranged between 5 x 5 cm and 11 x 6 cm (median 6 x 6 cm), being slightly larger for T2 than for T1 tumors. All the treatment fields included at least 1 cm flash-off of the anterior neck. Treatment duration ranged from 32 - 68 days (median 48 days).

2. *Surgery* – Among primarily operated T1 patients, 23 underwent chordectomy and five partial vertical laryngectomy. In the T2 group, five patients underwent chordectomy, while four patients had partial vertical laryngectomy, and seven total laryngectomy.

3. *Salvage surgery* – among 26 recurrences in T1 patients treated by primary radiotherapy, there were 8 chordectomies, 3 partial vertical laryngectomies, and 13 total laryngectomies performed.

Surgical procedures for 32 recurrences in T2 primarily irradiated patients involved chordectomy in four and total laryngectomy in 20 cases. Altogether, 10 out of 58 recurrent patients received no further surgical treatment. Two out of seven recurrences in primarily operated patients were treated by total laryngectomies.

Statistical analysis

Recurrence-free survival and disease specific survival were calculated using Kaplan-Meier method, and the differences between groups were tested by log-rank test.

Results and conclusions

Using salvage surgery for treatment failures the disease specific survival (DSS) was 96% vs. 92% in T1 and 78% vs. 78% in T2 tumors for primarily operated and primarily irradiated patients respectively (Figure 1).

Figure 2 shows recurrence-free survival (RFS) for 219 primarily irradiated patients according to treatment duration. Significantly better RFS was achieved for patients in whom overall treatment time did not exceed 48 days.

Figure 3. shows different types of surgical procedures needed for ultimate local control (ULC) in patients retrospectively selected to be suitable for primary voice-sparing surgery. Patients are divided according the stage, type of primary treatment and overall treatment time in primary irradiated patients. In T1 patients no laryngectomies were required in 28 primary operated patients and in 74 irradiated patients in whom overall treatment time did not exceed 48 days. In T2 patients the same proportion of LE was required in 9 primary operated and 11 primary irradiated patients with shorter overall treatment time in order to achieve the same ULC. In primary irradiated patients with a longer overall treatment time a substantially higher proportion of LE was required in both stage groups.

Figure 4 shows proportion of LE necessary in ULC in patients found to be unsuitable for primary voice-sparing surgery. All patients treated by radiotherapy should need LE if operated, however in 31/41 finally cured patients the larynx was preserved. Again, an important influence of overall treatment time was observed.

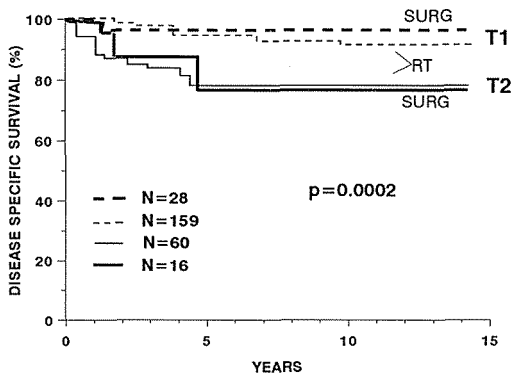


Figure 1. Recurrence-free survival in all 263 treated patients regarding the stage of disease and type of primary treatment.

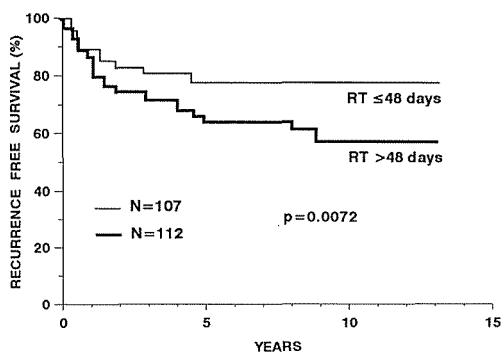


Figure 2. Recurrence-free survival in 219 patients treated with primary irradiation according to treatment duration.

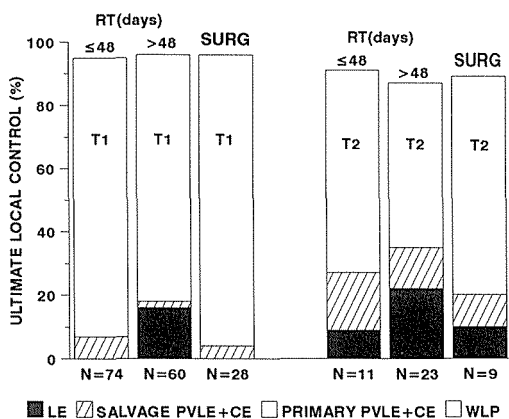


Figure 3. Ultimate local control achieved in patients retrospectively selected to be suitable for voice-sparing operation according to stage, primary treatment modality, duration of treatment time in irradiated patients and type of salvage surgery. LE = laryngectomy, PVLE = partial vertical laryngectomy, CE = cordectomy, WLP = whole larynx preserved.

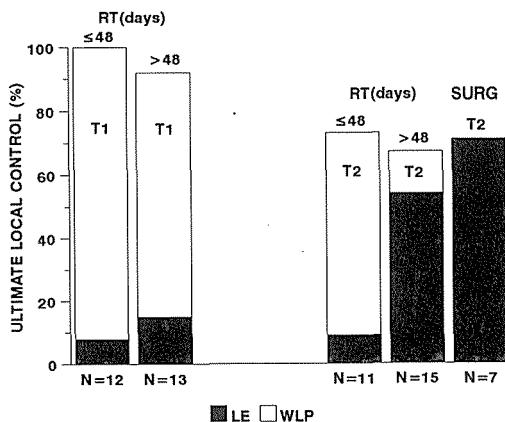


Figure 4. Proportion of laryngectomies needed for ultimate local control in patients unsuitable for voice-sparing operation according to stage, primary treatment modality and duration of radiation therapy. LE = laryngectomy, WLP = whole larynx preserved.

Regarding the final cure rate, the stage of the disease in patients with early glottic cancer is still the most important prognostic factor. In our study, the type of primary treatment modality (surgery or radiotherapy) did not interfere with the final treatment outcome within each particular stage. On the other hand, the pretreatment estimation of the suitability of tumor lesions for conservation surgery should be of crucial importance for the final quality of life (i.e., voice-preservation) of treated patients. In smaller lesions, preservation of normal voice in irradiated patients was dependent on the over-all treatment time, while in bigger tumors (unsuitable for conservation surgery) radiotherapy offered better final preservation of the larynx. If radiotherapy should become the preferential treatment modality in early glottic cancer, the problem remains how to assure an optimum treatment outcome. Shorter overall treatment time and higher dose per fraction offer some improvement.⁷⁻¹¹ Using predictive assays for investigation of intrinsic radiosensitivity^{12,13} in future will probably enable an easier solution in choosing optimum primary treatment for early glottic cancer.

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