

## EARLY GLOTTIC CARCINOMA (T1N0)

### Results of irradiation with or without endoscopic microsurgery

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#### Abstract

Seventy-nine patients with T1N0 glottic carcinoma were treated at the Department of Radiology, University of Tokyo, between 1967 and 1977. The average total dose varied from 73 Gy in the first year to 32 Gy in the last year of the period. Endoscopic microsurgery was introduced in the middle of the period. The overall local recurrence rate was 15 per cent within 5 years. Observed and adjusted five-year survival rates were 79 and 91 per cent, respectively. Endoscopic microsurgery was not an important factor for local control rates and survival rates. Patients with T1N0 glottic carcinoma were successfully treated with a total dose equivalent to a time-dose-fractionation of 80 to 100.

Seventy-nine patients with squamous cell carcinoma confined to the glottis (UICC T1N0M0 stage I) (4) were treated by primary irradiation. The treatment policy was changed in the middle of the period under review, in order to decrease the total dose. Introduction of endoscopic microsurgery further accelerated such a trend. The purpose of this article is to present the results obtained and to discuss the clinical significance of endoscopic microsurgery and the relationship between the time-dose-fractionation (TDF) factor (9) and the local recurrence rate.

#### Materials and Methods

Seventy-nine previously untreated patients (75 males, 4 females, age range 20 to 87 years with an average of 60 years), with T1N0M0 squamous cell carcinoma of the glottis, received radiation therapy

at this hospital during the period Jan. 1, 1967 to Dec. 31, 1977. Fifty-eight patients were staged as T1a (tumor confined to one cord) and 21 as T1b (tumor involving both cords). The present retrospective analysis is based on a review of the clinical records of these patients.

The policy of management at the hospital during the period was primary irradiation with surgery reserved for recurrence. Irradiation was given using a  $^{60}\text{Co}$  unit with a rotational gantry and an 80 cm source-axis distance. The average total tumor doses during each year are shown in Fig. 1. The policy was changed in 1971 in order to decrease the total doses and to minimize possible complications. Endoscopic microsurgery was introduced as an integrated part of the treatment in 1973. Before or shortly after the start of irradiation the tumor tissue was excised as completely as possible with a microsurgical technique using a transoral approach. As a result of this procedure, the total tumor doses were further reduced and reached an average of 32 Gy/3.2 weeks in 1976. Low total doses equivalent to a TDF of less than 70, without microsurgery, were given to 3 patients treated in 1977. There is no universally accepted method to compare total doses for different fractionation schedules, but most authors have used the NSD concept. However, it was decided to use the TDF factor in the present analysis, in accordance with the comments of ORTON & ELLIS (9). Total tumor dose, daily tumor dose, and treatment

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Accepted for publication 18 January 1984.

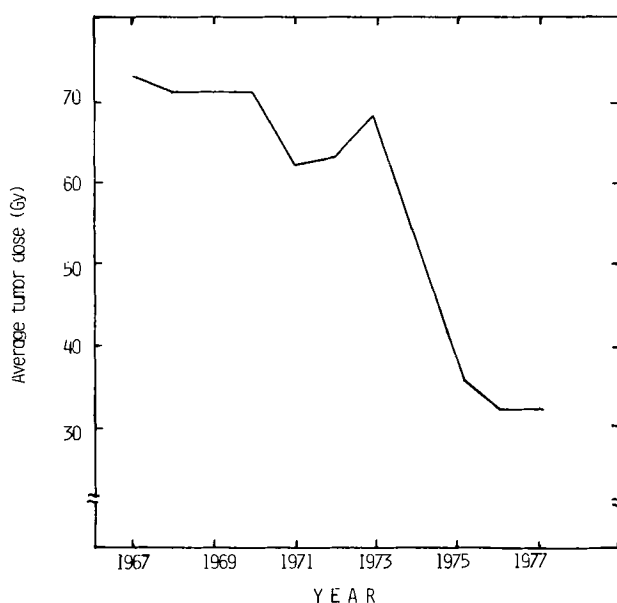


Fig. 1. Average tumor doses for each calendar year.

frequency were used for calculation of the TDF factor according to the tables given by ORTON & ELLIS. Techniques for irradiation other than the total dose did not change during the period. The treatment was given with the patient in supine position from lateral parallel opposing fields or anterior oblique wedged fields. Field size, defined within the 50 per cent isodose line, was at the central axis on average 45 cm<sup>2</sup>. Patients with recurrent disease in the larynx were treated with microsurgery or partial laryngectomy followed by total laryngectomy if the disease could not be controlled by limited surgery. All patients were followed for at least five years from the beginning of treatment or until their death. Survival rate was calculated according to the life table method (1). Local recurrence rate was calculated by dividing the number of patients with local recurrence in the period by the number of patients at risk at the beginning of the period.

### Results

Of the 79 patients, 25 were treated with microsurgery at the beginning of irradiation. The clinical courses are summarized in Fig. 2. Twelve of the 79 patients developed recurrence in the larynx within five years from the beginning of treatment. Three of these 12 patients were saved by surgery while 9 were not. Seven of the 9 patients who were not saved died with tumor within five years from the

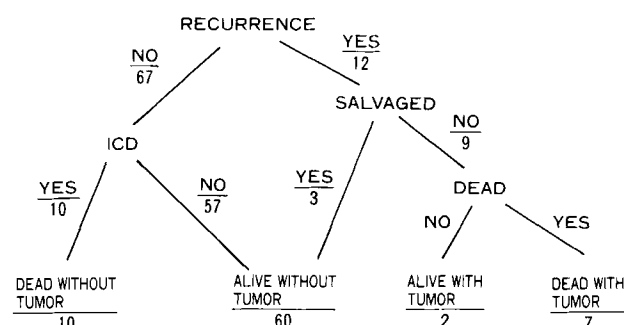


Fig. 2. Clinical course in 79 patients with glottic carcinoma (T1N0M0).

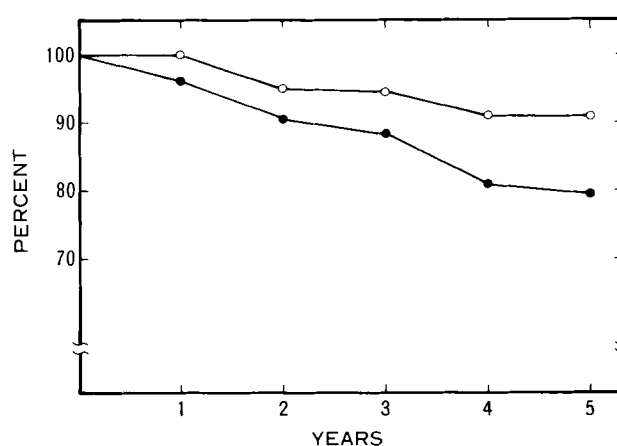


Fig. 3. Survival rates, adjusted (○), observed (●).

Table 1

Number of patients in different groups according to TDF and microsurgery

| Microsurgery | TDF |     | Total |
|--------------|-----|-----|-------|
|              | <80 | 80≤ |       |
| Done         | 13  | 12  | 25    |
| Not done     | 11  | 43  | 54    |
| Total        | 24  | 55  | 79    |

primary treatment. The remaining 2 patients were alive with tumor after five years but died later from the tumor. Of the 67 patients without recurrence; 10 died from intercurrent diseases within five years. The remaining 57 patients were alive and free of disease at five years. Survival rates for the 79 patients are shown in Fig. 3. Observed and adjusted five-year survival rates were 79 and 91 per cent,

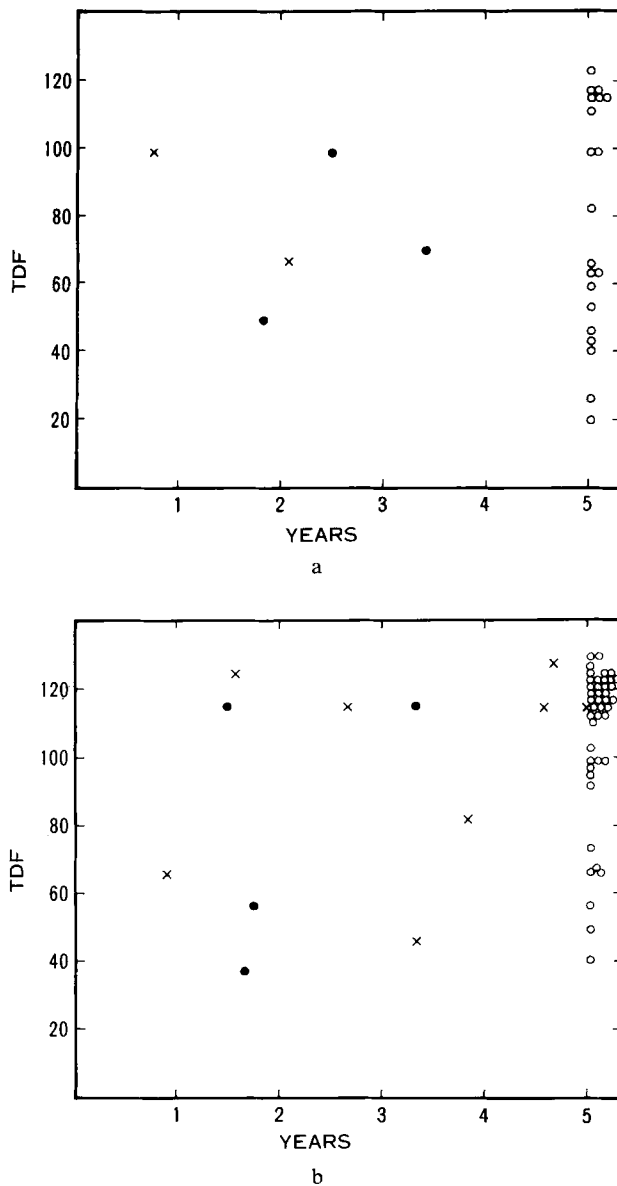


Fig. 4. Relation between TDF and survival in patients treated with microsurgery (a) and without microsurgery (b). Patient dead from tumor (●), patient dead from intercurrent disease (x), patient alive at five years (○).

Table 2

Adjusted five-year survival rates (in per cent) for different groups according to TDF and microsurgery

| Microsurgery | TDF |     | Total |
|--------------|-----|-----|-------|
|              | <80 | 80≤ |       |
| Done         | 84  | 91  | 87    |
| Not done     | 80  | 98  | 92    |
| Total        | 82  | 94  | 91    |

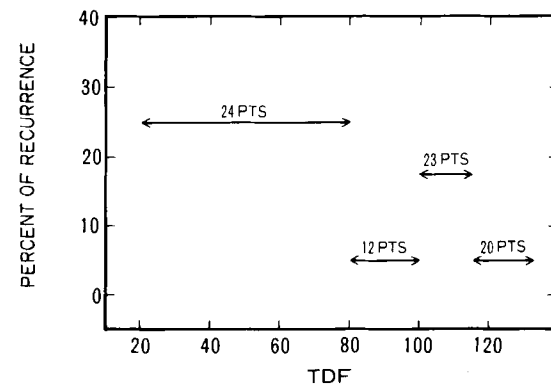


Fig. 5. Relation between TDF and local recurrence rate.

respectively. The relation between TDF and survival for 25 patients treated by microsurgery at the beginning of treatment is shown in Fig. 4a, and for 54 patients not treated by microsurgery in Fig. 4b. In Table 1 the patients are grouped according to TDF value and microsurgery. Adjusted five-year survival rates for each group are shown in Table 2. The highest five-year survival rate was found for a group of 43 patients treated by irradiation with a TDF of 80 or more without microsurgery. The local recurrence rate for all 79 patients within five years was 12/79 or 15 per cent. The relation between TDF and local recurrence rate is shown in Fig. 5, and local recurrence rates in relation to both TDF and microsurgery in Fig. 6. Of 12 patients with recurrence in the larynx 3 were saved. One patient was found to have lung metastasis at autopsy. Two patients developed recurrent disease in the trachea. No major complications were observed in the present series.

### Discussion

Although radiation therapy is a well established method for treatment of early glottic carcinoma, conservative surgery is also used for the primary management of this disease.

VAUGHAN et coll. (12) advocated endoscopic microsurgery with transoral approach, similar to the technique used in the present series, as curative treatment for the disease. Survival rates for patients treated with and without microsurgery were very similar in the present series (Table 2). A tendency towards a dose-response relation was observed in the group treated with microsurgery (Fig. 6). Microsurgery was, however, not an important factor for survival rate or local control rate in the present

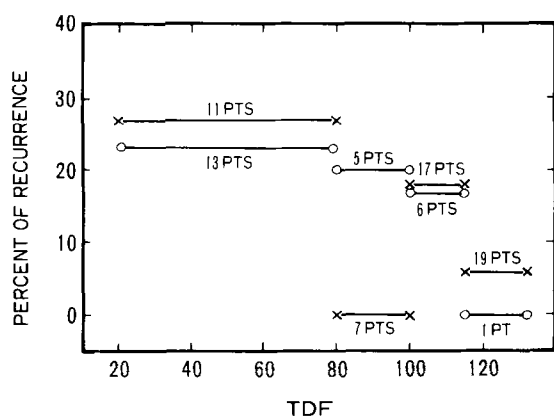


Fig. 6. Relation between TDF and local recurrence rate for groups with (○) and without (×) microsurgery.

series. It should be noted, though, that the technique and radicality of microsurgery may have varied as the operations were performed by several different laryngologists during the period.

The radiation doses have varied widely in the treatment of early glottic carcinoma. Some authors treat laryngeal carcinoma with rather high radiation doses (6, 10). Other authors have, however, reported that local control rate did not decrease with low to moderate tumor doses. SUNG *et coll.* (11) obtained an 8 per cent local recurrence rate with tumor doses ranging from 46 Gy to 56.99 Gy using orthovoltage roentgen rays. HARWOOD *et coll.* (5) obtained a 14 per cent local recurrence rate with a total dose of 55 Gy in 5 weeks. The local recurrence rate in the present series was 15 per cent, which is comparable to reported results. Judging from Fig. 6, tumor doses equivalent to a TDF below 80 should not be given in primary radiation therapy for T1N0 glottic carcinoma. FLETCHER (2) observed that a 90 per cent control rate was achieved with 50 Gy in 5 weeks, which is equivalent to a TDF of 82 according to the ORTON & ELLIS table for microscopic disease in cervical lymph nodes. T1N0 glottic carcinoma is sometimes of very small volume, especially after excisional biopsy. Our observations are in accordance with those of FLETCHER. Opinions differ regarding the dose-response relation in radiation therapy for early glottic carcinoma (3, 7, 8). In the present series, the local control rate in a group with TDF below 80 was lower than in the other groups. However, since no local recurrences were observed in the seven patients treated without microsurgery and with TDF between 80 and 100, it seemed unlikely that a dose-response relation existed in the range

of a TDF between 80 and 131. On the other hand, a dose-response relation was observed within the group of 25 patients treated with microsurgery. One explanation for this discrepancy could be the small number of patients in each subgroup. Therefore, it seems unwise to draw any conclusions concerning the dose-response relation in the present series. We were, however, impressed by the low recurrence rate in the group treated with a TDF between 80 and 100 and obviously T1N0 glottic carcinoma could be successfully treated by irradiation alone with tumor doses equivalent to TDF values within this range. The main reason for the unacceptably low rate of surgical success in laryngeal recurrence in the present series was probably the conservative approach. Most patients with laryngeal recurrence were treated by microsurgery followed by partial laryngectomy if further recurrence occurred. This policy was not adjusted during the period covered by the present review.

#### ACKNOWLEDGMENTS

The authors wish to thank Drs Yuji Itai, Annerose Akaike and Akira Akaike for their critical scrutiny of the manuscript.

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