

## Vertical partial laryngectomy: our results after treating 81 cases of T<sub>2</sub> and T<sub>3</sub> laryngeal carcinomas

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### Abstract

From 1976 to 1989, 81 patients with T<sub>2</sub> and T<sub>3</sub> laryngeal carcinomas were treated with vertical partial laryngectomy at the University ENT Department of Thessaloniki, Greece. All patients were male with a median age of 56 years (33–71 years). Four patients had N<sub>1</sub> lymph nodes. Ten patients received post-operative radiotherapy. Seventeen patients developed local recurrences or distant metastases. Mean follow-up was more than seven years. Absolute three-year survival was 94.6 per cent for 74 patients and absolute five-year survival was 89.6 per cent for 58 patients. Actuarial five-year survival of the whole group of 81 patients was 91 per cent calculated with the Kaplan-Meier method. Recurrence rate and survival of stage II and III patients are also discussed and compared using the log-rank test. We conclude that vertical partial laryngectomy is a very successful treatment selection for T<sub>2</sub> glottic and false vocal cord carcinomas and for some selected T<sub>3</sub> glottic lesions.

### Introduction

A considerable diversity of opinion exists regarding the proper treatment approach for T<sub>2</sub> and T<sub>3</sub> carcinomas of the larynx (Kelly *et al.*, 1989). The most important advantage of radiotherapy is the very good quality of voice after treatment in the majority of cases and the fact that the treatment failures still have the chance of surgical salvage. On the other hand the disadvantage is that since the cure rates for radiotherapy in these cases are not as high as in T<sub>1</sub> cases of glottic cancer (app. 95 per cent), (Daniilidis *et al.*, 1990) the number of patients who finally have to undergo a total laryngectomy is increased compared to those who undergo partial laryngectomy as first choice treatment. In this paper we analyze the results after the surgical treatment of 81 T<sub>2</sub> and T<sub>3</sub> cases of laryngeal carcinoma. All of them underwent vertical partial laryngectomy and some of them additionally radical neck dissection (RND) or post-operative radiotherapy.

Three and five-year survival and disease-free survival are discussed, as well as the recurrence rate and their management.

### Materials and methods

From 1976 until the end of 1989, 81 patients with glottic or supraglottic laryngeal cancer underwent vertical partial laryngectomy. Sixty-one (75.3 per cent) of them had T<sub>2</sub> lesions and 20 (24.7 per cent) T<sub>3</sub>. Four also had N<sub>1</sub> lymph nodes, while the remaining 77 were N<sub>0</sub>. All the patients were male with a median age of 56 years (range 33–71 years). Ninety-six per cent of them were cigarette smokers and 35 per cent alcohol abusers.

One of the patients was treated for a recurrence three years after cordectomy, another one two years after cor-

dectomy and post-operative radiotherapy and a third two years after radiotherapy for a T<sub>1</sub> glottic carcinoma. Thirty-eight patients had lesions occupying only one vocal cord, seven one vocal cord with extension to the anterior commissure, 16 patients have supraglottic lesions occupying the false vocal cord with no visible extension to the true vocal cords and 20 had lesions occupying both one vocal cord and the laryngeal ventricle with or without extension to the false vocal cord.

The primary site was divided almost equally between the right and left vocal cords (52 per cent and 48 per cent respectively). TNM staging was made according to the AJCC criteria. All the patients were evaluated carefully with direct laryngoscopy under general anaesthesia by the team of surgeons who performed the partial laryngectomy a few days later and multiple biopsies were taken from several sites in every case in order to estimate the extent of the disease and to decide whether partial laryngectomy was a safe operation or not, according to the generally accepted rules of surgical treatment of laryngeal cancer. In spite of that, in 10 cases the final histological examination on the partial laryngectomy specimen revealed the existence of cancer cells close to the resection margins and in those cases post-operative radiotherapy was decided to be the adjuvant treatment.

Histological examination showed squamous cell carcinoma in all our cases with various differentiation (49 G<sub>1</sub>, 31 G<sub>2</sub> and 1 G<sub>3</sub>). In six of the cases the pathology report revealed adult type papillomas with malignant change to squamous cell carcinoma.

The extent of resection varied, depending on the extent of the lesion. In all the cases the vocal cord, laryngeal ventricle and false vocal cord of one side were removed in continuity with the half of the thyroid cartilage on the diseased side. In 12 cases, the vocal process of the aryte-

noid was resected as well. In 15 cases, the whole of the arytenoid on the affected side was removed. In 11 cases, frontovertical partial laryngectomy was performed in order to include the anterior commissure in the resection since the lesion either extended to this region or was very close to it. In nine cases, part of the base of epiglottis was removed too and in three cases with subglottic extension of approximately 1 cm, the lower part of the resection was more radical including part of the cricoid cartilage as well. The four N<sub>1</sub> patients also underwent a radical neck dissection under the same anaesthetic.

A temporary tracheostomy was left for a median time of five days and a nasogastric tube was used for the patients, feeding during the first three post-operative days.

### Complications

Six of the patients experienced some difficulty in swallowing for two weeks and the nasogastric tube was left in place during this period. Five patients developed adhesions, mucosal prolapses in their larynx which resulted in stenosis of the airway and breathing problems; as a result the tracheostomy remained permanently. Otherwise the post-operative period was uneventful and the vast majority of the patients were quite happy with their voice which was hoarse and weaker than normal, of course, but satisfactorily serviceable.

### Recurrences

Seventeen patients developed either local recurrences or distant metastases. Thirteen of them recurred in the primary site or in the cervical lymph nodes or both (Table I) Two patients developed lung metastasis, one bone metastasis and one in the lymph nodes of the upper mediastinum. In all but one the relapses developed within two years post-operatively. Eight of the relapsed patients had T<sub>3</sub> lesions when treated primarily (40 per cent of the T<sub>3</sub> patients) and nine T<sub>2</sub> (14.7 per cent of the T<sub>2</sub> patients). Five patients underwent total laryngectomy due to local recurrences at a median time of 15 months (6–36) after partial laryngectomy.

Seven patients underwent a unilateral radical neck dissection (RND) (two in continuity with the laryngectomy) and two received radiotherapy treatment after the RND because they had very extensive neck nodes with ruptured capsule. Two more patients were treated only with radiotherapy for their cervical lymph nodes.

### Second primaries

There were only four cases (4.9 per cent) of second primaries among our patient population. Their sites were: one in lower part of trachea after five months, one in the

lung after five years; one in the lower lip after three years and one in the larynx (opposite side) after eight years.

### Survival

Mean follow-up of our patients was seven years and three months (18 months to 14 years). Seventy-four patients were followed up for at least three years and are eligible for three-year survival.

Five patients died within the first three years after partial laryngectomy. Four of these died from their disease and one from another cause but free of disease. So the three-year survival rate is 94.6 per cent. Among the four patients with N<sub>1</sub> lymph nodes who underwent RND together with partial laryngectomy, three are still alive with no sign of recurrence for a median time of seven years and one died four years post-operatively due to distant metastases. Fifty-eight patients are eligible for five-year survival. Seven patients died during the five-year post-operative period, six of them from disease. So the five-year survival rate is 89.6 per cent. In total, among the 81 patients 17 died, nine from disease and eight from other causes but were free of disease.

Among the nine patients, six had T<sub>2</sub> and three T<sub>3</sub> primary site lesions (9.8 per cent of the T<sub>2</sub> population and 15 per cent of the T<sub>3</sub> population respectively).

Actuarial three, five and seven-year survival of the whole group of patients was calculated with the Kaplan-Meier method (1958) and was found to be 91.5 per cent, 91 per cent and 78.9 per cent respectively.

The same method was used to calculate separately the actuarial survival of patients with T<sub>2</sub> and T<sub>3</sub> laryngeal lesions, but comparison of the survival curves with the log-rank test (Mantel, 1966; Peto *et al.*, 1977) did not reveal statistically significant differences ( $\chi^2 = 0.25$ ,  $p > 0.10$ ) (Fig. 1).

Time to progression of the whole group of 81 patients was also estimated with the Kaplan-Meier method and the results are shown in Figure 2. As is clearly seen, 77.8 per cent of the patients are disease-free at five years after partial laryngectomy. Figure 2 also illustrates the time to progression of the two groups of patients with T<sub>2</sub> and T<sub>3</sub> lesions. Using the log-rank test to compare the two curves we found that patients with T<sub>3</sub> lesions tend to recur more often than patients with T<sub>2</sub> primary lesions and the difference is statistically significant ( $\chi^2 = 4.14$ ,  $p < 0.05$ ). In

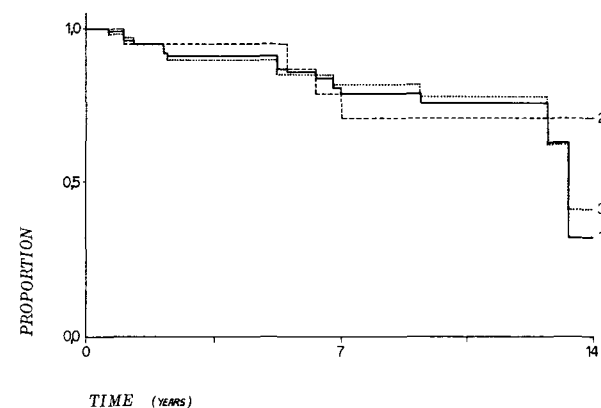


FIG. 1

Actuarial survival of 1: the whole group (n = 81); 2: T<sub>3</sub> patients (n = 20); 3: T<sub>2</sub> patients (n = 61).

TABLE I

SITE OF RECURRENCE OR PROGRESSION OF DISEASE

Site of recurrence	No. of patients
Primary site	3
Cervical lymph nodes (c.l.n.)	8
Both primary and c.l.n.	2
Lungs	2
Bones	1
Lymph nodes of mediastinum	1

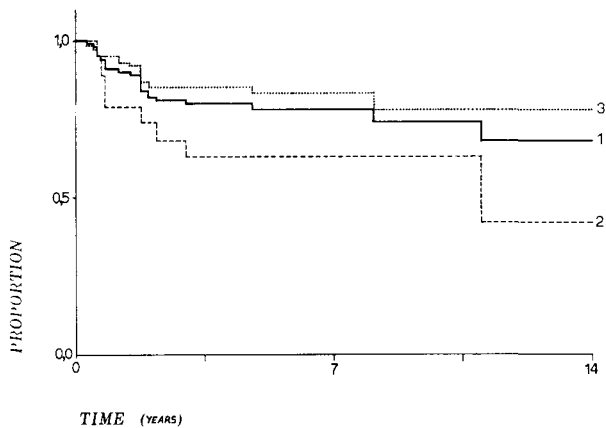


FIG. 2

Time to progression of 1: the whole group (n = 81); 2: T<sub>3</sub> patients (n = 20); 3: T<sub>2</sub> patients (n = 61).

spite of the higher rate of recurrence of the T<sub>3</sub> lesions after partial laryngectomy the survival of patients with T<sub>2</sub> and T<sub>3</sub> lesions shows no statistical difference and this is because salvage laryngectomy for the recurrences is performed as soon as they are detected.

## Discussion

Many authors (Harwood *et al.*, 1981; Dickens *et al.*, 1983; Stalpers *et al.*, 1989) propose radiation therapy as the treatment of choice for T<sub>2</sub> laryngeal carcinoma, although most of them agree that radiotherapy is not superior to surgical treatment in terms of survival, but results in a better quality of voice.

On the other hand, Kennedy and Crause (1974), Glanz *et al.* (1989), and others believe that partial laryngectomy for T<sub>2</sub> laryngeal carcinomas produce better survival and decreases the number of recurrences that require total laryngectomy. As for T<sub>3</sub> laryngeal carcinoma the treatment of choice is either total laryngectomy or radiotherapy followed by laryngectomy in cases of residual disease (Ackerman and Del Regato, 1977). In selected cases though, standard vertical partial laryngectomy or more extended partial laryngectomies are justified as primary treatment for T<sub>3</sub> laryngeal carcinoma (Lesinski *et al.*, 1976; Harwood *et al.*, 1980; Mendenhall *et al.*, 1984; Kessler *et al.*, 1987). Hoefler (1983) reported that T<sub>2</sub> laryngeal tumours can be treated endoscopically with CO<sub>2</sub> laser with equal success compared to conventional techniques.

Several techniques have been published regarding the extent of vertical partial laryngectomy (Kleinsasser, 1987). The surgeon should be ready to perform each procedure depending upon the extent of the disease as estimated pre-operatively by direct laryngoscopy and multiple biopsies, as well as with the findings of CT scanning which proves to be helpful in many cases (Kessler, 1987). In our patient population, CT scanning was not used routinely, but during the last four years it is one of the routine prerequisites for the treatment selection of our patients.

When resection margins are very close to the tumour further treatment is mandatory. In 10 (12.3 per cent) of our patients this was the case. All 10 received post-operative radiotherapy and two of them underwent a laryngectomy.

Seven of them recurred either locally or presented distant metastases.

The fact that seven out of 10 recurred shows that possibly the extent of the disease was not correctly estimated before and during the operation and perhaps total laryngectomy, as an initial treatment, would have been a more successful treatment choice.

The success rate of radiotherapy for recurrences or residual disease after partial laryngectomy is about 50 per cent according to Million and Cassisi (1984). We believe that local recurrences or residual disease after partial laryngectomy should be treated immediately with total laryngectomy.

The fact that only one patient recurred, out of four, with N<sub>1</sub> lymph nodes who underwent RND under the same anaesthetic with partial laryngectomy shows, according to our opinion, that early cervical metastasis is not a contraindication for conservative laryngeal surgery.

Bauer and associates (1975) in an interesting study analyzing the significance at surgical margins in 111 partial laryngectomy specimens, concluded that although 35 per cent of the cases had involved margins the local recurrence rate was only 10 per cent after a five-year follow-up.

Kelly *et al.* (1989) treating 53 patients with stage II glottic cancer achieved locoregional control in 76 per cent of their cases. Treatment failures underwent total laryngectomy increasing the percentage of successful control of the disease in 90 per cent. The three-year survival was 86 per cent. Doyle *et al.* (1977) reported 72.6 per cent five-year survival after treating 73 T<sub>2</sub> patients with primary radiotherapy and salvage surgery for the failures.

Ogura and associates (1975) reported a three-year disease-free survival rate of 91 per cent for 281 patients treated by partial laryngectomy. Absolute survival in 61 patients with anterior commissure involvement treated by partial laryngectomy was 74 per cent (Sessions *et al.*, 1975).

Glanz *et al.* (1989) reviewing 139 cases of T<sub>2</sub> and 92 cases of T<sub>3</sub> laryngeal carcinomas which were treated surgically, report that 87.5 per cent of T<sub>2</sub> and 84 per cent of T<sub>3</sub> cases survived for more than five years. They concluded that more patients lose their larynx or their life after irradiation of small carcinomas than after primary surgery. Our results are in accordance with the above conclusion, since 94.6 per cent of our patients achieved three-year survival and 89.6 per cent five-year survival after partial laryngectomy.

Only five of our patients required total laryngectomy at some stage due to local relapse and five have remained with a permanent tracheostomy due to laryngeal stenosis post-operatively, but kept a serviceable voice.

Ogura and Biller (1969) reported an overall complication rate of 11.6 per cent after partial laryngectomy, while in our cases it was 13.5 per cent. The most serious one was laryngeal stenosis in five patients.

Silver (1981) mentions that respiratory obstruction is slightly more prevalent than aspiration after vertical partial laryngectomy.

## Conclusions

1. T<sub>2</sub> vocal cord carcinoma is a perfect indication for vertical partial laryngectomy.
2. The most important indications for vertical partial

laryngectomy in cases of T<sub>3</sub> laryngeal carcinomas are:

1. Tumour confined to one vocal cord.
2. No extension to the anterior commissure.
3. Subglottic extension less than 1 cm.
3. Residual disease after partial laryngectomy revealed from the pathological examination of the specimen is an indication for immediate total laryngectomy rather than radiotherapy.
4. T<sub>2</sub> supraglottic carcinoma occupying only one false vocal cord is a good indication for vertical partial laryngectomy.
5. N<sub>1</sub> ipsilateral cervical lymph nodes are not a contra-indication for partial laryngectomy.

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