

Supraglottic laryngectomy: experience with 66 patients over 20 years

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Abstract

We reviewed the records of 66 consecutive patients with previously untreated supraglottic laryngeal carcinoma who underwent a supraglottic laryngectomy in our department between 1970 and 1989. There were 23 T₁, 30 T₂ and 13 T₃ cases. Eight patients had neck metastases and underwent neck dissection also. Twenty-four (36 per cent) patients received post-operative radiotherapy. Two-year and five-year survival rates were 88.9 per cent and 82.2 per cent respectively. When the survival rates of the patients with T₁, T₂ and T₃ lesions were calculated separately and compared with each other the differences were not statistically significant. Recurrences, post-operative complications, time to progression and indications for supraglottic laryngectomy are discussed.

Key words: Laryngeal neoplasms; Laryngectomy, supraglottic

Introduction

Various therapeutic methods have been proposed for the management of supraglottic cancer of the larynx. These consist of surgical procedures (partial or total laryngectomy, depending on the stage and location of the neoplasm), radiotherapy and/or a combination of both. From an oncological point of view, the conservative surgical management of supraglottic cancer requires a precise set of indications, provided the patient's cardiopulmonary demands are met.

In the 1950s, Alonso (1947) and later Ogura and Biller (1969) established the significance of and indications for horizontal or supraglottic laryngectomy. Subsequently numerous surgical techniques and variations have been published (Silver, 1981; Kleinsasser, 1987).

The purpose of this study was to demonstrate our experience with supraglottic laryngectomy by reviewing retrospectively 66 consecutive cases that were operated on at the University ENT Department of Thessaloniki, Greece, during the period 1970–1989. The surgical complications, recurrences and their management, the survival rate and the disease-free survival rate, as well as the prognosis, are all examined with reference to the stage of the primary tumour.

Materials and methods

Between 1970 and 1989, 489 patients with supraglottic carcinoma presented to the University ENT Department of AHEPA General Hospital. Sixty-six of these underwent a standard supraglottic laryngectomy because they fulfilled the necessary criteria (see later). Sixty-four were male and two were female. The rest of the patients

received different treatment modalities, such as total laryngectomy, radiotherapy, chemotherapy or a combination of the above. No patient underwent an extended supraglottic laryngectomy that included parts of the true vocal cords or arytenoid cartilages. The mean age of the 66 patients was 56 years (range 40 to 73 years). The biopsy results in all cases reported squamous cell carcinoma of various degrees of differentiation (22 G₁, 35 G₂ and 9 G₃).

Using the patients' records, the extent of the primary lesion was assessed retrospectively and classified according to the criteria set by the American Joint Committee on Cancer (1988). There were 23 T₁ cases, 30 T₂ and 13 T₃. In four of the T₃ cases there was invasion of the medial wall of one pyriform fossa, although in the remaining T₃ patients there was significant extension of the tumour towards the base of the tongue. Eight of the patients presented with clinically invaded cervical lymph nodes (six N₁ and two N₂). Before final treatment all the patients underwent direct laryngoscopy to assess the limits of the tumour and were also subjected to biopsy for histological classification.

Mandatory prerequisites for surgery were: no invasion of the vocal cords, the anterior commissure or the ventricle of Morgagni by the tumour, as well as good vocal cord mobility. In the pre-operative assessment special attention was given to pulmonary function so as to exclude patients suffering from severe chronic pulmonary disease (Daniilidis and Petropoulos, 1981).

In summary, the surgical technique used was as follows. Transverse incision of the skin at the level of the inferior border of the hyoid bone. Dissection of the hyoid bone, pharyngotomy at the vallecula, dissection and resection of

the upper third of the thyroid cartilage. Removal of the whole supraglottic portion of the larynx, the inferior border being the ventricle of Morgagni. The hyoid bone was also resected although the arytenoid cartilages remained intact. The base of the tongue was sutured to the dissected perichondrium of the thyroid cartilage. When the tumour also extended to the base of the tongue, a larger portion of the base was removed. A partial pharyngectomy was performed in cases where there was extension towards the medial wall of the pyriform fossa, and in the eight patients with invaded cervical lymph nodes a radical neck dissection (RND) was also done. Post-operatively the patients were fed via a nasogastric tube for about two weeks. Feeding by mouth with blended meals was then initiated. The tracheostomy remained for a period of 20 to 25 days.

One patient underwent pre-operative radiotherapy, and 24 patients (36 per cent) were subjected to post-operative radiotherapy. Seventeen of the irradiated patients had T₂ tumours and the remaining seven had T₃ tumours. Criteria for radiation therapy were: tumour location near the resected border, low degree of tumour differentiation (G₃), and greater than N₁ cervical metastases.

The mean post-operative follow-up period was 9.5 years (range 2 to 19 years). Six patients have been lost to follow-up at some stage. The time lapse between the operation and their last contact, as well as their disease status at that time, were taken into consideration when calculating the survival. The survival rate and the length of time to recurrence were calculated using the Kaplan–Meier (1958) method.

Survival rates among the groups of patients with T₁, T₂ and T₃ primary lesions were also compared using the log rank test (Mantel, 1966). In the calculation of survival rates deaths from other causes were taken into consideration. One patient who died four months post-operatively from aspiration pneumonia was included in the deaths from disease.

Results

Recurrences

Of the total of 66 patients, 22 (33 per cent) developed recurrences (17 locoregional and five distant metastases) and in six (9 per cent) a second primary neoplasm developed. Specifically, eight of the recurrences occurred at the site of the primary lesion, six only in the cervical lymph nodes, three in both the larynx and the lymph nodes, and five in the lungs. Almost all the cases of recurrence presented within the first two post-operative years, as has already been mentioned in our previous studies (Daniilidis *et al.*, 1984, 1990). Methods used to manage recurrent cases are shown in Table I.

TABLE I
MANAGEMENT OF REGIONAL RECURRENCES

Type of therapy	No. of patients
Cervical radiotherapy	1
Laryngeal radiotherapy	2
Radical neck dissection (RND)	3
Radiotherapy + RND	3
Total laryngectomy	4
Chemotherapy	2
No treatment	2
Total	17

Seven of the patients with recurrent disease survived, but the other 10 died. It should be noted that three of the four patients who underwent a total laryngectomy survived more than five years. The two patients with recurrent laryngeal disease who underwent radiotherapy died. Of the 24 patients who underwent post-operative radiotherapy, 12 remained free of disease and the rest developed either recurrences (seven patients) or a second primary lesion (five patients).

Second primary neoplasms

The locations of the secondary primary neoplasms and the time taken for them to develop post-operatively are shown in Table II.

Post-operative complications

In all patients the tracheostomy was retained post-operatively for an average duration of 23 days. In three patients, the tracheostomy remained permanently, due to the development of adhesions in the area of the glottis. Post-operative feeding was via a nasogastric tube which remained for an average of 14 days. Persistent aspiration was observed in four patients and one of them died from aspiration pneumonia. Unfortunately this last patient was admitted to hospital when his condition was irreversible. A total laryngectomy a few weeks earlier would probably have saved his life. In the remaining three cases, a total laryngectomy was not required to manage aspiration.

Proper instructions for feeding in an almost supine position was helpful for most patients. On the seventh post-operative day one patient developed severe haemorrhage but was managed successfully. In the majority of patients phonation was excellent since in all cases the two arytenoids had been retained.

Survival

Out of the total of 66 patients, 26 died. Of these 26 patients, 18 (27 per cent) died from the disease and eight (12 per cent) from other causes. The survival rates calculated using the Kaplan–Meier method were 88.9 per cent, 82.2 per cent and 66.3 per cent at two, five and 10 years respectively (Figure 1). The survival rates of the patients with T₁, T₂ and T₃ primary lesions were computed separately (Figure 2). When the survival rates of these subgroups of patients were compared (T₁ vs T₂, T₁ vs T₃ and T₂ vs T₃) using the log rank test, the differences were found not to be statistically significant ($\chi^2 = 0.46$, $p > 0.10$; $\chi^2 = 3.12$, $p > 0.05$; $\chi^2 = 1.48$, $p > 0.10$, respectively).

Time to progression

Median time to progression has not been reached yet,

TABLE II
SECONDARY PRIMARY NEOPLASMS

Location	No. of patients	Time to appearance (years)
Apex of tongue	1	6
Pancreas	1	6
Soft palate	1	5
Lung (adenocarcinoma)	1	5
Lung	1	18
Large intestine	1	2

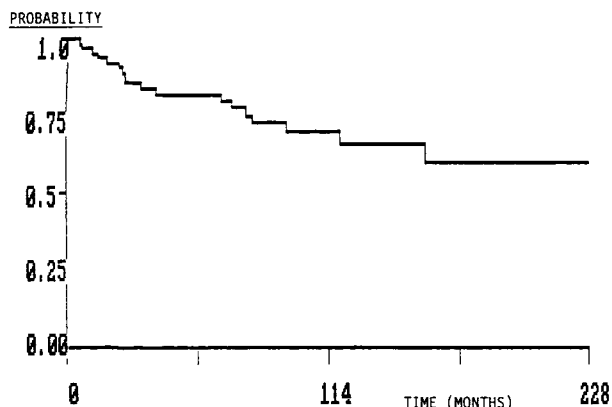


Fig. 1

Actuarial survival of the whole group of patients ($n = 66$).

but at 24, 60 and 120 months was respectively 75 per cent, 66.3 per cent and 52.2 per cent (Figure 3).

Discussion

There are several papers in the literature dealing with the survival of patients with supraglottic carcinoma of the larynx who were treated with supraglottic laryngectomy. There are also significant differences in the manner these patients were chosen, their stages of disease, their management (RND and/or post-operative radiotherapy) and, finally, in their outcomes.

For example, Burstein and Calcaterra (1985), in 41 patients of which 68 per cent had third and fourth stage tumours, found 90 per cent disease-free survival after supraglottic laryngectomy. Seventy-five per cent of their patients also underwent a neck dissection and 44 per cent complementary post-operative radiotherapy. Lee *et al.* (1990), in 60 patients with tumours of all stages, had two-year and five-year survival rates of 96 per cent and 91 per cent respectively. All their patients also underwent a bilateral functional neck dissection and 83 per cent had post-operative radiotherapy. Other studies state a lower survival rate: for example, Maceri *et al.* (1985), 80 per cent; Bocca (1991), 78 per cent; and Ogura *et al.* (1980), 67 per cent. In our patient population the survival rates after two and five years were 88.9 per cent and 82.2 per cent respectively.

Only 12 per cent of our patients underwent a complementary neck dissection, and 36 per cent post-operative

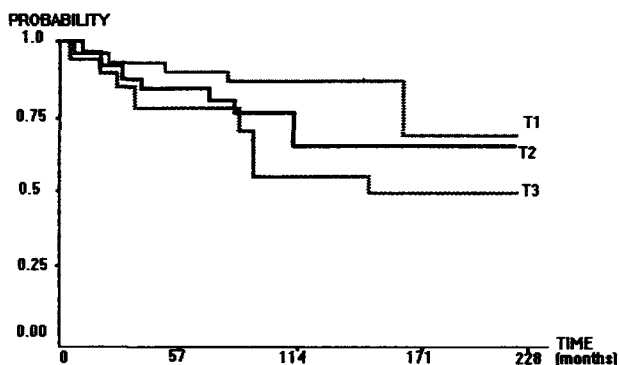


Fig. 2

Actuarial survival of the T_1 ($n = 23$), T_2 ($n = 30$) and T_3 ($n = 13$) patients.

radiotherapy. Therefore, the indications for these treatments (as defined above) were much more restricted than those in previous studies, while still obtaining the same survival rates. This cannot be because the patients in the other studies had more advanced disease, because our study shows that the differences in survival rates calculated separately in T_1 , T_2 and T_3 patients are not statistically significant.

No patient with T_1 tumour received post-operative radiation therapy, while 17 of 30 T_2 and seven of 13 T_3 tumours were irradiated because they fulfilled the criteria which we set. We have not calculated the survival of these subgroups separately because the numbers of patients were too small for statistical comparison. On the other hand the proportion of irradiated patients is almost identical in the T_2 and T_3 groups, so the survival curves according to the extent of the primary tumour are comparable, not being influenced by the treatment method.

It is interesting that although we avoided preventive neck dissection (contrary to the recommendations of numerous studies: Burstein and Calcaterra, 1985; Lee *et al.*, 1990; Bocca, 1991) and also further restricted the indications for post-operative radiotherapy, our rate of recurrence in the neck was only 13.5 per cent compared with the 17 per cent reported by Burstein and Calcaterra (1985) who performed preventive neck dissection. These authors recommend that preventive surgery should be performed on the neck followed by post-operative radiotherapy, to prevent cervical metastases.

There were 11 cases (16.5 per cent) of laryngeal recurrence. Four of these patients underwent a total laryngectomy (three survived for more than five years), three underwent radiotherapy, two had chemotherapy, and two received no treatment at all. All these patients eventually died, except for the three who had a salvage laryngectomy. We therefore conclude that the best method for the proper management of recurrences of the primary lesion is total laryngectomy. Burstein and Calcaterra (1985) had a 10 per cent local recurrence rate and agreed that total laryngectomy is the treatment of choice.

We had five cases of distant metastases, all in the lungs, and another six cases in which a second primary lesion developed. Regarding the post-operative complications, in all studies persistent aspiration is stated as the most frequent. We had several patients with this complication, one of whom died. Although total laryngectomy for the management of persistent aspiration suggested for the

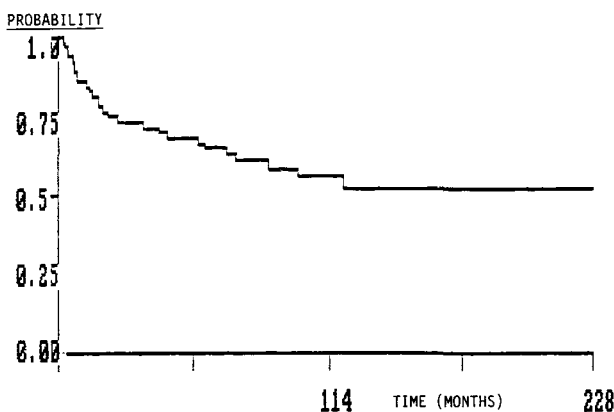


Fig. 3

Time to progression of the whole group of patients ($n = 66$).

more severe cases [values of 2.5 to 8.5 per cent are mentioned by Burstein and Calcaterra (1985) and Lee *et al.* (1990)], in our cases it was unnecessary, with the possible exception of the patient who died from pneumonia. It should be noted that in all our cases both arytenoids were left intact and this certainly minimized the severity of aspiration.

Conclusions

We believe that supraglottic laryngectomy should be performed in cases where the tumour is limited to the supraglottic portion of the larynx with unimpaired vocal cord mobility. The possibility of persistent aspiration that is difficult to control is otherwise high. Surgical margins very close to an extensive tumour will result in either poor survival or the need for total laryngectomy very soon. We also conclude that post-operative radiation should be reserved for those cases in which the tumour will be proved to be very close to the surgical margins; also possibly when the tumour is poorly differentiated and, finally, when the RND specimen reveals neck lymph nodes measuring more than 3 cm or with a ruptured capsule. The size of the primary supraglottic tumour does not seem to be of statistical significance.

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