European Review for Medical and Pharmacological Sciences 2014; 18: 1212-1217

Surgical treatment of T1b glottic tumor, 10-years follow-up

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Abstract. – BACKGROUND: The TNM classification of glottic tumors defined T1b as a tumor involving both vocal cords with normal mobility of such.

In the last fifteen years, in the medical literature, the role of open surgery for management of laringeal cancer has decreased considerably owing to the development of transoral laser microsurgery which is an oncologically and functionally reliable treatment particularly for early glottic cancers.

AIM: Report the efficacy of different surgical techniques (laser CO_2 cordectomy or supracricoid partial laryngectomy) in T1b glottic cancers treatment with a 10-years follow-up.

PATIENTS AND METHODS: 92 patients with T1b glottic cancer undergoing surgery between 1986 and 2002, of which 39 were treated with CO_2 laser cordectomy while 53 with supracricoid partial laryngectomy (14 crico-hyoid-pexy and 39 crico-hyoid-epiglotto-pexy). Each of the three groups was recalled and evalued with the aim to calculate the survival, initially at 3 and 5 years and thereafter, provide a 10 years follow-up, including local recurrence.

RESULTS: 10 years absolute survival of the 39 patient treated with CO_2 laser was 56.25%, while that of the two groups subjected to supracricoid partial laryngectomy was respectively of 66.6% for crico-hyoid-pexy and 58.82% for crico-hyoid-epiglotto-pexy.

CONCLUSIONS: Our data suggest an excellent absolute survival also after 10 years follow-up. Since both the CO_2 laser and supracricoid partial laryngectomy show similar local control and survival rates we can't determine with certainty the best therapeutic approach as claimed by a great number of literature studies.

Key Words:

Laryngeal carcinoma follow-up, absolute survival, laser cordectomy, subtotal laryngectomy.

Introduction

Laryngeal carcinoma is one of most common head and neck cancers and may affect the glottis, supraglottis or subglottis region[1-3].

The TNM classification of glottic tumors defined T1 as a tumor limited to the vocal cord(s) with normal mobility. The tumor is classified as T1b when it involves both vocal cords[1,2,4].

In the last fifteen years, in the medical literature, the role of open surgery for management of laringeal cancer has decreased considerably owing to the development of transoral laser microsurgery which is an oncologically and functionally reliable treatment particularly for early glottic cancers, and with advances in radiation therapy[5-7].

In our department, transoral laser microsurgery for early glottic cancers is proposed as the first-line treatment to patients in the absence of contraindications. Careful patient selection for transoral laser microsurgery is essential for ensuring good results. Open surgery (supracricoid partial laryngectomy), according to the recent guidelines of the Italian Society of Otorhinolaryngology and Head and Neck Surgery (SIO), is considered in selected cases as an alternative technique for T1 laryngeal cancer[8-10].

The aim of our study is to describe absolute and relative survival between individuals affected by T1b glottic cancer, treated by means of different surgical techniques (laser CO_2 or supracricoid partial laryngectomy). Another important aim of the study was also to evaluate the loco-regional control probability after 10 years.

The main feature of the study was extension of the follow-up period to 10 years, because there are not data in the literature regarding such a long observation period.

We compared our data with those described by several authors concerning the follow-up at 3 and 5 years.

The TNM classification, including tumors with different origin and subsites (vocal cords or commissure), doesn't provide precise indications regarding the best surgical treatment options. This often creates confusion because the lack of an univocal surgical approach gives rise to controversial long term results.

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Patients and Methods

This retrospective study was performed at the Organi di Senso Department of the "Sapienza" University, Rome, Italy. We enrolled 92 patients with T1b glottic cancer who underwent surgery between 1986 and 2002.

The patients were classified as T1b based on the tumor characteristics and on preoperative CT features. All patients were N0 and none of them underwent lateral cervical lymph node dissection in the first instance.

All patients were divided into three groups according to the different surgical technique performed. All patients treated with supracricoid partial laryngectomy, were selected according to the criteria proposed by the SIO. These guidelines state that the first choice treatment of T1b vocal cord tumors is CO_2 laser excision or radiation therapy. Supracricoid partial laryngectomy is reserved only for selected cases: 1) suspicion, even if minimal, of supra or subglottic plane involvement 2) suspicion, even if minimal, of tumor encroachment beyond the anterior commissure (thyroid cartilage involvement).

Thirty-nine cases, (32 men and 7 women) mean age of 61 years, were treated with CO_2 laser cordectomy type Va, according to the classification of the European Laryngological Society. This number represents about 15% of all cordectomies performed in our department during the same period (260 total cordectomies).

Fifty-three patients (48 men and 5 women, mean age 63 years) underwent supracricoid partial laryngectomy, 18% of all supracricoid partial laryngectomy (294); of these, 14 cases of T1b glottic tumor (all male, mean age 64 years) were submitted to crico-hyoid-pexy (CHP) as described by Labayle whereas in 39 patients (34 men and 5 women, mean age 62 years) a crico-hyoid-epiglotto-pexy (CHEP) was chosen, known as Majer-Piquet subtotal laringectomy.

Each of the three groups was recalled and evalued with the aim of calculating the survival, initially at 3 and 5 years and thereafter, to provide 10 year follow-up data from the initial surgery incuding local recurrence. However, the follow-up was carried out subjecting the patient to a clinical examination by fibre optic laryngoscopy and with a head-neck-chest CT.

The collected data were analyzed statistically using the chi-squared test to compare simple frequencies. Differences in loco-regional control and survival among various groups were evaluated by the log-rank test. The level of $p < 0.05$ was considered significant.

Subsequently, all data were compared with those of several studies published in the literature. The paper was approved by our institutional Reviewer Board.

Results

The majority of the patients were smokers, 36 (39.13%) had smoked for over 20 years, 24 (26.08%) for around 15 years and only 13 (14.13%) had smoked for less than 10 years. 19 (20.65%) patients had never smoked.

Postoperative histological examination confirmed that almost all cases were squamous cell carcinoma (94.5%). Verrucous carcinoma and carcinosarcoma were reported in 4 and 1 patients, respectively.

Regarding the 39 patients treated with CO_2 laser (first group), the three-year survival rate was 92.3%. Because of a loco-regional recurrence, 2 patients underwent total laryngectomy but both died about a year later, while another patient died for unknown causes. At 5 year follow-up 34 patients were alive (87.17%) with two cases of death from locoregional recurrence (Table I). One patient who had an early relapse (after four months) in the anterior commissure, even though the margins of surgical resection were free from disease, was subjected to total laryngectomy with bilateral neck dissection and, after a 5 year follow-up, had no evaluable recurrence.

Table I. Distribution of patient, according to the treatment options. Survival rate at 3-years and 5-years follow-up.

	Number of patients	Male	Female	Mean Age	3-years survival rate	5-years survival rate
Laser CO_2 cordectomy	39	32	7	61	92.3% (36 pz)	87.17% (34 pz)
CHP	14	14	–	64	85.7% (12 pz)	78.5% (11 pz)
CHEP	39	34	5	62	94.8% (37 pz)	84.6% (33 pz)

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The survival rate of the 14 patients belonging to the second group (CHP) was 85.7% at three years and 78.5% at five years follow-up (Table I) with only one death for distant metastases after four years. In one case, the histological assessment showed infiltration of the commissure cartilage (pT4) and the patient was submitted to total laryngectomy with bilateral neck dissection: five years later he was free of disease.

The group of patients treated with CHEP showed a three-year survival rate of 94.8% with two deaths for local relapse, after two and three years of follow-up. Another four patients of this group died within five years, thus reducing the survival rate to 84.6% (Table I).

The data resulting from our study, with a 10-year follow-up from the initial surgery, was significant (Table II).

Unfortunately, in each of the three groups there were patients who disappeared to follow-up, and were therefore not considered in the total group of patients (seven, two and five in the first, second and third group, respectively).

The absolute survival rate at 10 years of the thirty-nine patient who were initially treated with CO_2 laser was 56.25% (18 cases). Nine patients died between 5 and 10 years, six for causes not related to the disease, two for local relapse and one for distant metastases**.** Excluding those patients who disappeared at follow-up, over a period of 10 years a total of seven patients died as a result of recurrent disease after initial cordectomy using CO_2 laser, four in the first, and three in the second 5 years. The relative survival rate from early disease was 78.12% at 10 years.

The fourteen patients in whom CHP was performed, , had an absolute survival rate of 66.6% (8 cases) after 10 years. Three patients died before 5 years, and only one died due to cancer recurrence after 7 years. Two cases died from recurrence during our study period, the relative survival rate from initial disease was 83.3% (10 cases).

The third group of patients who underwent CHEP showed an absolute survival rate of 58.8% at 10 years (20 cases). Between 5 and 10 years follow-up, five patients died for pathologies not related to the initial disease and two died from local recurrence.

A total of six patients (four in the first, and two in the second 5 years) had disease recurrence, the relative survival rate for the CHEP group was 82.35% (28 cases).

Data analysis, comparing all groups in terms of absolute survival at 10 years, by means of Kaplan-Meier curves, gave p-values of 0.19. Since this value is > 0.5 in this study there isn't statistic correlation between the type of intervention chosen and 10-year survival (Figure 1).

Regarding the number of relapses in ten years, 7 in the first group, 2 in the second and 6 in the third, analysis of the data (Figure 2) confirmed a value of $p > 0.05$ (0.22).

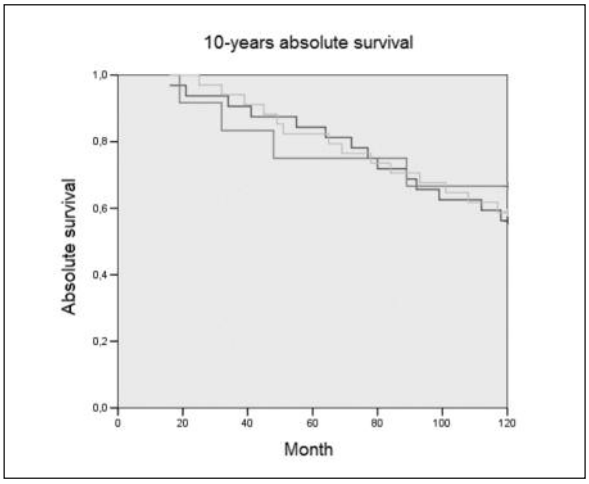

Figure 1. 10-years absolute survival of the three patients groups. The green line shows the absolute survival rate of the group treated with crici-hyoid-pexy (66.6%), whereas brown and blue line those subjected to crico-hyoid-epiglotto-pexy (58.82%) and CO_2 laser cordectomy (56.25%) respectively.

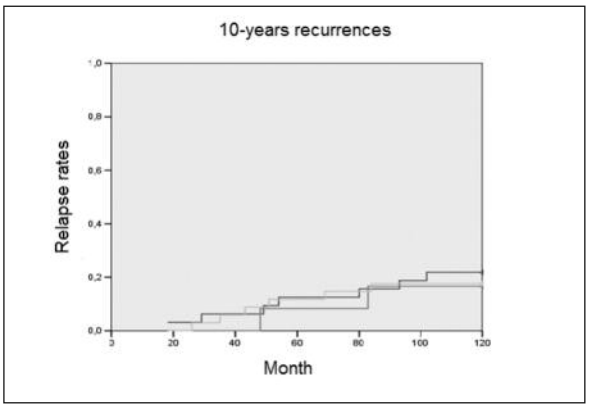

Figure 2. 10-years recurrences of the three patients groups. The green line shows the relapse rate of the group treated with crici-hyoid-pexy (16.6%), whereas brown and blue line those subjected to crico-hyoid-epiglotto-pexy (17.6%) and CO_2 laser cordectomy (21.8%) respectively.

Discussion

Cancer of the larynx is the most common head and neck cancer in the USA and Europe, with 75% of these tumors being confined to the glottic area. Patients are mainly men aged between the fifth or sixth decades and the association with cigarette smoking has been well established[2-5,11,12]. This data has been confirmed in our study with a 79.34% presence of smokers.

The majority of glottic tumors arise on the anterior third of the vocal cord with frequent involvement of the anterior commissure[11-14]. TNM classification of glottic tumors defined T1 as a tumor limited to the vocal cord(s) which may involve the anterior or posterior commissure with normal mobility. The tumor is classified as T1b when it involves both vocal cords[1-4,7].

The diagnosis of glottic cancer is often made at an early stage (Tis or T1-T2 N0M0) for the following reasons: firstly because lesions in the true vocal cords give rise to early voice changes and secondly because the true vocal cords in the glottis region of the larynx are devoid of lymphatic drainage[5,15].

Clinical symptoms usually include hoarseness or progressive dysphonia without pain or dysphagia.

Early glottic cancer is a highly curable disease. The optimal treatment strategies should offer the best oncological results while preserving functional features. T1b treatment options include radiation therapy, laser microsurgery and partial laryngectomy[6,10,11,16].

Radiation therapy has long been considered has the standard treatment for T1 glottic cancer. In some studies a local control rate between 92% to 97% is reported after this treatment; these results are similar to those of CO_2 laser treatment at 5-year follow-up (range 92%-94%)[6].

In our study we decided to exclude patients treated with radiotherapy in order to analyze the survival rate linked to surgical options alone.

Use of the CO_2 laser represented a turning point in the treatment of glottic tumors: in fact, our therapeutic approach to t1b cancer has undergone a radical change[18]. All tumors previously treated with traditional Leroux-Robert frontolateral laryngectomy or Calearo-Teatini horizontal glottectomy, are now submitted to CO_2 laser endoscopic cordectomy or to supracricoid partial laryngectomy. Factors such as older age, and poor general conditions, oriented the treatment towards minimally invasive surgery (laser CO_2) but always with the certainty of being able to achieve the oncological radicality[7,13,16,17].

Despite the CO_2 laser cordectomy is the preferred treatment in these tumors the choice of the surgical treatment requires in some cases the surgeon's experience.

Regarding adequate tumor exposure and complete removal to ensure good results, supracricoid partial laryngectomy may be necessary in some cases[3,20,21]. Open surgery (supracricoid partial laryngectomy) is considered as a alternative method in selected cases, such as involvement of areas supra or subglottic plane or when exist the suspicion ,even if minimal, of tumor encroachment beyond the anterior commissure.[8-10]

Treatment of lesions with anterior glottic involvment by endoscopic laser surgery is still debatable. Some investigators believe that anterior commissure involvement represents a contraindication to laser surgery because of the high rate of recurrence[13,14,19].

Regarding CO_2 treatment, several studies have reported different and sometimes contrasting data with an overall survival rate comprised in a range between 90 and 100% at 3 years and from 85 to 90% at 5 years[7,12,15-17,19,22-24]. The data emerging from our study concords with these figures.

Good survival rates were achieved with CHP, our results being slightly better than those reported in the literature, especially after five-year follow-up (78.5% versus 66.7-71.4%)[8,9,20,25,26] .

The excellent survival (84.6% at five years) of patients treated with CHEP, similar to those reported by other Authors (on average about 80%), confirms the greater efficacy of this treatment, respect to the more aggressive surgical option[8,9,20,21,26-28].

As previously reported, our study evaluated a longer term (10 years) follow-up. Very interesting data have emerged concerning the absolute survival rate related to each of the different surgical techniques, 56.25%, 66.6% and 58.82% respectively.

These percentages are not disappointing, considering the long time of the study and the already advanced age of some patients at the time of surgical treatment.

Survival curves show a better result of CHP in comparison to the other surgical techniques. However, the difference with the other two groups is too small to be considered statistically significant and to affirm that this type of treatment is the most effective over such a long period of time.

Good results have also been confirmed by the relative survival rate, with the best value obtained by CHP (83.33%).

Several different are the factors that influence the risk of loco-regional recurrence, including the tumor site, smoking and, especially, the initial type of surgery performed[2,3,11].

Mendenhall et al[5] in 2004 compared the results of several studies dealing with T1-T2 tumor treatment. Local control rates after laser excision ranged from 80% to 90% for T1 disease, while open partial laryngectomy showed local control ranges to 90-95%.

Pignataro et al[29] reported their experience of a group of 37 patients staged as T1b treated with horizontal glottectomy, with a rate of recurrence estimated at 13.5%.

A few studies have illustrated the need for a close follow-up of these patients mainly for the detection of early loco-regional relapse[5,7,11]. Our policy is to perform a CT every 6 months for the first 2 years and once a year thereafter.

In our study, two cases (one treated with CO_2 laser and one with CHEP) had early relapse, despite the fact that histological examination of the lesion had confirmed a radical tumor excision with resection margins free from disease. A timely total laryngectomy ensured the survival of the two patients.

During the 10 years of follow-up, 15 patients (19.2%) died due to locoregional recurrence or to appearance of distant metastases. In the group treated with CHP there was the fewest number of recurrences, only two (16.6%). Unfortunately, this data is affected by the smaller number of participants and the p value > 0.05 does not enable us to affirm that this type of treatment is associated with a lower number of relapses with respect to other treatment options.

Moreover, in our patients we observed a relationship between the initial site of the tumor, localized in the anterior commissure, and more aggressive behaviour of the disease, often beyond the glottic plane with greater locoregional recurrences.

The commissure is regarded as a "locus minoris resistantie", due to its anatomical features that greatly influence tumor spread in the horizontal and vertical planes[13,14]. These characteristics include the absence of both the perichondrium that the barrier represented by the elastic cone, that at this level is dehiscent, and, lastly, the presence of Broyles ligament.

Sachese et al[14] in a recent retrospective review found no difference between open surgery and transoral laser resection for T1 or T2 tumors involving the AC, but showed that local control was significantly decreased if the AC was involved, compared with tumors not involving the AC.

Conclusions

Our data suggest an excellent absolute survival rate ranging from 56.25% to 66.6% at 10 year follow-up for T1b glottic tumors. Since both the CO_2 laser and supracricoid partial laryngectomy yield similar local control and survival rates, it is not possible to establish with certainty the best therapeutic approach even with such a long period of surveillance. Obviously the quality of life after transoral laser cordectomy is much better than after SCPL which remains a second-line treatment only for some selected cases.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

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