ENDOSCOPIC LASER SURGERY OF GLOTTIC CARCINOMA

Summary:
Introduction: The purpose of the study was to analyze the surgical, functional and oncologic results in patients with glottic carcinoma treated by CO2 laser surgery.

Material and Methods: In the ENT Department Timisoara between 1998 and 2007 were treated by endoscopic CO2 laser surgery 288 patients with glottic carcinoma T1a, T1b, T2 and N0. Endoscopic laser CO2 surgery was the primary and solitary management for curative resection of the glottic carcinoma. We performed four types of cordectomies depending of the stage of tumor. Post operative control examination included videoendoscopical procedures and neck sonography for early detection of cancer recurrence.

Results: In our experience tracheotomy was not required. The mean follow-up was 36 months, range 12 to 48 months. The oncologic results at 36 month showed no recurrence of disease in 93.1% of cases. The vocal results obtained in our series were very good.

Conclusions: Endoscopic CO2 laser surgery represents an efficient treatment method with superior oncologic and functional results to conventional surgery. The oncologic radical character was achieved only when the indications, contraindications, oncologic objectives and CO2 laser specific principles were followed.

Keywords:
glottic carcinoma, laser surgery

Rezumat:
Introducere: Scopul acestui studiu a fost de a analiza rezultatele chirurgicale, functionale si oncologice in cazul pacientilor cu cancer glotic tratați prin chirurgie endoscopica cu laser CO2.


Rezultate: În cazul pacienților nu a fost necesară tracheotomia. Perioada medie de urmărire postoperatorie a fost de 36 de luni, variind între 12 și 48 de luni. La 36 de luni, rezultatele oncologice nu au evidențiat recidivă în 93.1% din cazuri. Rezultatele funcționale în ceea ce privește vocea au fost foarte bune.

Concluzii: Chirurgia endoscopica cu laser CO2 reprezintă metoda de tratament eficientă cu rezultate functionale și oncologice foarte bune, net superioare chirurgiei convenționale, având caracter de radicalitate oncologică primară numai dacă se respectă indicațiile, contraindicațiile, obiectivele oncologice și principiile specifice ale abordului cu laser CO2.

Cuvinte cheie:
cancer glotic, chirurgie laser

Received for publication: 22.05.2011
Revised: 26.06.2011

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INTRODUCTION

In Boston, U.S.A., in 1972, Geza Jako and Stewart Strong were the first surgeons to perform endoscopic CO2 laser resection for vocal cord middle 1/3 superficial carcinoma (1,2). At the beginning of 1980 in Europe, Germany, Erlangen, Wolfgang Steiner was the first surgeon which extended the initial indications of endoscopic surgery to advanced stages (3). Endoscopic CO2 laser surgery represents a useful treatment modality for laryngeal carcinoma with oncologic and functional results superior to classic surgery.

The scope of this study was to evaluate endoscopic CO2 laser surgery oncologic and functional results in cases of glottic carcinoma in order to adequately indicate this procedure for oncologic patients in ENT Department Timisoara.

MATERIAL AND METHODS

In the ENT Department Timisoara between 1998 and 2007 were treated by endoscopic CO2 laser surgery 288 patients with glottic carcinoma T1a, T1b, T2 and N0. Endoscopic laser CO2 surgery was the primary and solitary management for curative resection of the glottic carcinoma.

Careful selection represents the essential factor in establishing the correct indications for endoscopic CO2 laser surgery – T criteria (TNM, UICC 2002), - localization, - macroscopic aspect (vegetative, ulcerative or infiltrative), - dimensions, - volume, - surface and deep extension and vocal cord mobility.

T1a, T1b, T2 glottic cancers represents optimal and absolute indications for endoscopic CO2 laser surgery, especially vegetative, with surface extension. We extended the relative indications to T3 tumors endolaryngeal confined, careful selected, with a fixed vocal cord, but without CT scan cartilage invasion.

All patients were N0 – clinically and by ultrasonography.

Following clinical exam, fibrolaryngoscopic exam, rigid endoscopy, suspended microlaryngoscopy, ultrasonography, computer tomography, preoperative evaluation protocol, according to patient stage, we selected the following glottic carcinoma group: stage T1a - 66 cases (22.9%), stage T1b - 45 cases (15.6%), stage T2 - 164 cases (56.9%) and stage T3 – 13 cases (4.6%).

Gender distribution was: males - 266 cases (92.4%) and females - 22 cases (7.6%). Group mean age was 56.2 years, varying from 34 to 78 years old. The highest incidence was represented by the fifth and sixth decade of life 119 cases (41.3 %) and 92 cases (31.9%), respectively. We have noticed a high incidence in the fourth decade of life with an incidence as high as 21.3% of the patients, related with tobacco consumption in youth patients.

We performed four types of cordectomies (type I, II, III and IV) and unilateral transglottic resection according to tumor stage (T1a, T1b, T2, T3) and characteristics.

The cordectomies were performed accordingly: type I cordectomy in 21 cases (7.3%), in stage T1a, type II cordectomy in 45 cases (15.6%) in stage T1a, type III cordectomy in 178 cases (61.8%) in stage T1b and T2. Type III cordectomy without anterior commissure resection was performed in 98 cases (34.1%), stage T2, and with anterior commissure resection was performed in 80 cases (27.7%) (24 cases (9.2%) stage T1b and 56 cases (7.9%) stage T2). Type IV cordectomy and unilateral transglottic resection was performed in 21 cases (7.3%) stage T1b and in 23 cases (7.9%) (10 cases (3.4%) stage T2, and 13 cases (4.5%) stage T3), respectively.

Anterior commissure resection was performed in 80 cases (27.7%), stage T1b and T2. Complete anterior commissure resection to thyroid cartilage was associated with type III cordectomy or represented an extended type IV cardeotomy surgical step.

No tracheotomy was necessary in 288 patients which underwent endoscopic CO2 laser surgery. Postoperative follow-up varied between 12 and 48 months, average 36 months, accordingly: monthly in the first year postoperative, at 2-3 months in the 2nd and 3rd year, at 3-6 months in the 4th and 5th year.

Postoperative control examination included clinical exam, videoendoscopical procedures (fibrolaryngoscopy and rigid endoscopy) and neck sonography for early detection of cancer recurrence in patients with short and thick neck. Suspended microlaryngoscopy was performed in case of local recurrence suspicion, or in cases of inconclusive fibrolaryngoscopy and rigid larynx endoscopy. Thoracic X-ray and abdominal ultrasonography was performed to rule out distant metastases.

RESULTS

Following the anesthesia-surgical security protocol we did not encountered any laser specific incidents, accidents and complications. In order to prevent larynx edema we intraoperatively I.V. administered 100-200 mg Hydrocortizon Hemysuccinate. We did not notice any intra and postoperative hemorrhage complications, acute
respiratory insufficiency (24-48 hours) or local and
general infectious complication. In our experience
tracheotomy was not required. Postoperative pain was
mild in all patients.
Postoperative medical treatment was minimal,
necessitating antibioprophylaxis, mucolytics agents and
mild pain killers. Nonsteroid anti-inflammatory drugs
were not necessary, patients evolution being favorable
without superior respiratory obstruction signs. Larynx
edema due to CO2 laser surgery was minimal or absent.
Postoperative evolution was favorable in all patients.
The wound evolved to spontaneous healing in 2-4
weeks postoperative, regarding the extension of
endoscopic CO2 laser resection.
Inflammatory granuloma 5.5% (16 cases) appeared at
2-3 months postoperative, being small in dimensions and
localized in anterior 1/3 of the neoglottis area. The
treatment consisted in endoscopic CO2 laser granuloma
resection. No patient developed anterior commissure
synechiae, despite a complete resection which reached
anterior commissure thyroid cartilage or a type II and III
cordectomy with anterior commissure resection.
Patient’s hospitalization was of short duration, on
average 4.2 days, ranging from 2-3 day in case of type I
and II cordectomy to 7 days in cases of type III with
anterior commissure resection and type IV cordectomies.
Patient’s socio-professional reintegration was in 7 to 14
days.
Functional results were analyzed on the 2 laryngeal
major functions: phonation and respiration,
Deglutition and respiration were unaffected
immediately or late postoperatively.
Phonation was affected by the surgical procedures;
the worst results were noticed immediately
postoperatively. Functional results were good and very
good in 71.8% of cases, with neoglottis voice production
due to healing process of residual vocal cord and
postexcision scar tissue in patients in which the anterior
commissure was preserved. All patients presented
satisfactory conversational postoperative voice.
Endoscopic CO2 laser resections oncologic results
were represented by NED (no evidence of disease) in
93.1%, (268 patients in stage T1a, T1b and T2) and local
recurrence in 6.9% (20 cases in stage T1b, T2 and T3).
We did not encounter any lymph node recurrences. 36
months survival rate was 98.2% (5 deaths by liver and
pulmonary metastases).
Local recurrence were noticed in 20 cases, 8 patients,
stage T1b, underwent type III and IV cordectomy and
transglottic resection, with or without anterior
commissure resection, 7 patients, stage T2 (subglottic
extension below 5 mm at the level of anterior
commissure), underwent type IV cordectomy with
anterior commissure resection and 5 patients, stage T3,
underwent transglottic resection. 15 out of 20 cases with
local recurrences benefited by classic salvage treatment
with favorable evolution. All patients with local
recurrences did not quit smoking, against medical
recommendation.
Time interval between initial procedure and local
recurrence was on average 13 months, varying from 3 to
18 months. Salvage treatment consisted in classic
conventional surgery – total laryngectomy with neck
dissection. All patients were pN0. Postoperative
evolution was favorable in all 15 cases, with all patients
alive at the end of the follow-up. The mean follow-up was
36 months, range 12 to 48 months. The oncologic results
at 36 month showed no recurrence of disease in 93.1% of
cases. The vocal results obtained in our series were very
good.

DISCUSSIONS

Jako and Strong (1) proved the efficacy and
advantages of endoscopic CO2 laser surgery in case of
glottic cancer, stage T1a. Afterwards the indications
were extended (3) to glottic cancer stage T1b, T2 and T3.
The advantages of endoscopic CO2 laser surgery are
represented by the larynx fundamental functions
conservation, phonation and respiration on natural
airways, without tracheostomy (2,4,5).
Endoscopic CO2 laser cordectomy is recommended
by many authors as optimum treatment method
(3,6,7,8). The oncologic safety was ensured by tumor
complete excision with negative margins. The resections
were performed 1-3 mm in normal tissue, average 1.5
mm. (9).
Beside careful selection, following general principles
of endoscopic CO2 laser surgery represents an important
oncologic aspect, with a recurrence rate in the study
group of 6.6% (5 cases) with good and very good
functional results (3,8).
Literature (10,11) showed that in stage T1 endoscopic
CO2 laser surgery has a 36 months healing rate of
80-90%, better than conventional surgery or
radiotherapy.
T1 and T2 glottic carcinoma treated by endoscopic
CO2 laser surgery oncologic results presented by
different authors (12,13,14) revealed a recurrence rate as
high as 10% of cases.
Recurrence rate of 6.9% was related to the local and
general disease control failure due to anterior
commissure involvement and histological parameters (15).

Salvage treatment (16) in patients with local recurrences consisted in endoscopic CO2 laser surgery, total laryngectomy, vertical partial laryngectomy and radiotherapy.

Anterior commissure cancer is difficult to treat endoscopically with CO2 laser surgery (17) with maximum oncologic efficacy due to the lack of internal thyroid perichondrium and the vicinity of cartilaginous structure.

Most of the authors (18,19) suggest that anterior commissure represents the area of glottic region with the highest recurrence rate, 7 out of 10 recurrences being at this level, despite the treatment modality: radiotherapy, conventional partial surgery or endoscopic CO2 laser surgery.

Functional results with a very good and good voice quality in 76.3% of patients are literature accordingly (11,12) being in relation with the amount of resection performed (type of cordectomy, anterior commissure preservation) and the surgical technique accuracy obtained by optimum laser parameters programming (20).

Endoscopic CO2 laser surgery represents an important alternative (19,21) for patients with T1a, T1b, T2 and T3 glottic cancer, when selection and evaluation preoperative criteria are followed, having a high oncologic efficiency, with a 93.1% disease free rate in our 288 patients group. Those date are accordingly to other authors, even in cases of anterior commissure involvement.

CONCLUSIONS

The endoscopic interventions were performed without the use of tracheotomy, maintaining the integrity of laryngeal cartilages. Endoscopic CO2 laser surgery represents an efficient treatment method with superior oncologic and functional results to conventional surgery. The oncologic radical character was achieved only when the indications, contraindications, oncologic objectives and CO2 laser specific principles were followed.

References: