

# Laser Endoscopic Microsurgery of Laryngeal Cancers

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## Abstract

**Introduction** The aim of our study is to present our experience in treating laryngeal cancers with endoscopic CO<sub>2</sub> laser surgery.

**Materials and Methods** This retrospective study was conducted from January 2008 to December 2012 at Antoine Lacassagne Center of Nice. The functional and oncologic results of this surgical technique were analyzed and discussed.

**Results** The average length of hospital stay was 2.5 days. Phonatory results were considered excellent in 75% of our patients who maintained satisfactory phone communication skills after their interventions. Chronic hoarseness was the most common reason for bilateral or extended cordectomies. On the oncologic basis, histologic exam showed 90% of our margins were normal. The clinical control showed excellent laryngeal preservation in 94.23%. In 5 years, the overall survival was estimated at 96.15%.

## Keywords

- ▶ laser therapy
- ▶ endoscopy
- ▶ laryngeal neoplasms

**Conclusion** This study shows the benefit of the laser endoscopic microsurgery for the preservation of laryngeal functions and the local histologic control, essentially for early stage laryngeal cancers.

## Introduction

Conservative surgery of vocal cord pathology combines the use of an endoscopic route, a surgical microscope, and a CO<sub>2</sub> laser. Strong and Jako<sup>1</sup> described this surgical technique for the first time in 1970,<sup>2</sup> which experienced a strong growth in popularity over the past 20 years under the leadership of several authors.<sup>3,4</sup>

The aim of our study was to evaluate the functional and oncologic results of our patients operated by this technique of laser endoscopic microsurgery.

## Materials and Methods

From January 2008 to December 2012, 52 patients followed for laryngeal cancer were treated with CO<sub>2</sub> laser endoscopic microsurgery in our center. There were 47 men and 5 women of average age 63.5 years (range 52 to 81).

Chronic hoarseness (39 cases) was the essential reason for consultation with an average duration of 4 months. The examination found a history of smoking in 38 cases, alcoholic use in 21 cases, and previous irradiation in 12 cases. All of our patients were examined thoroughly (physical examination + direct flexible laryngoscopy) and systematically (with a pan-endoscopy and computed tomography scan).

The nature of the tumor was determined by the extemporaneous histologic reading of the piece after endoscopic biopsy. Later confirmation was given by histologic examination. There were 52 cases of squamous cell carcinoma.

All our interventions were performed under general anesthesia with oral intubation. The surgical instruments consisted of endoscopic and microscopic surgery equipment, a surgical microscope, and laser tubes of CO<sub>2</sub>. We used a cordectomy for cancer with a glottic location, and for supraglottic cancer, a supraglottic laryngectomy dissection-type epiglottectomy with a systematic dissection of neck (type III).

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The attending physician followed all our patients regularly for 1 to 2 weeks after surgery. Later, the clinical condition of the patient determined the frequency of the follow-up, varying between 2 and 4 months for the first and the second year. This follow-up consisted of a thorough clinical examination coupled with systematic indirect endoscopies and computed tomography scans.

Our patients were systematically sent to a physiotherapist for vocal and sometimes nutritional rehabilitation. The functional outcome was evaluated based on the duration of hospitalization, need for tracheotomy/ nasogastric tube, and quality of swallowing and speech. In accordance with Li-Jen et al,<sup>5</sup> the evaluation of speech depended on the patient's ability to maintain a proper telephone communication within 1 month after the intervention.

Our oncologic evaluation criteria took into account the resection margins and cuttings, local control, laryngeal preservation, completion of a complementary treatment (radiation and/or chemotherapy), local and lymph node recurrence, and mortality.

## Results

Systematically, our patients benefited from a thorough clinical examination (physical examination + direct flexible laryngoscopy), panendoscopy, and computed tomography. These explorations have highlighted 39 glottic locations, 10 supraglottic locations, 3 glottic and supraglottic locations, 2 cases of cervical ganglion flooding, and 1 esophageal secondary location.

According to the Union for International Cancer Control/American Joint Cancer Committee's 2002 laryngeal cancer classification, our carcinomas were classified as Tis in 9 cases, T1 in 35 cases, T1b in 5 cases, and T2 in 3 cases.

For glottic locations according to the European Society of Laryngology classification,<sup>2,5</sup> our cordectomies were type I (epithelial) in 7 cases, type III (transmuscular) in 29 cases, type Va (extended to the anterior commissure) in 3 cases, and type Vc (extended to the supraglottic area) in 3 cases. Our 10 supraglottic locations benefited from a supraglottic laryngectomy dissection-type epiglottectomy with a systematic neck modified radical dissection (type III).

## Functional Results

The average length of hospitalization of our patients was 2.5 days (range 1 day in the cordectomy type I and III, 7 to 18 days in the extended cordectomy type Va and Vc). Disorders of swallowing corresponding to the type of false roads were noted in 24 patients. In 7 of these patients, placement of a nasogastric tube for nutrition was necessary. A tracheotomy was performed in emergency on 1 patient in the emergency room for severe postsurgical laryngeal shortness of breath. The phonatory results have been satisfactory, with 34 patients (75%) maintaining phone communication skills in the months following the intervention. The trailing hoarseness was especially encountered in our patients who benefited from a bilateral or extensive cordectomy (type: Va, Vc). Voice quality was considered good in all our patients by the physiotherapist at the end of the voice rehabilitation.

## Oncologic Results

In 90% (47 cases) of our resections, margins were healthy. In one case, the endoscopic resection corrected the histologic biopsy diagnosis: one mucoepidermoid carcinoma was in reality a squamous cell carcinoma.

The 5-year survival was estimated in our series to be 96.15%. We had two deaths: one patient died 2 months postoperatively of an array of cardiovascular decompensation and esophageal metastasis and high blood pressure. The other died of cancer at 14 months after the procedure.

The local oncologic control was 94.23%; our three relapses have all occurred on previously irradiated areas and the patients have gone on to total laryngectomy.

## Discussion

Functional surgery of laryngeal cancers has long been done externally in the form of partial surgery and by radiotherapy more recently. The introduction of laser endoscopic microsurgery has revolutionized this treatment, as well as had tremendous effect on the duration of hospitalization, swallowing and speech disorders, and need for tracheotomy and/or nasogastric tube.

All the authors agree on a significant reduction in the length of hospital stay after laser endoscopic surgery. According to Brasnu<sup>2</sup> and Ansarin et al,<sup>6</sup> the length of hospital stay was reduced from 1 to 3 days. The average length of hospitalization in our study was 2.5 days. Longer stays of hospitalization in our series were for extended cordectomies (Va, Vc) or supraglottic laryngectomies due to more frequent postoperative complications. The practice of a tracheotomy is exceptional after laser endoscopic surgery.<sup>2,7,8</sup> Moreau and Pierre used laser to treat invasive or in situ laryngeal carcinoma in 160 patients, doing no tracheotomy postoperatively.<sup>7</sup> In our series, a single postoperative tracheotomy was necessary, largely due to infectious complication (compressive cervical abscesses). In the series of Policarpo et al<sup>9</sup> and Moreau and Pierre,<sup>7</sup> as in ours, postsurgery voice quality depended on the type of cordectomy. The voice quality was worse if cordectomy was extended (bilateral type III, type Va, and type Vc). By comparing the quality and voice recovery time after laser endoscopy and after radiotherapy, Christine et al concluded that voice quality was normal 3 months after laser cordectomy.<sup>10</sup> However, after radiotherapy, this standardization takes longer and the two qualities of voice will be equivalent in the long run.

Swallowing is generally preserved after laser endoscopic microsurgery. Brasnu<sup>2</sup> explained rapid swallowing recovery by the recovery of an efficient glottic closure reflex 48 to 72 hours after the laser surgery, although after an externally supraglottic laryngectomy, the glottic closure reflex is inefficient for at least 3 weeks. In our series, 24 patients (46.15%) presented food false routes but only 7 of them (13.46%) required the establishment of a nasogastric tube. Ruben et al compared the length of time of nasogastric feeding after a laser supraglottic laryngectomy to that of tube feeding after an external supraglottic laryngectomy and found an average of 9.53 days for laser laryngectomy and 16.95 days for external surgery.<sup>11</sup>

Local control and laryngeal preservation after laser endoscopic microsurgery are regarded as excellent by many authors.<sup>2,5,6,9</sup> Preuss et al, with a 5-year follow-up period, had a local control rate ranging from 94.6 to 98.2% and a rate of laryngeal preservation between 95.5 and 100%. In our series, the local control rate was 94.23% in 5 years.<sup>12</sup>

The assessment of local control based on the invasion or not of anterior commissure is not yet the object of consensus. According to Peretti et al<sup>13</sup> and Pearson and Salassa,<sup>14</sup> statistically there is no significant difference of local control in accordance with the flooding or not of the anterior commissure. However, Steiner et al found that local control was not as good in the event of infringement of the anterior commissure.<sup>3</sup>

Our study did not find any statistical difference but noted a greater difficulty of exposure when the tumor extended to the anterior commissure. Also in our practice, we limited the indications of laser endoscopic surgery to cancers of the larynx classified as Tis, T1, and T2. In the literature, there is not a generally agreed upon opinion on the indications of laser endoscopic surgery of larynx cancers.<sup>3,8,9,12</sup>

The assessment of local control of laryngeal preservation and of the survival according to the type of treatment shows that there is no significant difference between external conservative surgery or laser surgery and radiotherapy.<sup>2,5,9</sup> However, for Brasnu,<sup>2</sup> the advantage of the laser endoscopic surgery is to avoid incision of skin and platysma, to preserve normal tissue, to keep swallowing and speech functions, and to avoid the side effects of radiotherapy.

Laser endoscopic surgery is still nowadays one of the most efficient techniques of preservation of laryngeal functions despite the introduction in recent years of the robot-assisted transoral surgery, which is not widely used.

## Conclusion

The concern of any practitioner is the constant improvement in patient care. Laser laryngeal endoscopic surgery lies within this framework with significant reduction of postoperative complications. It also allows for local control, laryngeal preservation, better voice quality, and survival equivalent to that of the external surgery and radiotherapy, hence the

interest of this surgical technique in the early support of laryngeal cancers.

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