

RADIOSURGERY IN THE TREATMENT OF THE GLOTTIC PLANE CARCINOMA

SALVATORE RESTIVO, MD, RICCARDO SPECIALE, MD,
ROSALIA GARGANO, MD, RICCARDO DI LEO, MD,
FRANCESCO FARINELLA, MD, SALVATORE GALLINA, MD

During the last 20 years, various conservative surgical techniques have been proposed to treat larynx cancer. On the basis of our various experiences and of the ultrastructural data on the tissues treated with radiowaves, we decided to also use radiosurgery in operations under direct microlaryngoscopy. We select 18 patients suffering from epidermoid carcinoma. These patients had been referred to our ENT clinic at the Policlinico of Palermo between 1999 and 2001. The authors describe the surgical procedures used and emphasize the advantages of radiosurgery in the treatment of larynx cancer.

During the last 20 years, various conservative surgical techniques have been proposed to treat larynx cancer. We now have the possibility to perform surgical procedures on extended neoplasias of the glottic plane, but only as long as these are performed radically, ie, "the tumor must be removed with a large enough margin of healthy surrounding tissue."¹ From the data available in medical literature, we are able to state that the oncologic results obtained by this method are satisfactory.

Carrying out conservative operations requires patients to be meticulously selected and implies tumor staging, an evaluation of the motility of the cords and arytenoids, multiple biopsies, a computed tomography (CT) scan of the larynx and a clinical and histopathological assessment.

The CO₂ laser has been used for quite some time in the treatment of carcinomas of the glottic plane and limited tumors of the vocal cords.² Motta et al.³ hold that it is possible to use the CO₂ laser under direct microlaryngoscopy even if the tumor is diffused and extended to areas of the glottic plane or to adjoining areas. However, the tumor must be removed radically, ie, including a "sufficient margin of healthy surrounding tissue and using the same cleavage plane as that followed in traditional conservative laryngeal surgery."

Obviously, the contraindications to any type of conservative surgery are neoplastic infiltration of the cartilaginous skeleton, of the cricothyroid membrane, the thyroepiglottic cavity, and the presence of metastatic locoregional adenopathies.

Based on the histopathological and clinical evaluation, such operations can possibly be associated with functional neck dissection. If a locoregional relapse or a latero-cervical metastasis arises, it is possible to carry out demolitive surgical procedures with a survival percentage equivalent

to that obtained by the authors who have performed traditional surgery.⁴

We have been using radio frequency (RF) for 5 years to perform various surgical procedures: removal of superficial facial neoplasias, skin section, detachment and coagulation of subcutaneous tissues in tympanoplasty surgery, total laryngectomies, neck dissection, treatment of the OSAS (reductive submucous decongestion of the inferior turbinates, uvulopalatoplasty).

This technique uses patented high-frequency, low temperature radio waves and enables the surgeon to cut and/or coagulate tissues almost atraumatically. The RF wave is applied with a thin electrode that sections the tissue very precisely. The cells on its path are destroyed by the heat resulting from the resistance the tissue offers to the passage of the wave. Cellular water is heated and vaporized and molecules are dissolved (a process referred to as "molecular dissolution").

The histological and ultrastructural comparative study of the tissues sectioned with CO₂ laser versus RF waves has undoubtedly proven that radio waves maintain the structural integrity of the epidermis and dermis, while the CO₂ laser causes a fragmentation and disorganization of these skin layers.⁵

MATERIALS AND METHODS

We selected 18 patients suffering from epidermoid carcinoma (with a medium and high degree of differentiation). These patients had been referred to our ENT clinic at the Policlinico of Palermo between 1999 and 2001.

The study group includes 17 men and 1 woman, ages 44 to 80 years (average age 67). The diagnosis was performed with flexible fiberoptic videolaryngoscopy and a biopsy which resulted with the following data:

- 12 patients presented with a monolateral condition of the true vocal cord with normal motility.
- 1 patient had a monolateral condition of the true vocal cord, the anterior commissure and the false homolateral cord with normal motility.
- 1 patient had a monolateral condition of the true vocal cord, the anterior commissure with normal motility.
- 2 patients presented with a monolateral condition of

From the Division of Otorhinolaryngology B, University School of Medicine and Surgery of Palermo, Palermo, Sicilia.

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Address reprint requests to Salvatore Restivo, Division of Otorhinolaryngology B, Via delle Alpi 75, 90144 Palermo, Sicilia, Italy.

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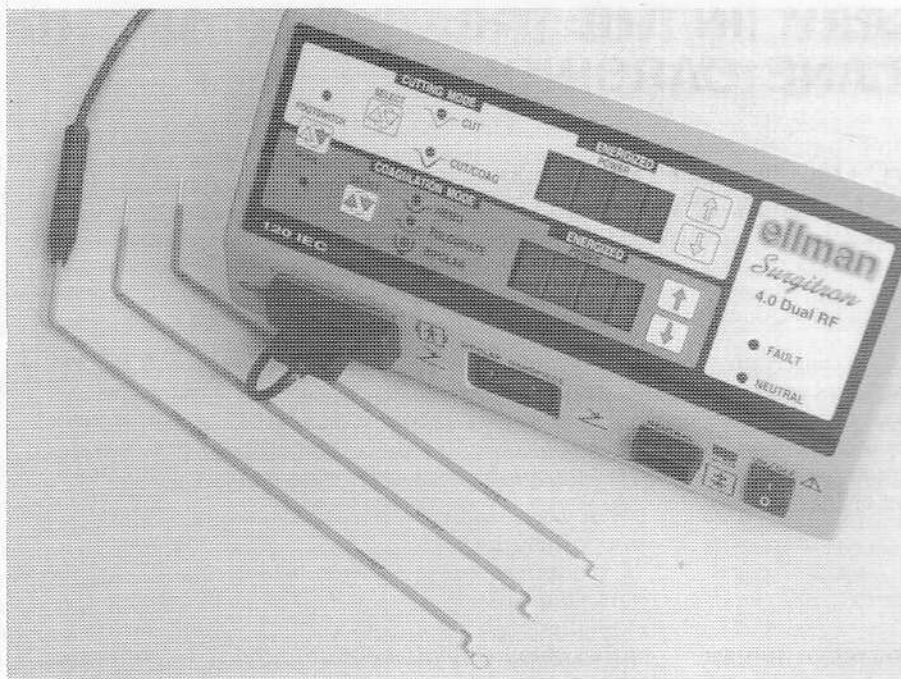


FIGURE 1. Ellman surgical equipment.

the true vocal cord and of the homolateral Morgagni's ventricle, with reduced motility.

- 2 patients presented with a bilateral condition of the true vocal cord, of the anterior commissure with normal motility.

The following procedures were performed with radio frequency under direct suspension microlaryngoscopy:

- 9 simple monolateral cordectomies
- 7 extended monolateral cordectomies
- 1 simple bilateral cordectomy
- 1 extended bilateral cordectomy

SURGICAL TECHNIQUE

On the basis of our various experiences and of the ultrastructural data on the tissues treated with radio waves⁵ we decided to also use radiosurgery in operations under direct microlaryngoscopy. The surgical equipment we used was developed and patented by Ellman and includes RF microfiber, protected terminals that can be either ending in a tip (for cutting) or be blunt (for coagulating) (Fig 1).

The surgical procedures we followed are similar to those used with the CO₂ laser. The procedures were performed under general anesthesia by oro-tracheal intubation, using small diameter endotracheal tubes to guarantee a proper exposition of the operating field.

Simple Cordectomy (Fig 2)

1. Laryngoscope introduced up to the free margin of the false vocal cord.
2. Infiltration with 0.5 mg of adrenalin diluted into 10 mL of physiological solution. The infiltration must be performed in the bottom of the ventricle at the level of the anterior, medium and posterior thirds. The adrenalin infiltration serves to avascularize and at the same time medialize the vocal cord.
3. Vertical incision with an RF scalpel along the anterior commissure to the thyroid cartilage.

4. Incision of the lateral wall of the ventricle inclusive of the internal perichondrium of the thyroid cartilage.

5. Detachment of the vocal cord extended to the inferior margin of the thyroid cartilage and following anterior-posterior incision of the hypoglottis.

6. Vertical incision at the vocal apophysis of the arytenoid which enables the vocal cord to be removed as a whole.

7. Optional hemostasis with radiocoagulation.

Extended Cordectomy (Fig 3)

The procedure implies the removal of the true vocal cord, Morgagni's ventricle, and/or of the false vocal cord and/or of the arytenoid.

1. Infiltration with adrenalin and physiological solution as for the simple cordectomy extended to the false cord.
2. Vertical incision at the anterior commissure.
3. Incision in the thickness of the false vocal cord or of

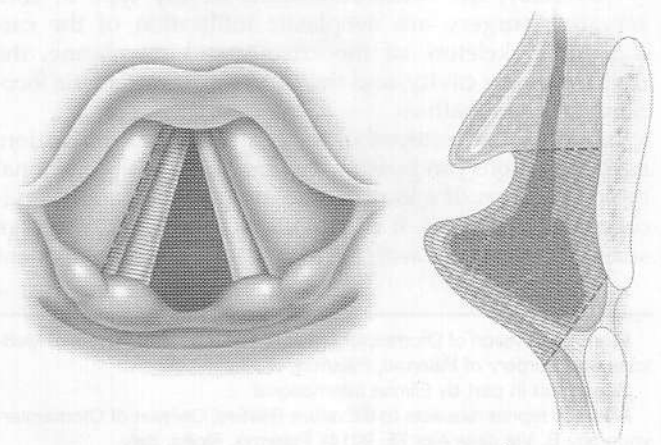


FIGURE 2. Simple cordectomy.

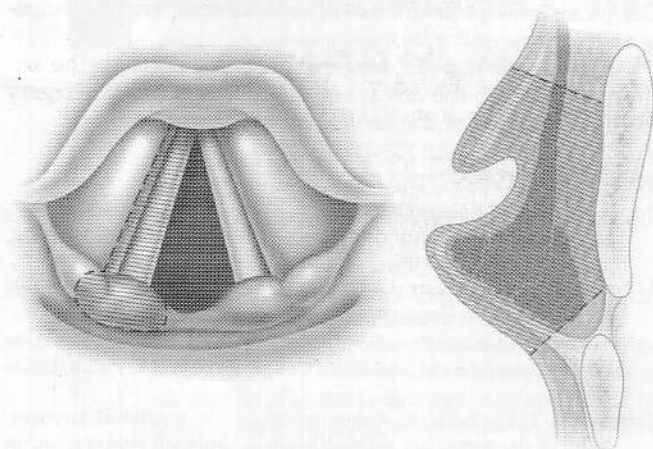


FIGURE 3. Extended cordectomy.

the aryepiglottic fold up to the arytenoid. The surgeon reaches the internal perichondrium of the thyroid cartilage with a detachment until the cricothyroid space. Antero-posterior incision at the cricoid ring.

4. Vertical incision at the vocal apophysis of the arytenoid with removal of the surgical area as a whole.

Bilateral Cordectomy (Fig 4)

1. Infiltration with adrenaline and physiological solution as for extended cordectomy.

2. "Horseshoe incision" a few millimeters above the free border of the ventricular folds, including the anterior commissure and the two anterior thirds of the false vocal cords.

3. Vertical incisions between the posterior third and the two anterior thirds of both true vocal cords. These incisions extend to Morgagni's ventricles. Below, they extend until the cricoid ring. The incisions also include the internal perichondrium.

4. Removal as a whole, after horizontal incision at the cricoid ring.

Bilateral Extended Cordectomy (Fig 5)

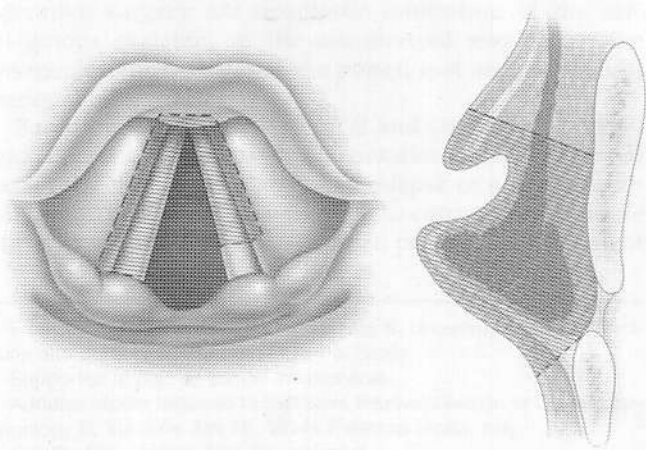


FIGURE 4. Bilateral cordectomy.

1. The "horseshoe" incision is performed at a higher level.

2. The incision at the hypoglottis can reach up to the inferior margin of the cricoid ring.

DISCUSSION

The analysis of data obtained by following the postoperative course with fiber optic videolaryngoscopy (at 1 day, 7 days, 15 days, and 1 to 3-6 months) with reference to the histological assessment (T1,T2/N0/M0), to the tumor location, the larynx motility and type of procedure, enables us to draw the following conclusions:

1. It is possible to carry out operations which conform to the radical oncological control:

- With short surgical timeframes
- With a rapid postoperative course
- Brief postoperative hospitalization (24 to 48 hrs)

2. There was only 1 case of relapse after 9 months in all 18 patients we treated. The patient suffered from epidermoid carcinoma with a medium grade of differentiation of medium and posterior thirds of the right true vocal cord with normal motility. The patient underwent a cordectomy extended to the homolateral Morgagni's ventricle and false cord. This case enables us to state that the neoplastic relapse is not directly related to the level of spread of the neoplasia nor to the reduced motility of the cords. This patient underwent a total laryngectomy.

3. The possible local relapse or laterocervical metastasis does not exclude the possibility to perform demolitive surgical techniques.

4. No important complication was reported in the cases we treated.

One patient suffered an anterior synechia after seven months that was excised with a radio scalpel. 15 months after the operation, the synechia had not developed again.

CONCLUSIONS

The surgical treatment with radio frequency in oncology proves to be a valid method for the following reasons:

1. The section of the tissues is equivalent to the one obtained with the scalpel but bleeding is almost nonexistent.

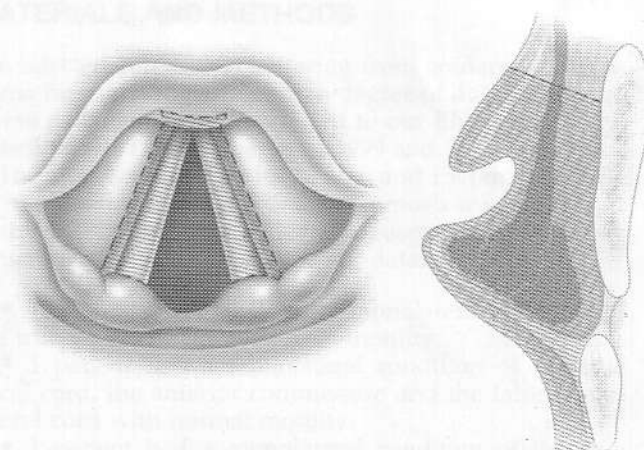


FIGURE 5. Extended bilateral cordectomy.

2. Very small incidence of postoperative edema.
3. No mechanical and painful dysphagia.
4. Hospitalization periods considerably shortened.
5. Since the radio wave enables tissues to retain their structural integrity, it is possible to carry out a serial histological evaluation of the surgical area to ensure that the surgery procedure is radical.
6. Eliminates the mutilating element—the tracheal stoma—for the patient.
7. Enables a very good anatomical recovery and normal functioning of the larynx.
8. The equipment takes up minimum space and cost is limited.

SUMMARY

The authors evaluated the results of radiosurgery in the treatment of glottic plane carcinoma using suspension microlaryngoscopy. Eighteen patients were examined, 17 men and 1 woman, all suffering from epidermoid carcinoma with medium and high degree of differentiation.

Diagnosis was performed with a flexible fiberoptic videolaryngoscopy and a biopsy.

After describing the surgical procedures used, the authors emphasize the advantages of applying radiosurgery in the treatment of the larynx cancer.

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