ACTA SCIENTIFIC OTOLARYNGOLOGY (ISSN: 2582-5550)

Volume 2 Issue 10 October 2020

Topical Mitomycin C Application Post Endoscopic Removal of Antrochoanal Polyp

Mohammad Waheed El-Anwar¹*, Ashraf Elmalt², Ahmed Annany¹, Wael A Ahmed³ and Ahmed Abdel Fattah Nofal²

¹Professor, Otorhinolaryngology Head and Neck Surgery Department, Faculty of Medicine, Zagazig University, Egypt

²Assistant Professor, Otorhinolaryngology Head and Neck Surgery Department, Faculty of Medicine, Zagazig University, Egypt

³Assistant Professor, Otorhinolaryngology Head and Neck Surgery Department, Faculty of Medicine, Sohag University, Egypt

*Corresponding Author: Mohammad Waheed El-Anwar, Professor, Otorhinolaryngology Head and Neck Surgery Department, Faculty of Medicine, Zagazig University, Egypt. Received: July 20, 2020 Published: September 24, 2020 © All rights are reserved by Mohammad W El-Anwar., *et al.*

Abstract

Endoscopic CO_2 laser surgery alone was proved to give good oncological results and is a desirable alternative to radio-therapy or partial laryngectomy for patients with early T2 glottic carcinoma [1]. However, Diode laser was not investigated in such cases. Moreover, most previous studies were retrospective [5-7].

In reviewing the literature, high recurrence rate was reported after laser surgery for T2 tumors. It was obvious that the main cause was incomplete removal of the tumor. Piece-meal technique was more frequently used with low local control with laser (68.5% [5], 76.4% [6], 84% [7]) and high residual (31.5% [5], 23.6% [6], 16% [7]).

Vocal muscle infiltration and involvement of the paraglottic space and subglottic area have a significant impact on disease-free survival after laser surgery [7].

Keywords: Endoscopic Laser; Laryngectomy; Glottic Carcinoma

Introduction

Complete eradication of the disease is the main objective of treatment of malignant tumours of the larynx. However, preservation of laryngeal functions and trial to solve the problem of postoperative voice disorders are other factors that should be considered [1,2].

Laser cordectomy is considered one of the modalities of choice for treatment of patients with early glottic carcinoma [1-3]. In addition to its comparable oncological results with radiotherapy and open surgical procedures, it offers several advantages including short hospital stay, less postoperative morbidity and favorable cost-effectiveness ratio [2-4]. The larynx can compensate for voice production after laser cordectomy by different compensation mechanisms [2].

Aim of the Study

The aim of the current study was to assess Trans oral Diode laser enblock microsurgical tumor excision (TDLEM) from periphery area (grossly cancer free) towards the tumor for patients with early T2 glottic squamous cell carcinoma, N0M0, without crushing or cutting through the specimen.

Patients and Methods

This preliminary prospective study included selected 24 patients (22 male, 2 females) with T2N0M0 glottic carcinoma who underwent endoscopic Diode laser enblock excision, between January 2014 and July 2018 at otorhinolaryngology head and neck surgery department, university hospitals. Informed written consent was obtained from all patients and the study was approved by IRB (/2016). Recurrent tumor after radiotherapy, patients refuse to share in the study, unfit patient to general anesthesia were excluded.

According to extent of T2, patients were divided into 4 categories; 1- unilateral T2 glottic tumour with free anterior 3 mm of vocal cord, 2- patients with unilateral T2 glottic tumour with involvement of the anterior 3 mm of the vocal cord, 3- patients had anterior commissure T2 glottic tumour extending to both vocal cords, and 4 patients with T2 glottic tumour spread to the contralateral vocal cord.

Surgical technique

Patients were intubated orally using a small-sized, Laser resistant endotracheal tube (Medtronic USA). Its cuff was inflated with methylene blue –saline. An appropriate-sized laryngoscope was used and suspended to expose the larynx. The larynx was sprayed with xylocaine, 4%, solution. A surgical microscope (Zeiss) with 400-mm lens was used to visualize the larynx. Surgical cottonoid moistened with saline was kept in the subglottis to protect the endotracheal tube cuff, as well as stainless shield designed to protect the tube when laser was used in close proximity to the tube [8].

Initial endoscopic assessment (with Storz 0 telescop) of the larynx was done with attention to ventricles, subglottis and how much the anterior commissure was included with tumour or not.

Diode laser machine (Diomed Ltd. Cambridge, UK) was adjusted at 6 W power, repeated pulse mode, pulse duration 300 ms, the laser was transmitted with 400 mm laser fiber and the tip of the handpiece was angled in order not to obscure vision.

Handling malignant tumours during endoscopic laser surgery in larynx was done following proper oncologic principle. We approached the tumour from the prefery at area apparently under microscope and by palpation to be cancer free grossly; gentle tissue handling is a must as rough handling will increase the chances of seeding malignant cells in the surgical field, as well as, to lymphatics during surgery increasing the chances of both local recurrence and neck spread. Also squeezing the specimen by forceps should be avoided as this will lead to crushing of tissues, makes differentiation between malignant tissue and healthy tissues difficult during surgery and would damage the specimen for later histopathological examination. Gentle pushing away of the specimen by suction tip was the routine, and only grasping the specimen gently by forceps at the time of final removal.

3 patients with unilateral T2 glottic tumour with free anterior 3 mm of vocal cord were offered lateral enblock TLM laryngectomy, where the whole ipsilateral compartment were excised starting from anterior attachment of vocal cord, down deep to inner thyroid perichondrium, then back through this plane to the vocal process of arytenoid all in one block.

While in patients with unilateral T2 glottic tumour with involvement of the anterior 3 mm of the vocal cord, were offered laser fronto-lateral endoscopic enblock laryngectomy. The excision started from the healthy tissues of contralateral cord, 3 mm posterior to its anterior attachment. The cut should go all through to reach to the inner perichondrium of the thyroid cartilage, then moving anteriorly to free the specimen from the anterior commissure area up to level of attachment of epiglottis to thyroid cartilage and down to lower border of thyroid cartilage. Then excision continued in the same plane to free it from the thyroid cartilage on the tumour side from anterior backward. Any bleeder from branches of laryngeal arteries was easily controlled by bipolar diathermy.

While in anterior commissure tumours involving the anterior parts of both cords, or lesions spreading from one cord to involve the other cord, extended fronto-lateral endoscopic enblock laryngectomy was done, removing the anterior 2/3 of other cord as well leaving only its posterior one third, together with anterior commissure and ipsilateral cord all in one block, to clear anterior commissure and both lateral compartments.

When dissection reach posterior, we free it from the arytenoid cartilage, using the precise laser cut advantage, to cut it layer by layer and should recognize the healthy muscle tissue before cutting to avoid cutting through malignant tissue.

We applied the stainless steel shield to protect the tube during working near it to avoid combustion; it helped also in lateralizing the tumour making its excision much easier.

Now the specimen removed oncological sound as enblock, its anterior and posterior ends were marked with different colored threads and sent for serial section histopathological examination.

Dexamethasone sodium phosphate, 4 mg, was intravenously given to all patients during the operation to reduce laryngeal edema. This was repeated twice in 24 hours after the operation. In addition, broad spectrum prophylactic antibiotics were given for 5 days after the operation.

Patients were endoscopically examined after treatment in an outpatient clinic every week for the first month, then every month during the first year, and every 6 months during the following years. Patients were subjected to neck and endoscopic examination during follow-up periods to look for any residual, recurrence or complication (e.g. edema, granulations, aspiration, and/or web formation). At each outpatient visit, the patient was always examined by at least two physicians to double check test and examination results.

13

Voice evaluation

We compared the patient's post treatment voice with pre treatment voices, using GRBAS, maximum phonation time (MPT), air flow rate (AFR), pitch, and intensity obtained by aerodynamic tests. In this study, both authors and a speech therapest made judgment ratings of voice quality. The voice sample was measured and analyzed before and after surgery (from one year to 5 years). We used Multi- Dimensional Voice Program, MDVP (Kay Elemetrics Co., Ltd., NJ, USA) to test phonatory function. Statistical analysis was done with the Wilcoxon signed-rank test or paired student *t* test. P values of < 0.05 were regarded as significant.

Results

24 patients (22 males - 2 females) who proved to have squamous cell carcinoma of the larynx T2N0M0 were included in the current study: Their ages ranged from 52 - 71 years (mean 63 ± 6.87). No patient needed tracheostomy before or after the procedure. Recovery was eventless in all patients without the need for ICU admission. No post-operative infection, resistant edema, nor reported aspiration or dysphagia. Patients started their oral feeding four hours post-operative and left the hospital on the next day. 3 patients had unilateral T2 glottic tumour with free anterior 3 mm of vocal cord and 10 patients had unilateral T2 glottic tumour with involvement of the anterior 3 mm of the vocal cord. While, 9 patients had anterior commissure T2 glottic tumour extending to both vocal cords and 2 patients had T2 glottic tumour spread to the contralateral vocal cord. The follow up period ranged from 9 months to 5 years (mean= 3.9 year). Loco-regional control was achieved in 23 cases (95.8%). 21 (87.5%) of them by TDLEM alone (Figure 1-4), while 2 patients (8.3%) needed post-operative small dose radiotherapy (6r/6 weeks) to sterilize breeched surgical margins in one patient, and to sterilise the neck in the other patient after histopathological examination showed infilterative tumour margin with vascular, lymphatic invasion. Postoperative radiotherapy could be started as early as the 7th post-operative day without delay as needed in open surgery (Table 1).

Four cases (16.7%) showed postoperative granulation tissue that need to be excised endoscopically and were proved histopathologically to be reactive granulation tissue and the patients became free throughout following follow up.

One case (4.2%) showed tumour recurrence with extensive subglottic extension and was treated with total laryngectomy and neck dissection.

Figure 1: A; A case of T2a glottic cancer involving the anterior end of right vocal cord and ventricle, paraglottic space who offered right Diode laser frontolateral enblock endoscopic laryngectomy, B; post-operative view at end of surgery, C; 1 month post-operative, D; 2 years post-operative.

14

Figure 2: A cases of anterior commissure carcinoma involving anterior ends of both vocal cords who offered extended fronto lateral endoscopic diode laser enblock laryngectomy, A; pre-operative view, B; postoperative view after 3 years.

Figure 3: A case of right glottic T2 invasive carcinoma with right paraglottic space invasion, who offered enblock endoscopic Diod laser lateral laryngectomy; A; operative view at begin of surgery and B; post-operative view after 5 years.

Citation: Mohammad W El-Anwar., et al. "Topical Mitomycin C Application Post Endoscopic Removal of Antrochoanal Polyp". Acta Scientific Otolaryngology 2.10 (2020): 12-17. Figure 4: 1 year postoperative view of a case with anterior commissure carcinoma that was treated with Diode laser enblock laryngectomy showed no recurrence with non-obstructed anterior web formation.

Treatments	Patients (n)	Final recurrence (%)
TDLEM	21 (87.5%)	0
TDLEM + RT	2 (8.3%)	0
TDLEM followed by total laryngectomy	1 (4.2%)	0
Total	24 (100%)	0%

Table 1: Results of the studied patients.

TDLEM: Trans oral Diod laser en block microsurgica l tumor excision; RT: Radiotherapy.

Voice was accepted by all patients with no reported aspiration or dysphagia. we compared pre operative with post-operative voice qualities. There was little change in MPT (p > 0.01) after treatment in non recurrent T2N0M0 patients. Although the postoperative AFR and pitches were slightly higher than the pre-operative values but it was statistically insignificant (p > 0.01). The post- treatment voice qualities were judged to be the same or improved over pretreatment qualities (GRABAS scale).

Discussion

Radio-therapy (including chemoradiotherapy), open surgery, and laser microsurgery are alternative options for treatments for stage II glottic cancer [9,10]. However, the appropriate treatment for patients with T2N0M0 glottic cancer is not well defined.

In a trial to investigate the outcome of laser assisted surgery in stage II cancer larynx, we conducted this prospective study applying sound oncologic techniques of handling and excising malignant tissues in enblock, and using dependable histopathological parameters to mange regional N0 nodes. In this work, we took advantage of new laser technology but we applied it in accordance to the old gold standard oncologic techniques.

In this study, we preferred to work with Diode laser transmitted by 0.4 mm fiber, as the fiber guidance system permit the tip to be angled, which allows access areas that are difficult to handle with the CO_2 laser. This enabled us to go around corners and encompass the lower margin of tumour as down as the lower margin of thyroid cartilage which was very difficult and almost impossible to be done by CO_2 , without the need to cut through the tumour or pulling tumour away to clear the way for the beam, as all these maneuvers were avoided in this work to minimise malignant cells seeding.

The diode laser has excellent hemostatic properties as a result of high absorption by hemoglobin and particularly by oxyhemoglobin. It is also absorbed by water, but less so than the CO_2 laser. Furthermore, diode laser is portable, small, relatively inexpensive, and simple to use. It also has stable power output, long lifetime, and low installation and maintenance costs [11,12]. Moreover, the diode laser is delivered down by a fine glass fiber that allows the surgeon to hold it in a pencil-like holder for accurate manipulation [13]. As a result, the use of diode laser in transoral laser microlaryngosurgery has increased in recent years. However, it has the main disadvantage of occupying surgeon one hand, rendering him single handed throughout the surgery.

Applying the principle of excising the whole of any partially involved laryngeal compartment (safe compartment principle), achieved very good results without recurrence in 23 cases out of 24 (95.8%). 21 cases of them by TDLEM alone (87.5%) while 2 cases (8.3%) needed sterilizing small dose post-operative radiotherapy, only in accordance to histopathological examination of the excised block. In this study, applying the proper oncological techniques of handling and excising malignant tumour enblock, allowed us to preserve the specimen in good condition for proper serial sections histopathological examination of both surgical margin and tumour margin, and only sterilising neck lymphatic when the tumour margin was infiltrating or when there is vascular or lymphatic invasion. Up till this study, post-operative radiotherapy was used based on surgeon experience which was subjective and variable.

Following the basic proper oncologic principles on excising malignant tumours should not be overlooked or ignored by endoscopic laser surgeons. Techniques like removing tumours in pieces or attacking the tumour in its middle to asses the depth of invasion prior to excision are not with the sound and proper oncologic principles of malignant tumour excisions and should be condemned. In the current study, there were no operative complications and no need for post-operative ICU services and patients started their oral feeding 4 hours post operative and left the hospital the next day. There was no aspiration as the arytenoid were preserved and the epiglottis and aryepiglottic folds were neurologically intact closing the laryngeal inlet during deglutition.

All 23 cases achieved local control in this study were offered enblock excision of the involved compartment/s, which sound more oncologically proper. This technique offered minimal chance for malignant cells seeding or leaving residual tumour behind. Applying current technique allowed us to control tumours involving anterior commissure, and/or paraglottic space and/or extension down to the lower border of thyroid cartilage in one block, with good success rate. The only limiting factor of in our study was if down tumor extension is below the lower border of thyroid cartilage because the tumour can escape outside the larynx through the crico-thyroid membrane in such cases.

Anterior commissure is not yet the object of consensus. Statistically there is no significant difference of local control in accordance with the flooding or not of the anterior commissure [5,14]. This agrees with results of our study, as we did not find noted a greater difficulty of exposure when the tumour extended to the anterior commissure. Also in our practice, we limited the indications of laser endoscopic surgery to cancers of the larynx classified as T2a with freely mobile vocal cords which did not have enough time or inertia to invade thyroid cartilage at anterior commissure as muscular tissues were still free, as both cords were still freely mobile. The only side effect of anterior commissure involvement was post-operative anterior web formation due to bare surface in anterior commissure and both anterior ends of vocal cord following frontolateral or extended frontolateral endoscopic laryngectomy. Fortunately none of those patients ever complained of air way obstruction or stridor through out the follow up period, and in the event of any stridor happened we were ready to cut the web and insert endo laryngeal keel for one month as treatment. Also 4 of our cases (16.7%) developed granuloma which were excised and histopathologically examined and nothing more were needed.

In this study the post-treatment voice qualities were judged to be nearly the same as pretreatment qualities. We think that voice qualities should be an important factor to integrate into decision making.

Favorable results for selected T2N0M0 laryngeal carcinoma treated with laser surgery are supported by previous study [4,10].

Radiotherapy is believed to preserve voice best, but radiotherapy alone is associated with a high risk of local recurrence [15,16]. For T2 glottic cancer, the local control with radiotherapy alone falls to 50 to 85% [17]. The previous report showed it seemed to favor open conservation surgery over radiotherapy or endoscopic laser surgery when local control is the endpoint [17]. But en-block excision in our study showed that the 5-year survival and 5-year voice preservation rates were 100% and 91.6% respectively.

This study showed the need for new TNM staging for TDLEM as the present one was designed for external excisional surgery. For example paraglottic space invasion, in spite of its great significance, is totally ignored in present TNM system. Also smaller lesion like T1b needed more aggressive extended frontolateral endoscopic laryngectomy, in comparison to bigger T2 lesion involving one vocal cord which treated with endoscopic lateral or fronto-lateral laryngectomy.

So, trans-oral Diode laser enblock microsurgical tumor excision (TDLEM) for T2 glottic carcinoma avoids crushing or cutting through the specimen and had comparable results to open conservative laryngectomies with lower morbidity, hospital stay and superior laryngeal functions preservation. However, TDLEM need to be investigated on large number of patients.

Conclusion

Transoral endoscopic enblock diode laser surgery for T2 had comparable results to open conservative laryngectomies with lower morbidity and superior functions preservation. Careful patient selection for laser surgery and following proper oncologic techniques are essential to secure good results. Also enblock excision preserves the excised specimen for seral sections histopathological examination of both surgical margin and tumour margin which can be used to select patients for post operative radiotherapy.

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16

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