DOI: 10.7860/JCDR/2018/36675.11710

Original Article

Oncology Section

Outcomes Assessment of Transoral Laser Microsurgery for T1 and T2 Glottic Cancer at the Ho Chi Minh City Ear-Nose-Throat Hospital

THUY PHAN CHUNG TRAN[1], TUAN THANH NGUYEN[2]

ABSTRACT

Introduction: Transoral Laser Microsurgery (TLM) has been accepted as a major treatment modality for early glottic carcinoma (T1, T2), with well-known advantages over Radiation Therapy (RT) and open partial laryngectomy.

Aim: To evaluate the oncological outcomes in a consecutive series of early glottic carcinomas treated with TLM as a single-modality therapy.

Materials and Methods: The study was conducted using the medical records of 32 consecutive patients who underwent TLMs and postoperative follow-ups. We only evaluated the oncological outcomes for 1-year disease-free survival and the organ preservation rate. The prognostic values of the related clinicopathological factors were evaluated using univariate analysis.

Results: Of the 32 patients, 31 were males and one was a female, with an average age of 61 years. The tumours were treated by cordectomy types IV (78.1%), Va (18.8%) and Vb (3.3%). The voice outcomes were assessed using the Voice Handicap Index scale, which showed that 8 patients had normal voices and 22 had mild changes. Only 2 had moderate-to-severe voice changes. The mean hospitalization period was 4.4 days (range 3-7 days). For resection margins, as reported by the pathologist, 31 cases (96.9%) had negative margins and 1 case (3.1%) had a positive margin.

Conclusion: Laser surgery has very good oncological outcomes for T1 and T2 glottic cancer with the highly proportion of negative margins and the voice outcomes is normal or mild changed.

Keywords: Cancer, ENT hospital, Ho Chi Minh City, Glottic, Outcome Assessment, Transoral Laser Microsurgery

INTRODUCTION

TLM has its advantages over RT and open partial laryngectomy [1-3]. In addition to these well-established oncological approaches, Transoral Laser Surgery (TLS) has emerged as a major therapeutic alternative. Such a preference seems quite obvious considering the advantages of low morbidity, good functional results, lower costs and a shorter hospital stay without significant differences in the local control or survival, when compared to the other modalities [4]. Although endoscopic laser surgery for the treatment of laryngeal neoplasms was first described and used in the United States, it has found wider acceptance in clinical practice in Europe. The initial pioneering work by Steiner W and subsequent major studies by Motta et al., have demonstrated the potential use of TLS for the treatment of early-stage glottic carcinoma [3]. TLS provides advantages relating to its haemostatic effects and precision in tissue ablation. TLS is now a widely used surgical approach for the treatment of glottic carcinomas.

The data available in the existing body of literature indicates that TLS leads to oncological results that are comparable to more conventional treatment modalities in selected groups of patients. However, in Vietnam, no detailed information on the local and regional control, final organ preservation rates and survival is available that might permit a meaningful comparison of TLS and the other treatment modalities for early glotticcarcinoma. In this prospective study, we evaluated the oncological outcomes in a consecutive series of early glottic carcinoma patients, treated with TLM as a single-modality therapy. In addition, we analysed the relationships between these outcomes and the other clinicopathological factors. The main outcome measure was local control with initial therapy.

MATERIALS AND METHODS

We performed a prospective study of the medical records of 32 consecutive patients with previously untreated early stage (T1/T2N0M0) glottic carcinomas who underwent TLMs at the Ho Chi Minh City Ear-Nose-Throat Hospital in Vietnam between 1 January 2016 and 30 June 2017, without any adjuvant treatment. Each patient had been diagnosed with a Squamous Cell Carcinoma (SCC) via a tissue biopsy, with laryngomicrosurgery conducted under general anaesthesia before the TLM. The microscopic surgical exposure of the larynx was evaluated during the procedure. The surgeon made an effort to visualize the lesions in the patients with difficult laryngeal exposures by performing external compression of the laryngeal framework, repositioning the laryngoscope, or adjusting the tension of the suspension laryngoscope. Most of the cases were successfully exposed with such efforts. Neck Computed Tomography (CT) scans was performed in those patients with involvement of the anterior commissure to exclude extralaryngeal extension, and in those with a suspicious extension of the tumour to the paraglottic space or thyroid cartilage, both of which would be contraindications for TLM. Informed consent for the procedure was obtained from each patient after explaining the treatment choices for the RT and TLM. In the patients who provided consent prior to the biopsy procedure; single-stage TLMs were performed for both diagnostic and therapeutic purposes based on an intraoperative frozen section.

Surgical Technique

As per the hospital protocol, the TLM was performed under microlaryngoscopy using a CO2 laser (Lumenis Ltd., Yokne'amIllit, Israel) coupled with a micromanipulator (AcuSpot 715) with superpulse delivery in the continuous mode (4–8 W) at a spot size of approximately 0.8 mm^2. All the patients were intubated transorally for surgery. The tumour was removed with a safety margin of 2 mm, using an en bloc or piecemeal technique, depending on the site and size of the tumour and the glottic exposure. A laser vestibulectomy was performed when the lateral or anterior part of the tumour was hidden by the false vocal cord, to acquire adequate exposure, and thereby, evaluate the extent of the disease. The tumour extent was evaluated by a visual examination through an

operating microscope (Carl Zeiss, Oberkochen, Germany), and by palpation with microforceps. Intraoperative rigid endoscopy with 0° and angled endoscopes was used when the lesions were difficult to evaluate through the microscope. The cordectomies were classified into six types according to the recent Proposal for Revision of the European Laryngological Society Classification of Endoscopic Cordectomies [5]. All the patients received 80 mg of methylprednisolone intravenously during the intervention and 40 mg of the same drug intravenously during the first 2-4 days after surgery.

Surgical Margin Assessment

Since it was difficult to assess the cancer infiltration depth, a frozen section investigation was carried out. The deep, posterior and anterior margins of the surgical specimen were marked with ink and suture knots after the TLM procedure being completed; then, the specimen was sent to an experienced pathologist after being fixed to a soft board. With piecemeal resections in some cases, the vocal cord chart was sent to the pathologist in order to show how to remove the specimen, and if essential, a personal appraisal of the specimen by the surgeon was implemented with the pathologist. The pathologist defined the resection margin as negative when the distance of the clear pathological margin was over 0.5 mm. A resection margin of over 0.5 mm was considered to be positive, which included cases showing not only the apparent tumour involvement of the resection margin, but also suspicious margins, including the suspected zones of tumour involvement in the irregular laser-carbonized zone with thermal artefacts.

Postoperative Follow-up

The patients were followed monthly for the first year, bimonthly for the second year, quarterly for the third year and biannually for the fourth and fifth years. A flexible laryngoscopy was performed at every postoperative visit, and neck CT scans were checked annually. Any suspicious lesions identified during the follow-up were checked with a microlaryngoscopic examination under general anaesthesia.

Statistical Methods

The clinicopathological factors evaluated were the patient's age, sex, pathological T stage, tumour extension to subsites (anterior commissure, arytenoids, supraglottis and subglottis) and the presence of margin invasion. Because our study was on the first-stage assessment, we evaluated only the oncological outcomes for the one year disease-free survival and the organ preservation rate. The prognostic value of the clinicopathological factors related to the oncological outcomes was evaluated using a univariate analysis. The follow-up ranged from 2 to 18 months (median 8 months). The statistical analysis was performed using PASW Statistics 18 software (SPSS Ltd., Quarry Bay, Hong Kong).

RESULTS

Of the 32 consecutive patients who underwent TLMs, 31 were males, one was a female, and their average age was 61 years old (range 42-81) [Table/Fig-1]. Each of the patients had an initial endoscopy and either a laser or conventional biopsy to confirm the diagnosis. The T staging for the early glottic tumours revealed 31 patients with T1 disease (T1a=25, T1b=6) and 1 patient with a T2 tumour. All 32 of the patients were clinically node negative based on the physical examination and neck CT scan. All the patients either drank alcohol or smoked tobacco.

The tumours were treated by cordectomy types IV (78.1%), Va (18.8%) and Vb (3.3%) [Table/Fig-2]. A soft diet was given one day after the surgery without any significant aspiration events, and nasogastric tube feeding was unnecessary in all the cases.

The voice outcomes were assessed with the Voice Handicap Index scale; 8 patients had normal voices, and 22 had mild changes. Only 2 patients had moderate-to-severe voice changes and there were

Characteristic		No. of patients	N (total)
Sex	Male	31	32
	Female	1	
Age	median 61-year-old (range 42–81)		
T-stage	IA	26	32
	IB	5	
	II	1	

[Table/Fig-1]: Clinical characteristics of the patients.

T-Stage	Cordectomy			
	IV	Va	Vb	Total
pT1a	25	0	0	25
pT1b	0	6	0	6
pT2	0	0	1	1
Total	25	6	1	32

[Table/Fig-2]: Type of cordectomy according to T-stage.

no aphonic patients. The swallowing assessments were conducted predominantly postoperatively; however, a few patients with preoperative dysphagia were seen before the surgery. In nearly all the cases, the first assessment was two days postoperatively. In the cases in which the patient was unwell, the first assessment was done up to one week after surgery. Those patients whose resections only involved a small part of the vocal folds recovered to normal eating and drinking 1-2 weeks after the surgery. The patients with larger resections generally required 1-2 months to reach their potential. Finally, the patients with large resections required a longer period of swallowing rehabilitation to learn and review the compensation strategies. At their last follow-ups, all the patients had returned to normal diets with no discernible difficulty in swallowing. There was 1 case of postoperative bleeding, but no significant complications [Table/Fig-3]. One patient developed laryngeal synechiae a sequela of TLS and required further open surgery to restore an adequate airway. No other clinical stenosis of the airway was found in any of

Complications		N
Intraoperative complications	Significant bleeding	2
Postoperative complications	Bleeding	1
Late complications	Laryngeal synechia	1
	Hoarseness	2

[Table/Fig-3]: Surgical complications.

the other patients treated.

The mean hospitalization period was 4.4 days (range 3–7 days). In general, our institutional policy is to discharge a patient the day after surgery, but there were no delayed discharges due to surgical complications in this series. Among the 32 patients whose resection margins were reported by the pathologist, 31 cases (96.9%) had negative margins and 1 case (3.1%) had positive margins.

During the mean follow-up period of eight months (range 1–18 months), one patient (3.3%) showed recurrence. This was a local recurrence, and the duration from the initial TLM to recurrence was 10 months. The initial pT stage of the patient with recurrent disease was T1b, and it was salvaged with a total laryngectomy. The remaining patients were all disease free. Overall, the laryngeal preservation rate was 96.9% for the T1/T2 tumours.

DISCUSSION

TLM can be used in any patient who is fit for general anaesthesia. The only major technical difficulty can come with anterior commissure tumours. The post-treatment surveillance may be easier following TLM, since the oedema and mucositis associated with External Beam Radiation Therapy (EBRT) are absent [2]. However, submucosal

disease may be difficult to detect with either modality. TLM and EBRT offer comparable cure rates for early glottic tumours; however, comparing these treatment modalities is problematic [6]. TLM allows for the accurate staging of the tumour (during resection), while radiotherapy relies on the initial microlaryngoscopy for the clinical staging. With transoral laser microsurgery, the tumour is resected until the tissue feels and appears healthy under the microscope.

The result of this study also showed the vital role of the consultation of pathologists before as well as during a surgery. Depending on how the resection was performed, they would evaluate the resection margins. The role of pathologists' presence was previously mentioned in various the studies. According to Crespo AN et al., it was very important for the presence of a pathologists during surgery for intraoperative analysis of margins using frozen section [8]. This statement was also reported in Hartl DM et al., study, which was based on their experience that a "second-look" procedure with biopsies can be performed if any discordance between the surgeon's impressions occurred [7].

TLM has certain advantages over "open" surgical procedures. For example, tracheotomies can have substantial negative impacts on the postoperative adjustment and quality of life in certain patients following open partial surgery, and these are usually not required with TLS [1,3]. In TLS, the perioperative morbidity is low and the hospitalization is usually short [3]. In addition, deglutition is usually not disturbed, while extended partial laryngectomies frequently lead to varying degrees of prolonged aspiration. It is obvious that TLS can be used to treat patients with early-stage glottic carcinomas successfully.

The organ preservation rates achieved in our study demonstrate that organ-sparing treatment modalities are frequently successful in patients with local failures after an initial TLM. Therefore, our high ultimate local control rates were not achieved at the expense of organ preservation. After the resection by laser method, the quality of voice has having better outcomes which depend on the level of resection with superficial tumours [6]. In addition, at first, the anterior commissure was significant variation was recorded, however, after resection of superficial tumours was not significant although only small number of episode was found [9]. In terms of TLM, Kennedy JT et al., mentioned that the quality of voice outcome by TLM method could be equal or more when comparing with EBRT method [9]. Moreover, Bahannan AA et al., found that EBRT method showed wallowing outcomes are good, and the recovery time is short for early glottic tumours when compared to the prolonged discomfort of mucositis and dryness or altered taste [10]. The study conducted by Burke LS et al., demonstrated the five-year survival after an EBRT results is eighty-five percent for glottic tumours from T1-T2. The proportion of laryngectomy was between 4 and 6 percent (open surgery), between 9 and 12 percent (radiotherapy) [11].

Based on the period and potential complications of RT and open surgery, TLM may be the favoured treatment methodology because it offers a shorter hospitalization, little morbidity as well as the same local control (79%– 92.8%) [2,3]. On the contrary, it has been shown that the local recurrence can lead to spread of the tumour to the arytenoids, subglottis and vocalis muscle.

Experience in dealing with the suspension laryngoscope is necessary as adequate exposure of the lesion in TLM important. The laryngoscope must be inserted and situated at an ideal position utilizing a properly sized scope, and during the operation, repositioning is required for patients with poor exposure or tumours with local extension towards the vicinity. Exposure of the anterior commissure or the ventricle may be often hindered by the false vocal cord. In these cases, conducting a laser vestibulectomy is highly recommended in order to fully identify the extent of the tumour and attain an adequate surgical margin. For small superficial lesions, an en bloc resection of the tumour is considered; nevertheless, a piecemeal resection is helpful to assess the extent of the tumour that may well be determined at the cut surface with various laser carbonizations; between the SCC and ordinary mucosa or submucosa.

An adequate resection margin in glottic carcinoma cases has been considered to be unique (limited to 1–2 mm) when compared to the general consensus of >5 mm to define an adequate margin in an SCC of the head and neck [12]. In the absence of a clear definition regarding the resection margin of a laser cordectomy, our pathologist reported a resection margin <0.5 mm as positive. The impact of the surgical margin on the oncological outcomes and necessity of postoperative additional treatment or a second look procedure after TLM have been debated by many authors, with different results and policies [9,13]. For example, Crespo AN et al., showed that positive margins were related to a 37.5% rate of recurrence, whereas negative margins predicted a recurrence rate of 0% [8]. Mohssen A et al., reported that patients with close or positive margins who did not undergo further treatment (i.e., a repeated operation or RT) had a greater risk of recurrence, and they commented that additional treatment should always be provided if positive margins are found [13].

CONCLUSION

This prospective study with laser surgery has very good oncological outcomes for T1 and T2 glottic cancer with the highly proportion of negative margins. In addition, many patients had the voice outcomes is normal or mild changed.

ACKNOWLEDGEMENTS

The authors would like to thank the patients who voluntarily participated in this study. In addition, they express their gratitude to the staff at the Ear-Nose-Throat Hospital in Ho Chi Minh City for their support.

REFERENCES

[1] DeSanto LW, Olsen KD, Perry WC, Rohe DE, Keith RL. Quality of life after surgical treatment of cancer of the larynx. Ann Otol Rhinol Laryngol. 1995;104(10 Pt 1):763-69.
[2] Peretti G, Cappiello J, Nicolai P, Smussi C, Antonelli AR. Endoscopic laser excisional biopsy for selected glottic carcinomas. The Laryngoscope. 1994;104(10):1276-79.
[3] Steiner W. Laser surgery in the ENT field (laser surgery for the treatment of malignant tumours of the upper aerodigestive tract. Archives of Oto-rhino-laryngology Supplement Archiv fur Ohren-, Nasen-und Kehlkopfheilkunde. 1986;2:8-18.
[4] Bradley PJ, Mackenzie K, Wight R, Pracy P, Paleri V , ENT-UK Head & Neck Group. Consensus statement on management in the UK: transoral laser assisted microsurgical resection of early glottic cancer. Clinical Otolaryngology. 2009;34(4):367-73.
[5] Remacle M, Eckel HE, Antonelli A, Brasnu D, Chevalier D, Friedrich G, et al. Endoscopic cordectomy. A proposal for a classification by the Working Committee. European Laryngological Society Archives of Oto-rhino-laryngology. 2000;257(4):227-31.
[6] Cohen SM, Garrett CG, Dupont WD, Ossoff RH, MS. C. Voice-related quality of life in T1 glottic cancer: irradiation versus endoscopic excision. Annals of Otology, Rhinology & Laryngology. 2006;115(8):581-86.
[7] Hartl DM, de Monès E, Hans S, Janot F, Brasnu D. Treatment of early-stage glottic cancer by transoral laser resection. Annals of Otology, Rhinology & Laryngology. 2007;116(11):832-36.
[8] Crespo AN, Chone CT, Gripp FM, Spina AL, Altemani A. Role of margin status in recurrence after CO2 laser endoscopic resection of early glottic cancer. Acta Oto-laryngologica. 2006;126(3):306-10.
[9] Kennedy JT, Paddle PM, Cook BJ, Chapman P, Iseli TA. Voice outcomes following transoral laser microsurgery for early glottic squamous cell carcinoma. he Journal of Laryngology & Otology. 2007;121(12):1184-88.
[10] Bahannan AA, Zábrodsky M, Chovanec M, Lohynska R. Quality of life following endoscopic resection or radiotherapy for early glottic cancer. Saudi Medical Journal. 2007;28(4):598-602.
[11] Burke LS, Greven KM, McGuirt WT, Case D, Hoen HM, Raben M. Definitive radiotherapy for early glottic carcinoma: prognostic factors and implications for treatment. International Journal of Radiation Oncology* Biology* Physics. 1997;38(5):1001-06.
[12] Hinni ML, Ferlito A, Brandwein-Gensler MS, Takes RP, Silver CE, Westra WH, et al. Surgical margins in head and neck cancer: a contemporary review. Head & Neck. 2013;39(5):1362-70.

[13] Mohssen A, Luigi S, Augusto C, Massaro MA, Calabrese L, Giugliano G, et al. Laser surgery for early glottic cancer: impact of margin status on local control and organ preservation. Archives of Otolaryngology–Head & Neck Surgery. 2009;135(4):385-90.

PARTICULARS OF CONTRIBUTORS:
1. Director, Ear-Nose-Throat Hospital at Ho Chi Minh City, Ho Chi Minh City, Vietnam.
2. Staff, Ear-Nose-Throat Hospital at Ho Chi Minh City, Ho Chi Minh City, Vietnam.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Thuy Phan Chung Tran,
Ear-Nose-Throat Hospital at Ho Chi Minh City, Ho Chi Minh City, Vietnam.
E-mail: thuytran.uphcm@gmail.com

FINANCIAL OR OTHER COMPETING INTERESTS: None.

Date of Submission: **Apr 07, 2018**
Date of Peer Review: **May 30, 2018**
Date of Acceptance: **Jun 04, 2018**
Date of Publishing: **Jun 15, 2018**