

Voice outcomes after laser cordectomies: Subjective evaluation using the voice handicap index

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ABSTRACT

INTRODUCTION: A multitude of treatment modalities have been proposed in management of early laryngeal squamous cell cancers (SCC). With the improvement of survival rates of these tumours, the degree of voice impairment after treatment became a deciding parameter in the choice of treatment modality. Many reports based on objective tools showed acceptable voice outcomes in patients treated with transoral laser microsurgery (TLM). This is a single centre study representing voice outcomes in patients treated with TLM using a patient-self assessment tool.

PATIENTS AND METHODS: we retrospectively reviewed medical data of patients treated with TLM between 2012 and 2017. Voice outcomes were evaluated using the Arabic version of the voice handicap index (VHI). Thirty patients participated in the questionnaire. Scores were collected then studied following type of cordectomy, resection of one or both vocal cords, number of laser sessions and age.

RESULTS: The mean age was 62 years. Sex ratio was 14:1. We performed 3 type III cordectomies, 10 type IV and 17 type Va (extended to the Anterior commissure). Local control was achieved since the first cordectomy in 27 cases, after 2 laser sessions in 2 cases and after 1 laser session in 1 case. The VHI score was realized in a mean delay of 29 months after surgery. The overall mean VHI was 47 (VHI-F= 15, VHI-P= 17 and VHI-E= 15). The handicap severity was considered mild in 2 cases (overall VHI<30), severe in 2 other cases (overall VHI> 60) and moderate in the remaining cases. The mean VHI following type of cordectomy was 26 ±6, 43 ±5 and 53 ±4 respectively in type III, IV and Va cordectomies. The mean overall VHI was 60 ±10 when the resection was extended to contralateral vocal cord (VC). However, it was 45 ±12 when the resection was limited to a single vocal cord. The mean overall VHI increased from 44 ±11 when a unique laser session was performed to 62 ±8 when extra laser sessions were needed. Older patients had a mean VHI equals to 46 ±14. In younger patients it was 48 ±10.

CONCLUSION: The VHI is a reliable self assessment tool based on subjective perception of the quality of voice. TLM in well trained hands offers acceptable functional outcomes.

KEY WORDS: Transoral laser surgery, VHI, laser cordectomy, vocal cord, glottic laryngeal cancer.

INTRODUCTION

Early glottic squamous cell cancer (SCC) is either treated by surgical excision or external beam radiation therapy (RT). When speaking of surgery, both endoscopic and external approaches showed comparative oncologic cure rates [1, 2]. Transoral laser microsurgery (TLM) offers in addition a shorter recovery time and lower morbidity rates [3]. Voice outcomes should be also considered in the choice of treatment modality. Many European studies, based on objective and subjective tools, showed acceptable functional results after TLM [4-6].

In this study we tried to investigate the voice outcomes after TLM using a patient-based self assessment tool: the VHI score. An Arabic version of the questionnaire validated by Malki et al was used [7]. It was based on the English original version of the questionnaire widely used and formulated by Jacobson in the nineties [8].

MATERIEL ET METHODES

This study had retrospectively reviewed the medical data of all patients treated with TLM from January 2012 to Ja-

nuary 2017. Thirty four medical records were exploitable. Therapeutic decisions were made within a multidisciplinary committee after staging of the disease following the UICC TNM classification of glottic cancers 2009 version.

Surgical interventions were realized under general anesthesia after orotracheal intubation with a carbon dioxide laser Unilas Limmer Germany used in the continuous super pulse mode with output power set to 2 to 5 Watts. An optical microscope Carl Zeiss (Carl Zeiss, Germany) connected to a camera was used during the procedure. Surgical interventions were saved in a proper data file for every patient for iconographic and legal purposes. Resections were performed following the European Laryngological Society classification modified in 2007 (ELS 2007).

We focused in this study on the functional aspects. Voice outcomes were evaluated using the voice handicap index (VHI) questionnaire. This patient-based self-assessment tool consists in 30 items equally distributed over 3 domains: physical, functional and emotional aspects of voice disorders.

An Arabic version of VHI validated by Malki et al and based on the original version by Jacobson was used (Appendix1).



Patients were either directly asked to fill the questionnaire or phoned. Some illiterate patients needed help from the examining physician or from a third person.

Total VHI score (overall VHI) as well as functional, physical and emotional VHI domains (VHI-F, VHI-P and VHI-E) were calculated. Statistical analysis was performed with SPSS version 20 statistical software.

A comparison between the VHI scores depending on several parameters (type of cordectomy, involvement of one or both vocal cords, number of laser sessions and age) was then made.

RESULTS

Thirty four medical records of patients treated by TLM for early glottic SCC were exploitable. Four patients did not participate in the study. Three among them had received either adjuvant radiation therapy (RT) or salvage open laryngectomies. The fourth patient was not contactable. Among the participants there was 28 men and 2 women (sex ratio 14:1). The mean age in the study was 62 years, ranging from 29 to 77. Ninety percent (90%) were cigarette smokers and 53.3% were alcohol consumers.

All patients were treated for early laryngeal SCC. The tumours were classified Tis in 3 cases, T1a in 20 cases, T1b in 4 cases and T2 in 3 cases. Three type III cordectomies, 10 type IV and 17 type Va (extended to the anterior commissure) were realized. The local control was achieved since the first cordectomy in 27 cases. However, 2 patients needed 2 sessions and 1 needed 3 sessions.

The VHI questionnaire was realized after surgery at different delays. The mean delay was 29 months after surgery ranging between 3 and 62 months.

The mean overall VHI score was 47 ranging between 21 and 80. The mean VHI-F was 15, the mean VHI-P was 17 and the mean VHI-E was 15 (figure 1). The handicap severity was considered mild in 2 cases (overall VHI<30), severe in 2 other cases (overall VHI> 60) and moderate in the remaining cases.

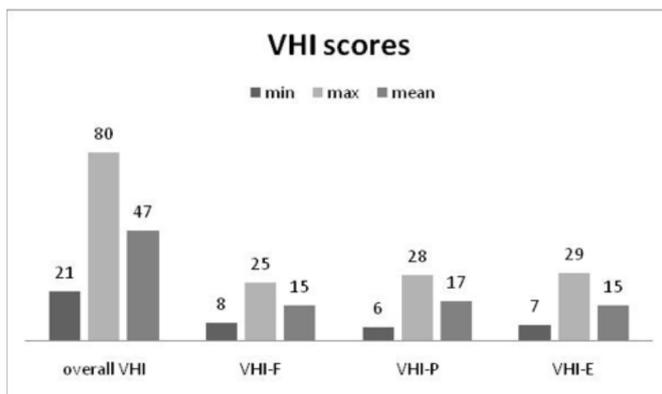


Figure 1 : VHI scores with min and max

The mean overall VHI score for type III cordectomies was 26 ±6 (VHI-F=9 ±1, VHI-P= 8 ±2 and VHI-E= 9 ±3). The mean overall VHI for type IV cordectomies was 43 ±5 (VHI-F= 14 ±5, VHI-P= 15 ±2 and VHI-E= 14 ±3). The mean overall VHI for type Va cordectomies was 53 ±4 (VHI-F= 17 ±4, VHI-P= 19 ±4 and VHI-E =17 ±5) (figure 2).

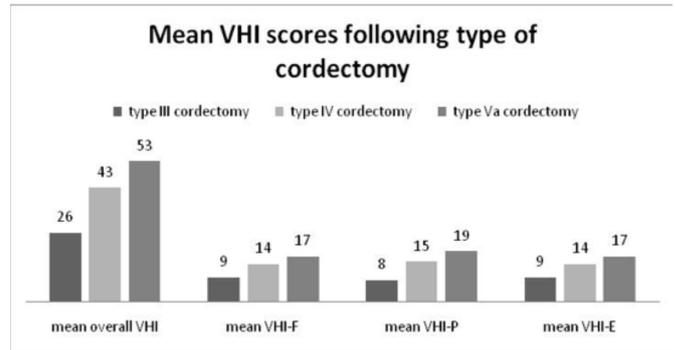


Figure 2 : VHI scores following type of cordectomy

Both vocal cords were involved in 4 cases (T1b). These patients had a mean overall VHI equals to 60 ±10 (VHI-F= 20 ±3, VHI-P= 21 ±5, VHI-E= 19 ±5). When a single vocal cord was involved the mean overall VHI was equal to 45 ±12 (VHI-F= 15 ±4, VHI-P= 16 ±5 and VHI-E= 14 ±4) (figure3).

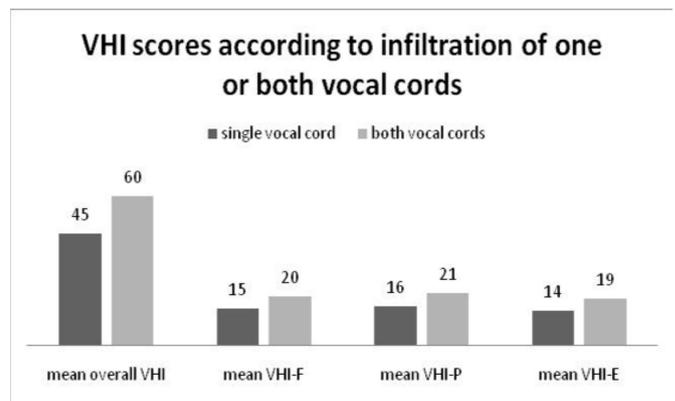


Figure 3 : VHI scores according to infiltration of one or both vocal cords

Patients who underwent a unique laser session had a mean overall VHI score equals to 44 ±11 (VHI-F= 15 ±4, VHI-P= 15 ±4, VHI-E= 14 ±5). Patients who required 2 and more laser sessions to achieve local control had an overall mean VHI score equals to 62 ±8 (VHI-F= 20 ±2, VHI-P= 23 ±3, VHI-E= 19 ±4) (figure4).

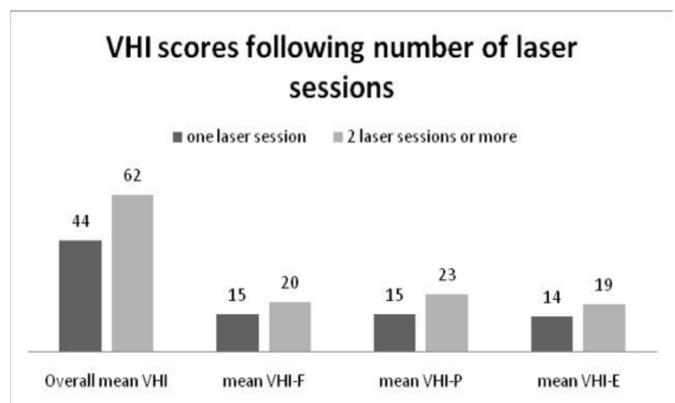


Figure 3 : VHI scores following number of laser sessions



Sixteen of our participants were older than 60 years. The mean overall VHI for these patients was 46 ± 14 (VHI-F= 14 ± 4 , VHI-P= 16 ± 6 and VHI-E= 16 ± 5). However younger patient had an overall VHI score equals to 48 ± 10 (VHI-F= 17 ± 4 , VHI-P= 17 ± 4 and VHI-E= 14 ± 3) (figure 5).

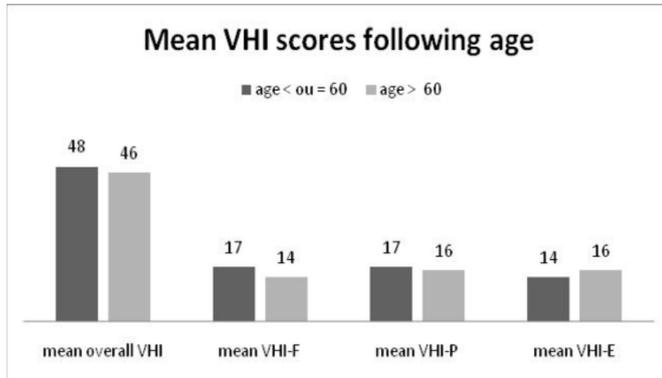


Figure 3 : VHI scores according to age

DISCUSSION

Unlike objective method based on physical analysis of the voice, the VHI is a patient-based self assessment tool. Its principal advantage is its ability to estimate the patient’s self satisfaction of his voice. However, this score cannot reflect the physical modifications in the vocal cord function after surgery.

In this study the VHI score was calculated at different delays after laser resection. The mean delay was 29 months. Loughran et al [9], followed the same approach in a retrospective study evaluating the voice outcomes using the VHI score in patients treated for early laryngeal SSC by TLM and RT. The mean delay between surgery and performing the questionnaire was 9 months for these authors.

Due to the retrospective nature of the study, in no case, pre operative VHI score was calculated. We recognize this as a principal weakness in our study. In fact, in a report of the vocal results in 57 patients after TLM by Lee et al [10], the VHI score was calculated before surgery then in the mean (8 to 13 weeks) and the late (6 to 61 months) post operative period. This approach is more interesting as it compares the voice quality before and after surgery and shows its evolution during time. The optimal time to collect the VHI score after surgery remains controversial. In fact the voice quality presents a deterioration in the early post operative period (< 3months) than an amelioration and stabilization up of the 6th month [11, 12].

The overall VHI score in our series was 47 ± 14 . In a study of the functional results in 11 patients after extended laser cordectomies (type III, IV and V), Mendelsohn et al found a mean overall VHI score equals to 43.82 ± 25.56 in the early post operative period (< 4months) [12]. This score passes to 23.56 ± 13.76 in the late post operative period (>6months). Lee et al [13], studied the voice outcomes in 57 patients after TLM (10 type I cordectomies, 11 type II, 21 type III, 1 type IV and 14 type V). The mean overall pre operative VHI was 34.6 ± 28.81 . However this score was respectively 43.74 ± 29.88 and 32.23 ± 28.79 in the early and late post operative time [13]. Chu et al [11], in a study including 25

patients (2 type I cordectomies, 11 type II, 5 type III, 4 type IV, 2 type V and 2 type VI), found a mean overall total VHI equals to 29.2 ± 20.6 [11]. This score passes to 35.3 ± 24.2 the first month after surgery, 30.1 ± 23.8 three months after surgery, 18.5 ± 17.8 six months after surgery and 15.3 ± 14.2 one year after surgery. Kasper et al reported a mean VHI score equals to 38.9 ± 26 [14]. These results are summarized in table 1.

Tableau : Mean overall VHI scores following the series

Series	Mean overall VHI scores			
	Mean overall VHI	VHI-F	VHI-P	VHI-E
Our series	47	15	17	15
Mendelsohn et al ⁽¹²⁾	23,56	-	-	-
Lee et al ⁽¹³⁾	32,23	11,14	10,79	12,43
Chu et al ⁽¹¹⁾	15,3	5,9	6,7	2,7
Fink et al ⁽¹⁵⁾	22,86 (limited cordectomies) 39 (extended cordectomies)	-	-	-
Loughran et al ⁽⁹⁾	22,2	-	-	-
Kasper et al ⁽¹⁴⁾	38,9	-	-	-

Only extended cordectomies (type III, IV and V) were performed in this series. Mean VHI scores were 26 ± 6 , 43 ± 5 and 53 ± 4 respectively in type III, IV and Va. The mean VHI-P was relatively higher compared to the mean VHI-F and the mean VHI-E. This could be explained by the glottal airflow due to the loss of glottal competence after important resection of soft tissue. This was demonstrated by Mendelsohn et al by the measurement of the MPT (maximum phonation time) as they found a significant decline in MPT which passes from 10.42 s to 6.25 s after TLM [12]. Fink et al [15], evaluated the VHI scores of 26 patients treated by TLM (7 type I, 3 type II, 12 type III and 4 type V). They reported an amelioration in the VHI scores in cases of limited cordectomies (preoperative mean overall VHI = 38 ± 25.02 , postoperative mean overall VHI = 22.86 ± 20.11). However, they reported a deterioration in cases of extended cordectomies (preoperative overall mean VHI= 33.5, post operative mean overall VHI= 39). These results are summarized in table 2.

Tableau : Mean post operative VHI scores following type of cordectomies

Series	Mean post operative overall VHI scores	
	Limited cordectomies	Extended cordectomies
our series	-	47 ±14
Lee et al ⁽¹³⁾	20,71 ±26,84	37,6 ±28,51
Fink et al ⁽¹⁵⁾	22,86 ±20,11	39
Chu et al ⁽¹¹⁾	11,2 ±4,8	25,9 ±4,8
Mendelsohn et al ⁽¹²⁾	-	23,56 ±13,76

Four patients underwent laser resection for T1b tumours (both VC infiltrated). The mean overall VHI was 60 ± 10 which is clearly lower than the mean overall VHI in case of a single VC infiltration (VHI = 45 ± 12). In fact, extended resection to the contralateral VC or the anterior commissure means more loss of tissue which is as previously seen



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