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Original Article

Transoral laser surgery for the upper aerodigestive tract: A C Camargo Hospital initial experience

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Abstract

Background: Endoscopic laser surgery has been presented as a viable option for head and neck tumor resection. Among its advantages we may include fewer complication rates, shorter hospital stay and similar oncological results in selected cases when compared to conventional therapy. **Objective:** The aim of this report the initial experience of our service with endoscopic laser surgery in head and neck. **Patients and Methods:** From June, 2002 to October, 2003, 55 patients underwent transoral laser surgery. They were 9 females and 46 males. The most common site was the glottis, accounting for 38 patients (69.1%), followed by oral cavity and oropharynx, 7 patients (12.7%); the supra-glottis, 5 patients (9.1%) and hypopharynx, 5 patients (9.1%). Forty-nine patients (89.1%) had just one surgical procedure, while the other six had between two and five surgical procedures. **Results:** Twenty-six patients presented malignant tumours, the most common histological type was squamous cell carcinoma (24 patients). Four were submitted to simultaneous neck dissection. Twelve patients (21.8%) required a tracheotomy and five (9.1%) a feeding tube, due to the surgical procedure. In patients without malignant lesions, the most common were papillomas, 6 cases (20.7%), followed by vocal cord hyperplasia in 4 patients (13, 8%). Other diagnoses were pharyngeal stenosis, benign tumors, vocal cord cysts or nodules and vocal palsy. The complications rate in our series for transoral laser surgery was 14.5%. The most common complications were post-operative symptomatic aspiration and bleeding in three patients each (5.5%). **Conclusions:** Transoral laser resection is an effective procedure that has becoming widely accepted as a therapy of choice for selected head and neck neoplasms, mainly due its advantages over the conventional therapy which include fewer complication rates, avoidance of tracheotomy and shorter hospital stay.

Key words: Head and Neck Neoplasms. Surgical Procedure, Operative. Laser Surgery.

Introduction

Since the introduction of CO2 laser in laryngeal surgery four decades ago[1], its use in head and neck oncology has been progressively expanded worldwide. Most experiences describe several advantages for laser surgery over conventional therapy (radiotherapy or open surgery); such as shorter duration of therapy, fewer side effects, lower morbidity and higher cost-effectiveness.[2] The reported functional results are usually encouraging and since no disruption of the cartilaginous skeleton occurs, the tracheotomy is not always necessary. The hospitalization is usually shorter, and it is possible to save options for salvage therapy (surgery and/or radiotherapy).[3,4] Finally, the minimum disturbance of the Reinke's space allows for superior epithelial regeneration and decreased risk of perioperative edema and bleeding.[5,6]

Currently, indications for laser surgery are selected cases of T1 and T2 tumours of the larynx, oropharynx and oral cavity as well as some benign

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conditions of the upper aerodigestive tract, for example, papillomas, vocal cord cysts and benign tumors.

The main objective of this paper is to report our initial experience with the use of the CO2 laser in transoral surgery of the upper aerodigestive tract.

Patients and Methods

Fifty-five patients were submitted to CO2 transoral laser surgery from June, 2002 to October, 2003. A retrospective analysis of these cases was performed by reviewing their medical charts. All pathologic analysis was performed by the institution's pathology staff.

The surgical procedures were performed using a CO2 laser (Laserscope, USA) which was coupled to an operating microscope (Carl Zeiss, USA), and was set to an output power between 12 and 15 watts. The laser was only used in pulse mode, with a microspot of 250 uðm. All patients underwent surgery under general anaesthesia. The surgical procedures were performed by attending surgeons of the Department of Head and Neck Surgery and Otolaryngology. Patients submitted to laser transoral based on literature recommendations, e.g., lesions that could be adequately exposed surgery were selected transorally and also for malignant lesions those which resection could be complete allowing a good oncological result (mainly initial stage lesions).[13]

According to oncologic surgery principles, there was a clear preference for en bloc removal of neoplasic lesions. Only a small number of tumors were removed in a piecemeal fashion. In all patients with neoplasic lesions, surgical evaluation of the margins was performed during surgery by frozen section. Based on clinical evaluation and on radiology reports, all patients with malignant disease were staged according to the 2002 AJCC staging criteria.

Statistical analysis was performed using SPSS v.10.0 for Windows. The association between categorical variables were analyzed using the Fisher's exact test. Statistical significance was achieved for p-values<0.05

Results

There were nine females (16.4%) and 46 males (83.6%) in our study group, with ages ranging from 20 to 89 years (median, 60.5 years).

The most common site was the glottis, accounting for 38 patients (69.1%), followed by oral cavity and oropharynx, 7 patients (12.7%); the supra-glottis, 5 patients (9.1%) and hypopharynx, 5 patients (9.1%). Sixty-six surgical procedures were performed in these patients. Forty-nine patients (89.1%) had just one surgical procedure, while the other six had between two and five surgical procedures. The average time of hospitalization was 2.3 days (median, 2 days).

Surgery for malignant neoplasm

There were 26 cases of malignant tumours, of which 24 were squamous cell carcinomas, one sarcoma and one melanoma. Among them, 7 patients (26.9%) had already been submitted to a previous oncologic treatment. According to clinical stage, 2 patients were staged as Tis; 7 were T1a; 3 were T1b; 10 were T2; 1 was staged as T3 and 1 patient has no information on T stage (Tx). One patient presented a metastatic melanoma to the vocal chord that was resected and 1 patient had recurrent sarcoma and was submitted to a palliative procedure. All patients presented no cervical lymph nodes (N0). In three patients, the surgical margins were considered positive, but in two of them the resection had only palliative intent. Four were submitted to simultaneous neck dissection. Twelve patients (46.2%) required a tracheotomy and five (19.2%) a feeding tube, due to the surgical procedure. The size of the pathological specimens for patients with malignant neoplasms ranged from 0.5 to 3.2 centimeters, with a mean size of 1.8 centimeters. Detailed information for all cases regarding tumor characteristics as well as follow-up information are described on Table 1.

Surgery for benign neoplasm/condition

Among the benign lesions, the most common were papillomas, accountig for six patients (20.7%), followed by vocal cord hyperplasia in 4 patients (13,8%). Other diagnosis were pharyngeal stenosis,

Table 1 – Description of cases regarding tumor characteristics, treatment intention and follow-up information

Case	Site	Histol	T stage	Intent	FU	Status
1	G	SCC	Tis	C	19.1	Rec
2	G	SCC	Tis	C	39.4	NED
3	G	SCC	T1a	C	24.7	NED
4	G	SCC	rT1a	C	26.4	NED
5	E	SCC	T1a	C	22.8	NED
6	G	SCC	T1a	C	40.6	NED
7	G	SCC	T1a	C	27.1	NED
8	G	SCC	rT1a	C	23.6	NED
9	G	SCC	T1a	C	29.1	NED
10	G	SCC	T1b	C	20.5	NED
11	G	SCC	T1b	C	17.9	NED
12	G	SCC	rT1b	C	18.7	NED
13	E	SCC	rT2	C	23.2	NED
14	Pl	SCC	T2	C	20.6	NED
15	G	SCC	T2	C	36.6	NED
16	E	SCC	T2	C	34.1	NED
17	G	SCC	T2	C	25.3	NED
18	O	SCC	T2	C	32.8	NED
19	G	SCC	T2	C	17.5	NED
20	G	SCC	rT2	C	18.5	NED
21	G	SCC	T2	C	28.2	NED
22	G	SCC	T2	C	27.1	NED
23	G	SCC	rT3	C	6.2	LFU
24	G	SCC	rTx	C	21.7	NED
25	O	SPM	Rec	P	–	–
26	L	Mel	Met	P	–	–

Legend: G – Glottis; E – Epiglottis; O – Oropharynx; L - LarynxSPM – sarcoma; Mel – melanoma; Pl – palate; Rec – recurrent; Met – metastatic; C – curative; P – Paliative; FU – follow-up in months; NED – no evidence of disease; LFU – lost to follow-up

benign tumors, vocal cord cysts or nodules and vocal palsy.

For patients with benign conditions, the most perfomed surgeries were: resection of papillomas, leukoplasia or vocal cord cysts or benign tumors in 16 patients, followed by sinequiae lisis and pharyngeal ampliation in 6 patients, vocal cord decortication in 3 patients, treatment of pharyngeal stenosis in 3 patients and cordectomy in 1 patient. The mean size of the resected specimen, ranged from 0.4 to 4.0 centimeters (mean, 1.4 centimeters).

The postoperative complications rate in our series for transoral laser surgery was 14.5%. The most common complications were symptomatic aspiration (3 cases – 5.5%) and bleeding (3 cases – 5.5%). One patient presented subcutaneous emphysema and one patient developed a subglottic stenosis, and underwent a postoperative tracheotomy. We did not observe differences in the complication rates according to the diagnosis of malignancy (p=0.291). Regarding the patients with malignancy, there was no significant difference also for patients with previous treatment (p=0.589) (Table 2). However, the simultaneous neck dissection significantly affected the complications rate in patients with invasive carcinoma treated with curative intent (p=0.018) (Table 3).

Table 2 – Complications rate for transoral laser surgery regarding histology and previous treatment

	Postoperative complications				
	No		Yes		
	n	%	n	(%)	p
Histology					
Benign	26	90	3	10	0.455
Malignant	21	81	5	19	
Previous treatment					
No	32	84	6	16	1.000
Yes	15	88	2	12	

Table 3 – Complications rate for transoral laser surgery regarding patients with invasive carcinoma treated with curative intent and neck dissection

	Postoperative complications				
	No		Yes		
	n	%	n	%	p
Neck dissection					
No	18	90	2	10	0.018
Simultaneous	1	25	3	75	

Discussion

Although laser surgery is not the first therapeutic option for upper aerodigestive tract carcinomas in most centres nowadays, its use is increasing steadily. This happens mainly due to its beneficial effects to the patient, including shorter operative time and hospital stay, low complication rates, tracheotomy avoidance, better functional results and lower costs [2]. However, the efficacy of transoral laser surgery for the management of carcinomas from the upper aerodigestive tract is controversial.

In patients with T1 glottic carcinomas, the local recurrence rate after laser therapy has been between

6 and 11 %. These rates are similar to those reported with radiotherapy or open surgery.[3,6] Radiotherapy has been the mainstay of treatment for carcinoma *in situ* of the vocal folds, but encouraging results of transoral laser surgery for these tumours have been published in recent years.[8,9] As presented in Table 4, the published results of single institution series, show a low recurrence rate with this procedure, comparable with the results previously published for radiotherapy. Another advantage for transoral laser resection of glottic carcinomas is the higher rate of larynx preservation for T2 lesions, with a comparable rate of primary control.[10]

Table 4 – Results of previously published series regarding transoral laser surgery

Author	Year	Patients	T stage	Survival	Local recurrence n (%)
Eckel	1992	67	T1-T2	100	6 (9)
Steiner	1993	130	T1-T2	100	10(8)
Rudert	1995	106	T1-T2	100	10(9)
Spector	1999	61	T1	95	14(23)
Peretti	2000	140	Tis-T1-T2	98	28 (20)
Moreau	2000	97	T1-T2	97	0 (0)
Total		601	Tis-T1-T2	98.5	68 (11)

There is less experience in the use of transoral laser surgery for oral cavity/oropharynx carcinomas, but preliminary results show a comparable rate of local control and survival in tumours that do not infiltrate the mandible.[11]

Another controversy is the en bloc removal of the tumour or its resection in a piece meal manner. According to results previously published in the literature, the en bloc resection is considered technically more difficult and the oncological results of both techniques are comparable.[12] In our series, a complete, en bloc resection of the tumour was possible in most cases, with adequate surgical margins.

The proposal of delayed neck dissection in patients submitted to laser excision of larynx neoplasms is also controversial. The main arguments favouring it were a lower complication rate of in patients not submitted to simultaneous and comparable rates of loco-regional control and overall survival. A number of advantages are pointed out for the performance of delayed neck dissection. The patients recover faster; functional rehabilitation, specially swallowing, is improved and the aspiration rate is lower. An elective neck dissection may be delayed for as much as 4-6 weeks; otherwise, it's usually performed after 4-8 days.[13]

The last point presented as a potential advantage of transoral laser surgery is the lower cost when compared to radiotherapy. The treatment is usually complete in a single session, allowing for an earlier patient return to work, the costs for rehabilitation are usually lower, since the complications rate are infrequent and the functional disturbances are minimum.[2]

Transoral laser surgery has also been used for the treatment of benign conditions. Patients with laryngeal papillomatosis are usually submitted to multiple surgeries due to the the risk high recurrence rate of the disease. The laser achieves vaporization of the lesions using a non-touch technique and with synchronous hemostasis, reducing the harm risk to the vocal chords and of getting scars on them. In a review of 200 patients with respiratory papillomatosis, a tracheotomy was avoided in 99% of the cases. The lesions are slowly vaporized until healthy mucosa is reached, avoiding entrance into Reinke´s space.[14]

Conclusion

Endoscopic transoral resection of malignant neoplasms is effective in terms of oncological results, yelding results comparable to open surgery or radiotherapy.

Due to its main advantages are the quality of life, avoidance of tracheotomy and shorter hospital stay; it's becoming widely accepted as a therapy choice for selected head and neck neoplasms.

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