

Diode laser microsurgery; a recent treatment for laryngeal cancer: Mosul experience

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ABSTRACT

Objective: To evaluate the results of treating laryngeal squamous cell carcinoma using diode laser.

Design: Prospective study.

Setting: Department of ENT-Al Jamhuri Teaching Hospital.

Patients and Methods: Thirty one cases of squamous cell carcinoma of the larynx with age range between 32-66 years. The stage of tumour was Tis: 3, T1: 12, T2:14, & T3:2 cases. Lesions were excised or evaporated using diode laser with safety margin and followed for at least 36 months to evaluate cure rate, recurrences and its relation to site and stage of tumour, need for tracheostomy, complications and quality of voice.

Results: Diode laser was highly effective in treating early laryngeal cancer. Cure rates after 36 month follow up were 100%, 92% & 78% for Tis, T1 & T2 respectively. For more advanced lesions (T3), the role of laser was limited only for debulking to avoid tracheostomy or biopsy taking in deep seated tumours as alternative to open biopsy. No major intraoperative or postoperative complications happened and no tracheostomy needed. Patients were discharged after twenty four hours. Voice quality was good after surgery in most cases.

Conclusion: Diode laser is safe in treating squamous cell carcinoma of the larynx and highly effective in early stages (Tis, T1, T2) and can avoid tracheostomy or open biopsy in more advanced lesions.

Key words: Diode laser, squamous cell carcinoma of the larynx.

الخلاصة

الهدف: لبيان نتائج علاج ورم الحنجرة الحرشفي باستخدام الليزر .
التصميم: دراسة مستقبلية .

موقع العمل: ردهة الحنجرة - المستشفى الجمهوري التعليمي بالموصل .

الحالات والمداخلات الإجرائية: تم استئصال ورم الحنجرة باستخدام الليزر في ٣١ حالة تتراوح أعمارهم بين ٣٢-٦٦ سنة . وكانت مراحل المرض كما يلي Tis: 3, T1: 12, T2: 14, T3: 2 وتمت متابعة المرضى لمدة ٣٦ شهراً على الأقل لإيجاد نسبة الشفاء ، والحالات التي عاود بها المرض ظهوره ، وعلاقة ذلك بمرحلة المرض وموقعه في الحنجرة ، والحاجة إلى عملية فتح الرغامى والمضاعفات الأخرى وتأثير العملية على صوت المريض .
النتائج: وجد الليزر ذو كفاءة عالية في علاج ورم الحنجرة في مراحله المبكرة ، بينما كان دور الليزر مفيداً في إنقاص حجم الورم أو لأخذ خزعة لتجنب فتح الرغامى أو عملية فتح الحنجرة . لم تحدث أية مضاعفات كبرى أثناء أو بعد العملية ولم يحتاج أي من المرضى لفتح الرغامى وكان الصوت جيداً في معظم المرضى .

الاستنتاج: إن الليزر آمن وفعال جداً في علاج ورم الحنجرة الحرشفي خاصة في المراحل غير المتقدمة للمرض . ويمكننا من تجنب عملية فتح الرغامى أو فتح الحنجرة في المراحل الأكثر تقدماً .

The theoretical foundation for laser was postulated by Einstien in 1917. He proposed the idea of stimulated emission which was new to science^(1,2). Had not this new found energy source been harnessed and focused, it would have remained little more than a surrealistic romantic product of atomic

physics⁽³⁾. Laser was a vision of the 1950s, an evolution of the 1960s, and a clinical reality of 1970s. In spite of slow initial acceptance of this new treatment modality, there has been increased interest relative to broadened spectrum of clinical application; the basic medical advantage of laser surgery includes non-contact, dry field,

highly sterile, very localized operation with clear field of view⁽³⁾. It has been said that when the time in which we live is finally named, it will be known as (Laser age) rather than atomic or space age .

The aim of this study is to find the advantage of using diode 25 laser in treating laryngeal cancer.

PATIENTS AND METHODS

Thirty one cases of squamous cell carcinoma of the larynx aged between 32-66 years were treated with diode -25 laser excision (Figure 1), through endoscopic microsurgery technique under general anesthesia without tracheostomy at the Departement of otolaryngology- Al Jamhuri teaching hospital over two years period (2000-2002). C-T scan and MRI were done

whenever needed to show the degree of tumour invasion.

Lesions were excised or evaporised with safety margin as much as the field permits. At the end of operation multiple biopsies were taken from the margin of cut for histopathological examination to confirm that disease free margin has been achieved. If biopsy was positive for malignant cells, another laser session was done.

Laser was the initial treatment in 25 cases, and following recurrence after radiotherapy in 6 patients.

All cases were discharged 24 hours after surgery and no major complication happened and no tracheostomy needed.

Table 1 shows the number of cases according to site and stage.



Figure (1): The Diode laser instrument

Table (1): Number of cases according to site and stage.

Stage	site	Number of cases	Total
Tis	Upper surface of vocal cord	3	3
T1	Vocal cord	8	12
	Aryepiglottic fold	1	
	Anterior commissure	1	
	Posterior surface & tip of epiglottis	2	
	Vocal cord with lateral extension.	4	
T2	Vocal cord with anterior commissure.	6	14
	Vocal cord with subglottis	4	
	More than one region with fixed cord	2	
T3	More than one region with fixed cord	2	2

Cases were followed up by indirect and fiberoptic laryngoscopy under local anesthesia monthly for at least 36 months and direct laryngoscopy and biopsy was done to any suspicious lesion which appears during the period of follow up. Recurrence was treated by another laser session or other treatment modality according to case. The quality of voice was noticed in all patients after surgery as well as the appearance of any lymph node or distant metastasis.

RESULTS

The mean age was 56 years. The number of patients who were free of disease after at least three years follow up according to stage of tumour is given in (Table 2). It is apparent that results were very good in early stages tumours (Tis, T1, T2), while

the role of laser in more advanced tumours (T3) was only limited for debulking or biopsy taking. The recurrence of tumour in relation to the site of lesion is shown in (Table 3) for T1 and T2 stages, which was 9% and 21% respectively, being highest when anterior commissure was involved. Out of the six cases when laser was done after recurrence following radiotherapy, tumor recurred in a single case after laser excision (16%). When laser was the initial treatment, recurrence was 24%. There was no death in this series and no major intraoperative or postoperative complication, and no tracheostomy needed. No nodal or distant metastasis were noticed during follow up period in all patients. Following surgery, voice quality was good in 22 cases and persistent hoarseness in the other 9 cases.

Table (2): Number of cases free of disease in relation to stage.

Stage	Number of cases free of disease after 36 months	
	number	%
Tis	3/3	100%
T1	11/12	92%
T2	11/14	78%
T3	0/2	0%
Total	25/31	81%

Table (3): Number of cases with recurrent disease in relation to site.

Stage	Site	Total number of cases	Number of cases with recurrent tumour	%
T1	Vocal cord	8	1	12.5%
	Aryepiglottic fold	1	0	0%
	Anterior commissure	1	0	0%
	Posterior surface and tip of epiglottis	1	0	0%
T2	Vocal cord with lateral extension	4	1	25%
	Vocal cord with anterior extension	6	2	33%
	Vocal cord with subepiglottic extension	4	0	0%

DISSCUSSION

In general there are three major laser types used in surgical application; argon, CO₂, and Nd:YAG⁽³⁾. Most workers use CO₂ laser in treating laryngeal conditions⁽⁴⁻¹²⁾. Its advantages are minimal injury to surrounding tissue and minimal postoperative oedema, so there is less chance of postoperative airway complications⁽²⁾.

In this study and few others^(13,14) diode laser was used for surgery, which incorporates class IV Ga AlAs (Gallium, Aluminum, Arsenic) diode laser with wavelength in range of 790-830nm, the energy being delivered to the treatment site by means of flexible optical fibres⁽¹⁵⁾.

The total control rate of early laryngeal tumours (Tis, T1 & T2) was about 85% with complete absence of disease after a minimum of thirty six months' follow up. A similar result, and up to 100% cure rate had been achieved by other workers^(4,7,13,16).

Mendenhall et al⁽¹⁷⁾, reviewed a large literature to compare results of laser excision, open partial laryngectomy, and radiotherapy in treating T1 and T2 glottic cancer. He concluded that local control, laryngeal preservation and survival rates were similar after all three types of treatment but voice quality was poorer with open method and was more costly⁽¹⁷⁾.

Maurizi et al⁽¹⁸⁾ found a significantly better survival rate in a group of patients treated with laser over open partial laryngectomy. They stressed the advantage of laser in leaving the laryngeal cartilaginous framework intact avoiding the spread of tumour out of laryngeal organ resulting in more favourable oncologic outcome.

Although results of laser and radiotherapy in treating early laryngeal tumours are almost similar, there is attraction to avoid radiation especially in younger persons when a sufficient length of life remains, during which the risk of radiation induced or other cancers is significant⁽¹⁾.

The role of laser in more advanced lesions, namely T3 and T4, seems to be limited in debulking of tumour causing stridor or biopsy taking in deep seated tumours to avoid tracheostomy or open biopsy through laryngofissure. Although tracheostomy effectively solves the problem, it can be associated with complications and irreversibility in most patients⁽¹⁹⁾. Peristomal recurrence after total laryngectomy is a serious complication, is uniformly fatal, and is more common if tracheostomy preceded the major surgery⁽¹⁾.

The impact of anterior commissure involvement on recurrence rate was controversial in different studies^(5,21); the recurrence rate in this study was found to be highest when this site was involved by lesion. In spite of this the local control of the tumour seems to be affected more by stage of tumour rather than its site within the larynx^(4,5).

Puxedde et al⁽⁴⁾ reviewed results of treating 12 patients with cancer affecting different supraglottic sites and found 100% local control in T1 and T2 tumours after 33.3 months follow up. Motta⁽⁶⁾ treated 124 patients with supraglottic cancers by laser microsurgery and found it highly effective in T1 and T2 supraglottic cancer, but advised that it should be implemented in T3 for cases when radical excision by endoscopic route is feasible due to relatively higher recurrence in this group⁽⁶⁾.

The quality of voice after laser excision in this study was good. Brondbo et al⁽²¹⁾ stressed the importance of good surgical technique to obtain good functional results. He suggested that laser should be kept low and the surgical margin small in order to minimize scarring and vocal cord stiffness⁽²⁰⁾.

Some studies showed that voice quality decreases significantly once the body layer is injured⁽²³⁾. Peretti et al⁽²³⁾, on the contrary, found no statistically significant difference between patients submitted to subepithelial and subligamental cordotomies and control.

CONCLUSION

Endoscopic diode laser is safe and effective in treating squamous cell carcinoma of the larynx. Results of this study show that more than 85% of cases were free of disease after 36 months follow up in early stages (Tis, T1 & T2). Its role in more advanced lesions (T3) was for debulking or biopsy taking, thus avoiding tracheostomy or open biopsy. There were no major complications and good voice was preserved in most patients.

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