CO₂ LASER - A NEW TOOL IN THE SURGEONS ARMAMENTARIUM

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ABSTRACT

One hundred and sixty five patients, treated with carbondioxide (CO₂) laser for benign and malignant lesions of the head and neck were studied. Alveolo-buccal complex (68/165) had the majority of benign and malignant tumors followed by larynx (23/165) and tongue (21/165). All lesions were widely excised, none were reconstructed and all defects healed well with minimal scarring. The post-operative morbidity was minimal and the hospitalization period was 1 to 5 days. Complications were not serious and could be managed easily. This study confirms the usefulness of CO₂ laser surgery for both benign and malignant conditions in head and neck.

MJAFI 1998; 54: 3-5

KEYWORDS : Carbondioxide laser; Head and neck; Malignant neoplasm; Premalignant lesions.

Introduction

The main aim of managing the disease is to eradicate it without leaving any untoward effects. To achieve this, energy in its various forms is tamed. In this endeavour, we have come across the traditional knife, electrocautery, cryoprobes, and now laser. Carbon dioxide laser by its tissue friendly nature and by its ability to be coupled with the microscopes has opened up new vistas in open and endoscopic surgery.

CO₂ laser was first reported in 1964 [1]. CO₂ laser incision was reported to be free of viable cells in 1976 [1], and this paved the way for the safe use of CO₂ laser for malignant lesions.

Material and Methods

This study was carried out in Head and Neck unit at Tata Memorial Hospital, Bombay, during the period Jan 1993 to Dec 94. CO₂ laser machine SHARPLAN, was used along with operating microscope with 400 mm and 300 mm lenses. Blackened, matt finish instruments were used in this study.

One hundred and sixty five patients with benign and premalignant lesions of head and neck regions especially of the alveolo-buccal complex, oral cavity, larynx and upper trachea were included in this study. Patients with early malignancies, viz., T-1 lesions and selected T-2 lesions of the same regions and hypopharynx were operated upon with CO₂ laser. Selected cases of advanced carcinomas (T-3 lesions) and post radiotherapy recurrences of glottic, supra glottic and pyriform fossae were also operated upon.

All lesions were excised widely and frozen section control of

cut margins and base of excision was utilized for all malignant lesions. The excised tissue was properly marked for orientation to facilitate histopathological evaluation.

The patients were followed up periodically once in a month for 3 months, once in 2 months for 1 year and once in 3 months after that. Some patients required multiple sittings and some required follow up examination at shorter periods.

In buccal and oral cavity, anterior and small lesions were excised under local anaesthesia and were discharged home the same day. Posterior and large lesions were excised under general anaesthesia and were sent home after 5 days. Post-operatively the patients were given frequent chlorhexidine mouth washes for 3 weeks, and liquid diet orally or by ryles tube for 7 days depending upon the location and extent of excision. None of the patients were given antibiotics or analgesics. All raw areas were kept open and allowed to heal by epithelialization from the margins of resultant ulcer. Even excisions from larynx, pyriform fossa and base tongue were done without subjecting them to tracheostomy.

Results

Total number of patients who underwent CO₂ laser surgery were 165. The breakdown of various diseases region wise and disease wise as given in the Table. In the premalignant lesions, maximum number of cases were of alveolobuccal complex (35/67). Lesion wise breakdown of these, revealed leukoplakia (51/67) being the commonest followed by melanoplakia (10/67) and erythroplakia (6/67).

In the malignant lesions, again, majority of cases were of alveolo-buccal complex (33/62). In the benign lesions, multiple juvenile papillomatosis of larynx (10/24) formed the bulk, followed by vocal nodules (6/24). Region wise breakdown revealed majority of the cases to be from vocal cords (16/24) followed by tongue (5/24) and alveolo-buccal complex (3/24).

Majority of miscellaneous lesions were laryngotracheal

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stenosis (5/12). Complications were (16/165), secondary haemorrhage (7/16), reactionary haemorrhage (6/16), laryngeal webs (2/16) and primary haemorrhage (1/16). All the excisions of buccal and oral cavities healed in 2 to 4 weeks and in larynx and hypopharynx by 1 to 2 weeks depending upon the extent of excision.

TABLE 1
Distribution of cases

Premalignant lesions (n=67)	
Alveolo-buccal complex	35
Vocal cord	15
Tongue	12
Others	5
Malignant Lesions (n=62)	
Alveolo-buccal complex	33
Tongue	9
Vocal cord	8
Palate	5
Hypopharynx	2
Others	5
Benign lesions (n=24)	
Papillomatosis larynx	10
Vocal nodules	6
Haemangiomas	5
Verrucous lesions	2
Lingual thyroid	1
Miscellaneous lesions (n=12)	
Laryngotracheal stenosis	5
Skin nodules	3
Neck wounds	2
Mycosis fungoides	1
Ranula	1

Discussion

Majority of the cases were of premalignant or malignant lesions of head and neck. This is due to the fact that the institution where the study was conducted basically deals with cancer patients.

Alveolo-buccal complex was the foremost in the premalignant and malignant lesions. This commensurates with the prevalence of tobacco usage by chewing, smoking and keeping the quid in the buccal cavity in population. Another reason is that this region claims about 30 to 40 per cent of all the head and neck cancers. This region is also easily inspected and palpated by the patient himself and hence presents relatively early.

Leukoplakias were excised widely and 13 per cent of them revealed unsuspected small foci of in situ or superficially invasive squamous carcinomas. The ability to excise even big lesions, and multiple lesions without any reconstruction prompts the surgeon to perform excision biopsies rather than wedge biopsy or multiple biopsies with supravital staining. These later

procedures can sometimes miss early carcinomas, which is avoided by performing excision biopsy and thereby indirectly preventing advanced cancer.

In the malignant lesions of alveolo-buccal complex and tongue as there is no skin graft or flap covering the base of excision, recurrences at the margin or base will be detected very early and can be further widely excised. With grafts and flaps in situ, recurrences are bound to be fairly advanced by the time they are detected and may not be amenable to local excisions.

Laser provides a no touch technology with micro precision and excellent haemostasis [3]. The resultant bloodless field allows proper assessment of tissues during dissection which facilitates adequate excision. In the benign and malignant lesions of larynx, open surgery, laryngeal stenting, tracheostomy and post-operative aspiration were avoided reducing the morbidity without compromising oncological principles. In only one case of recurrent carcinoma of pyriform fossa, the neck had to be opened to ligate the superior laryngeal artery as it could not be controlled with laser as well as the coagulating diathermy endoscopically.

In the multiple juvenile papillomatosis of larynx, CO₂ laser allows precise removal of laryngeal papillomas without bleeding and postoperative oedema and it is possible to avoid tracheostomy [4]. In our study of 10 cases, 3 cases who reported without prior tracheostomy could be treated without tracheostomy. Among the rest of 7 cases, 5 could be decannulated.

All 8 malignant lesions of larynx belong to T1 and T2 stage and were excised with good margins. All the raw areas healed well with good voice. None were subjected to tracheostomy. Steiner [5] also opined that CO₂ laser surgery gives excellent results in stage 1 glottic cancer with better quality of voice. He also opined that CO₂ laser can easily be extended safely to all T2 and selected T3 or T4 laryngeal resection and thus obviating the need for total laryngectomies [6].

Histopathological evaluation of specimens did not pose any constraint or compromise because charring was kept to the minimum by proper lasing technique. Hence, for effective use of laser, it is essential that the surgeon is conversant with these technicalities.

All the patients were on oral or ryles tube feeds by the first post-operative day and were discharged to home by next day and in major resections by fifth or sixth day. No patient had to undergo tracheostomy and none were given antibiotics or analgesics. All these factors immensely reduced the morbidity, hospitalization period, requirement of medicines, loss of precious man hours and has relatively increased the bed avail-

ability in a country like ours where resources are at a premium.

Complications were not serious. Most could be managed easily except for the laryngeal webs which occurred in patients who had undergone prior tracheostomy elsewhere for stridor. Prior Tracheostomy prevented passage of air between the vocal cords resulting in formation of synechiae leading to laryngeal webs. These webs were excised with laser in stages and patients were extubated finally.

Thus CO₂ laser has improved the precision of surgery by bloodless field and minimal tissue trauma. In contrast with radiotherapy, there is no cumulative effect and hence can be repeated. CO₂ laser reduces the residual cancer cells to the minimum so that immune system or further adjuvant therapy can tackle it effectively. CO₂ laser surgery reduces the morbidity, hospitalisation period and increases the availability of hospital beds. CO₂ laser thus is a tool which would be an asset to any hospital.

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