



OUR EXPERIENCE WITH 1ST TIME USE OF CO2 LASER IN OTOLARYNGOLOGY AND HEAD AND NECK SURGERIES IN KASHMIR VALLEY.

ENT

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ABSTRACT

Introduction: Co2 laser has been used for various indications in otolaryngology and head and neck surgery like laryngeal polyposis, laryngeal papillomatosis, arytenoidectomy, early laryngeal carcinoma, turbinate reduction in nose, stapedotomy in ear, oral cavity lesions, and LAUP (laser assisted uvulopalatopharyngoplasty)

Materials and Method: The study was prospective in design and was conducted in the department of ENT and Head And Neck Surgery, SMHS Hospital, GMC Srinagar, Jammu And Kashmir from January 2016 to June 2017. Aims and objectives of this study were: 1. To determine indications of CO2 laser in otolaryngological ailments of hospital attending population in Kashmir and 2. To study incidence of complications if any after CO2 laser surgery.

The patients' age and sex, pathology of the lesions in Otorhinolaryngology and head and neck region, type of surgery as well as any Intraoperative and postoperative complications were documented.

RESULTS: Total of 119 patients were studied. 45 patients of Benign, premalignant and malignant lesions of the larynx and 44 patients of oral cavity, oropharynx and hypopharynx were treated with CO2 Laser. In nose, reduction of inferior turbinates was done in 21 patients using CO2 laser. In ear primary laser stapedotomy was done in 7 patients and revision laser stapedotomy was done in 2 patients. No laser related complication occurred in any of the patients studied.

Conclusion: All patients with benign and early malignant lesion of larynx and oral cavity, symptomatic hypertrophic turbinates, primary and revision stapedotomies should undergo treatment with CO2 Laser.

KEYWORDS

CO2 LASER, Application, Complication

INTRODUCTION:

LASER is light, the term being an acronym for Light Amplification by Stimulated Emission of Radiation. CO2 lasers produce light with a wavelength of 10.6 micron in the infrared (invisible) range of the electromagnetic spectrum. The laser beam exits the end of the articulated arm and is delivered to the tissue via a handpiece, laser bronchoscope or a micromanipulator attached to an operating microscope. Laser settings are selected according to the type of tissue to be lasered (cartilage / muscle / mucosa), the desired depth of the laser cut, the need for haemostasis, and the need to avoid excessive heating of tissue. CO2 LASER has been used for various indications in otolaryngology and head and neck surgery. Because of the precise cutting and superficial well delineated effect of the CO2 laser, various benign lesions in phonosurgery, stenosis surgery, swallowing rehabilitation, and in the resection of most benign laryngeal tumors^{1,2,3,4,5,6}, precise excision of carcinoma in situ or early (T1) tumors, and vaporization of bulky obstructing carcinoma of the upper airway. Various laser systems have been used for the reduction of hyperplastic nasal turbinate's^{7,8}. CO2, lasers have been useful for ossicular surgery and particularly stapedotomy. Laser use in revision stapedotomy surgery offers significant advantages over conventional technique. When applied in the oral cavity and oropharynx, the CO2 laser is used mainly as a cutting instrument to remove benign and malignant lesions^{9,10,11,12,13}.

MATERIALS AND METHOD

- The study was prospective in design and was conducted in the department of ENT and Head And Neck Surgery, SMHS Hospital, GMC Srinagar, Jammu And Kashmir from January 2016 to June 2017 after obtaining ethical clearance. The aims and objectives of this study were:
 - To determine indications of CO2 laser in otolaryngological ailments of hospital attending population in Kashmir.
 - To study incidence of complications if any after CO2 laser surgery.
- The patients' age and sex, pathology of the lesions in otorhinolaryngology and head and neck region, type of surgery as well as any intraoperative and postoperative complications were documented.
- Sufficient informed consent and agreement in accordance with the Helsinki declaration was obtained from the patients. All patients were informed about the surgery, possible complications during surgery and post operative complications.

INCLUSION CRITERIA

- Benign and early malignant lesions of head and neck which can be treated with CO2 laser.
- Primary stapedotomies
- Revision Stapedotomies.
- Nasal lesions amenable to laser.

EXCLUSION CRITERIA

- Carcinoma larynx – stage 3 and stage 4.
- Large vascular malformations.

RESULTS:

Demography: The majority of patients were males (69%), among which 57% of patients belonged to rural areas. Majority of patients belonged to the age group of 46-60 years (35.2%) followed by 31-45 yrs (32%).

Stage wise Distribution of Malignant lesion in Larynx : Out of 119 patients operated with CO2 Laser 45 patients were having laryngeal lesions among which 18 patients were having Carcinoma larynx. Out of 18 patients with Ca Larynx 8 patients (44.44%) were having T1 lesions while 10 patients were having T2 lesion (55.6%)

TABLE I; Type of premalignant Lesions in Larynx

Type of premalignant Lesion	Number of patients n=9	Percentage
Hyperkeratotic Lesion	4	44.4%
Intra epithelial dyskeratosis	2	22.2%
Dysplasia	2	22.2%
Carcinoma in situ	1	11.11%
Total	9	100%

TABLE II; Type of Benign Lesions in larynx

Type of Benign Lesions	Number of patients n=18	Percentage
Bilateral vocal cord palsy	4	22.2%
Vocal cord polyp	3	16.6%
Laryngeal papillomatosis	3	16.6%
Supra glottic cyst	2	11.1%
Glottic web	2	11.1%
Vocal cord nodule	2	11.1%
Typical carcinoid	1	5.5%
Schwanoma larynx	1	5.5%
Total	18	100%

TABLE III; Procedure done in larynx

Type of procedure	Number of patients n=45	Percentage
Corpectomy	18	40%
Vaporization	17	37.7%
Laser assisted excision	06	13.3%
Kashima's procedure	04	8.8%
Total	45	100%

Type of Laser Corpectomy: Out of 18 patients, 4 patients(22.2%) underwent Type I corpectomy , 9 patients(50%) underwent Type II corpectomy ,4 patients (22.2%) underwent Type III corpectomy while 1 patient(5.5%) underwent Type IV corpectomy.

Stage of malignant Lesions in Oral cavity (tongue): Total number of patients with Carcinoma tongue operated were 4. 1 among them was having T1 lesion while 3 were having T2 lesion.

TABLE IV; Type of Benign Lesion in Oral Cavity , oropharynx and hypopharynx:

Type of Benign Lesion	Number of patients n=34	Percentage
Papilloma	11	32.35%
Benign intra epithelial Dyskeratosis	9	26.4%
Fibroma	4	11.7%
Prominent bleeding blood vessels	3	8.8%
Long Symptomatic uvula	3	8.8%
Long Soft palate with tonsillar hypertrophy	3	8.8%
Zenkers diverticulum	1	2.94%
Total	34	100%

TABLE V; Type of Premalignant Lesion in Oral Cavity and oropharynx

Type of Premalignant Lesion	Number of patients n=6	Percentage
Leukoplakia	3	50%
Proliferative verrucous leukoplakia	2	33.3%
Submucous fibrosis	1	16.7%
Total	6	100%

TABLE VI; Type of Procedure in Oral Cavity ,oropharynx and hypopharynx:

Type of procedure	Number of patients n=45	Percentage
Coagulation	3	6.8%
Evaporation	16	36.36%
Laser excision	22	48.8%
LAUP	3	6.6%
Total	44	100%

Type of Lesions in Nose : 8 patients (38%) had unilateral inferior turbinate hypertrophy while 13 patients (62%) had bilateral inferior turbinate hypertrophy

TABLE VII; Type of Procedure in Nose

Type of Procedure	Number of patients n=21	Percentage
Unilateral evaporation of HIT	8	38%
Bilateral Evaporation of HIT	13	62%
Total	21	100%

Type of Lesions in Ear: In our study out of 9 patients , 7 patients were having otosclerosis while 2 patients were having post stapedotomy conductive hearing loss who were treated with CO2 laser.

TABLE VIII; Type of Procedure in Ear

Type of Procedure	Number of patients n=9	Percentage
Primary Stapedotomy	7	77.7%
Revision Stapedotomy	2	22.2%
Total	9	100%

Recurrence: 2 patients (1.68%) with Ca larynx had recurrence. In both patients site of recurrence was subglottis. Post recurrence 1 patient underwent salvage laryngectomy while other was advised palliative chemotherapy.

Complications: No laser related Intraoperative or postoperative complications were seen in any of the patients.

DISCUSSION:

This prospective study was conducted first time in the department of Otorhinolaryngology Head and Neck Surgery, Government Medical College and Associated SMHS Hospital Srinagar. The study included 119 patients. .All these 119 patients were thoroughly evaluated.

In our study though varied cases were done with the help of CO2 laser , majority of cases were done for laryngeal and oral cavity lesions. Most of the patients in our study were males(69%), majority of which belonged to rural areas(57%) and majority belonged to age group between 46 to 60 years (35.20%) . Among these 45 patients operated for laryngeal lesions, 18 patients(40%) were having malignant lesions, 9 patients(20%) were having premalignant lesions while another 18 patients (40%) were having benign lesions. Out of 18 patients with malignant lesions 10 patients (55.6%) were having T2 lesions while 8 patients (44.4%) were having T1 lesions. Among the laryngeal malignancies , all patients were having squamous cell carcinoma. In our study number of patients with premalignant lesions treated with laser were 9. Among these 9 patients 4 patients (44.44%) were having hyperkeratotic lesion, 2 patients(22.22%) were having dysplasia, 2 patients were having dyskeratosis(22.22%) while 1 patient was having carcinoma in situ. Among 18 benign lesions of larynx that were operated upon via laser, the most common was bilateral vocal cord palsy (22.2%) ,followed by vocal cord polyp (16.6%), laryngeal papillomatosis(16.6%), vocal cord nodule (11.1%), supraglottic cyst (11.1%), glottic web(11.1%), schwannoma larynx (5.5%) and typical carcinoid(5.5%).4 patients with bilateral cord palsy presented with difficulty in breathing. Rest all 41 patients(91.1%) with vocal cord lesion presented with Change over voice . Among 18 patients with Ca larynx. 4 patients underwent type I corpectomy all of which were having T1 lesions, 9 patients underwent type II corpectomy, 4 underwent type III and 1 patient underwent type IV corpectomy. Rest of the patients underwent vaporization ,excision , Kashima procedure. According to the study done by **Motta G et al**¹⁴ It was seen in Laryngeal cancers, when clinical indications are correct, the main laser advantages in the treatment of T1 and T2 glottic cancers are the endoscopic removal of the lesion, avoidance of tracheotomy, shorter hospital stay and better quality of voice. According to study done by **Benninger MS**¹⁵ on Microdissection or microspot CO2 laser for limited vocal fold benign lesions, Significant improvements were noted for perceptual analysis over time for the laser excision group(n=16) .Our study is in accordance with these study. According to the study by **Vijay K Sharma et al**¹⁶ on evaluation of CO2 laser surgery for early carcinoma larynx where (n=40) Patients underwent trans oral laser surgery or radiotherapy as primary modality of treatment . This study revealed local recurrence rate 10% in CO2 laser treated arm which was not statistically significant. In our study ,2 patients had recurrence (4.44%). Rest all patients are disease free. The recurrence rate in our study is less than the above mentioned studies, which may be due to the short study period. Among 44 patients treated with laser for lesions in oral cavity and oropharynx 77.2% were benign lesions, 13.6 % were premalignant while 9% were malignant. Among the 4 malignant lesions of oral cavity all were present on tongue and all were squamous cell carcinoma. 3 patients among 4 were having T2 Ca tongue while one patient was having T1 Ca. Most common benign lesion in oral cavity was seen to be papilloma(32.35%) followed by benign intraepithelial dyskeratosis(26.4%), fibroma(11.7%), prominent blood vessels(which bled,8.8%), long symptomatic uvula(8.8%) and long soft palate with tonsillar hypertrophy(8.8%) , and zenkers diverticulum (2.94%). Out of 6 patients with premalignant lesions in oral cavity and oropharynx , 3(50%) patients had leukoplakia , 2 patients (33.33%) were having proliferative verrucous leukoplakia while 1 patient (16.7%) was having submucous fibrosis. **Tuncer et al.** [¹⁷] compared conventional surgery to laser surgery on oral soft tissue pathology. No intra- or postoperative complications were seen in laser group , which is in accordance with our study. **Wang et al.** [¹⁸] treated 28 patients with T1, T2 Ca tongue with CO2 Laser. No local recurrence occurred in any of the patients and is in accordance with our study. In total, 21 patients having hypertrophic nasal turbinates were treated with CO2 laser in our department. All 21 patients presented with nasal obstruction. . unilateral evaporation was done in 8 patients with only unilateral hypertrophic turbinate among 21 while 13 patients underwent bilateral evaporation of hypertrophic inferior turbinate. Spotting was done on anterior part of inferior turbinate while complete evaporation of posterior part of turbinate was

done. According to the study done by **Ramona Ungureanu**¹⁹ on the efficacy of CO₂ laser turbinoplasty in patients with chronic hypertrophic rhinitis assessed using 4-phase-rhinomanometry performed a prospective study on 39 adult patients. CO₂ laser turbinoplasty restored nasal flow, with a significant statistical reduction of total nasal airway resistance ($p < 0.05$). These studies are in accordance with our study, as in all patients symptoms were significantly reduced postoperatively subjectively. Out of 9 patients who were operated for ear diseases, 7 patients underwent primary stapedotomies while 2 patients underwent revision stapedotomies. According to the study done by **Molony TB**²⁰ on CO₂ laser stapedotomy, on Eighty-four patients. Complications and morbidity were minimal. In our study of 119 patients, 45 among them being of carcinoma larynx, 2 patients (4.44%) with carcinoma larynx had recurrence. 1 patient on follow-up had sub glottis extension after 8 months of surgery and underwent salvage laryngectomy. Another patient on follow-up was also seen to have subglottis recurrence and was advised palliative chemotherapy, due to anticipated anesthetic complications could not undergo surgery. There was no recurrence of any other lesion. There was no laser related complication in our patients treated with CO₂ Laser.

CONCLUSION: Co₂ laser can be used in variety of procedures in Otorhinolaryngology and head neck surgeries. Patients with Benign and early malignant lesion of larynx and oral cavity, symptomatic hypertrophic turbinates, primary and revision stapedotomies gives satisfactory results with co₂ laser treatment with low recurrence rate.

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