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Palliative Management of Late Stage Tongue Cancer by Laser: Experience of twenty patients

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Abstract

Oral cancer is the most common Cancer in Indian Males. Risk factors include tobacco use, heavy alcohol use and human papillomavirus (HPV) infection. Symptoms include a sore that doesn't heal, a lump or a white or red patch on the inside of the mouth.

Late stage tongue cancer is defined as any cancer in stage 4 which is unresectable. This happens either because of an increased size or early involvement of posterior part of tongue.

Treatment includes surgery and radiation therapy. In some cases, chemotherapy may be required.

Palliation in this condition is limited to nasogastric tube, pain management and Tracheostomy.

Aspiration pneumonia is a progressive condition which keeps on increasing as the mobility of tongue decreases gradually. This becomes increasingly intolerable for patients as the tumour growth enhances.

These patients have an extremely debilitating and limited life. Field cancerisation is very common in these patients leading to a very high incidence of recurrence. The conventional treatment modalities like chemotherapy and Radiotherapy are again not very effective and addition of Radiotherapy leads to an extensive side effects. There is inability to swallow solids more than liquids. Speech is badly affected, mucositis and xerostomia are common side effects. Long term effects include cricopharygeal stenosis.

Most patients are at a disadvantage regarding their quality of life after palliative radiotherapy for tongue cancer.

Lasers and light source technologies can be applied to a wide variety of open and laparoscopic surgeries, as well as other procedures encountered by general surgeons and other medical professionals. The ability to produce highly precise and controllable effects on tissues, and the potential to facilitate complex dissection make these devices a welcome addition to the armamentarium of the surgeon, who is skilled in their use. Each laser wavelength has a characteristic effect on tissue. The combination of the laser tissue interaction, the selection of the appropriate delivery systems and laser parameters determines the ultimate effects of laser use on the conduct and outcomes of surgery.

The use of laser to ablate the tumors was used in late stage tongue cancers. Laser ablation of late stage cancers of tongue is used for debulking the tumor in a blood less manner. Laser ablation destroys the Tumour thermally over a real time basis. The use of real time imaging allows a constant monitoring of the destroyed area. There was a marked increase in quality of life. Which was apparent within a week? There was also a marked increase in the life span of patients. Conclusion: Laser ablation offers a viable alternative for palliation in late stage Tongue cancer. The Palliation achieved depends on age of patient and involvement of volume of the tongue.

Keywords: Laser surgery • Tongue cancer • Palliation tongue cancer

Introduction

Oral cancer is major public health problem in the Indian subcontinent, where it ranks among the top three types of cancer in the country. The difference in incidence and partner of oral cancer can be due to an overall effect of ageing of population as well as some regional differences in the prevalence of specific risk factor. The low-income groups in India are affected most due to a wide exposure to risk factors such as tobacco chewing and insufficient exposure to newly diagnostic aids, resulting in a delay in reporting of oral cancer [1].

The Incidence of Tongue cancer among Oral cancer patients is approximately 30% of Oral cancer patients [1]. Conventional management of early Tongue cancer is a relatively straight forward procedure involving Surgery with or without chemotherapy and radiotherapy. Earlier the stage of cancer better are the results. Node positivity is the single factor affecting recurrence and survival. The overall survival and disease-free survival is better in patients without lymph node involvement and in patients with early stage of cancer as compared to the patients with node involvement and in advanced stages [2].

Functioning tongue is absolutely essential for a good quality of life. Loss of tongue function effects swallowing, speech and oral hygiene.

The tongue is divided into 4 parts for oncology purposes (Figure 1).

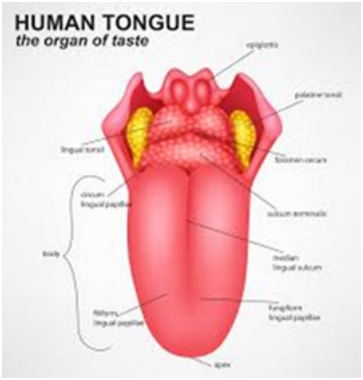

Figure 1. Human tounge

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Anterior left, Anterior Right, Posterior right, Posterior left.

Partial glossectomy with an adequate margin is possible only for tumor involving anterior part of tongue with no extension across midline and no involvement of posterior part of tongue.

This is combined with modified or radical neck dissection to remove the involved nodes.

Tongue-base surgery is required to remove larger tumors at the base of the tongue. These tumors are usually larger when first diagnosed, because they are more difficult to detect at an early stage, when they are smaller.

The predominant early symptom is ear pain. Voice changes and difficulty swallowing may occur as the tumor grows. Because these tumors are diagnosed later in their development, the cancer may have already spread to the neck area. Side effects include possible permanent gastrostomy, aspiration and speech disturbances. (3). Most of patients diagnosed with late stage Tongue carcinoma are treated with Chemotherapy and Radiotherapy since the surgery is very demanding. Total glossectomy impacts on the two most important functions of the organs involved: speech and swallowing. More specifically, the oral preparatory phase (formation of a bolus) and the oral phase of normal deglutition, can be significantly impaired following tumour ablation. Loss of a significant portion of the tongue will limit the ability to transfer food into the appropriate position for grinding by the dentition. Therefore, the first phase of swallowing is disrupted. The transfer of the bolus from the anterior portion of the oral cavity to the area of the tonsillar pillars, where the initiation of the swallowing reflex occurs, constitutes the second phase of swallowing. The harmonious coordination of the lips, tongue, buccal mucosa and maxillomandibular complex is required for completion of these phases and progression to the pharyngeal phases of swallowing. The same structures are associated with speech production and more specifically articulation. As a general rule, ablative surgery that involves the most anterior portion of the oral tongue is associated with significantly altered speech, while resections that incorporate the posterior tongue affect swallowing. As postsurgical time progresses, surgical site scaring and fibrosis, along with xerostomia from adjunctive radiotherapy, further impairs speech and swallowing [3,4]. There was a higher residual QOL (Quality of Life) in patients treated with surgery alone compared with those submitted to adjuvant RT. Multimodal treatments obviously increase side-effects with subsequent deterioration of residual QoL [5].

Masticatory function is adversely influenced by the surgical management of oral cancer. The tongue, floor of mouth, maxilla and mandible with the adjacent tissues are vital structures used for mastication and their anatomic and functional integrity is altered during ablative surgery. For efficient mastication all three components of mastication (manipulation, trituration, and consolidation) are required, and are the result of synchronous interaction of hard and soft tissues. Mandibular or maxillary resection affects the grinding ability either due to loss of stable and reproducible stomatognathic system relationships or due to loss of tooth-to-tooth contacts and diminished biting forces. In addition, loss of soft tissue bulk and sensation causes difficulties with the patient's ability to manipulate the food bolus to the occlusal table, retrieve the bolus, and then consolidate it prior to deglutition [6].

In advanced oral cancer, there was no significant difference between chemotherapy and/or radiotherapy and surgery in terms of 5-year survival rates. However, functional and aesthetic defects that result from radical surgery can reduce a patient's quality of life. Therefore, conservative methods are preferred over radical treatment in older patients [7-9].

Aims and objectives

Laser surgery in Oral cancer is increasing coming into prominence in select centers all over the world [10-12]. Laser uses a focused energy to coagulate and ablate the tissue. The laser light is absorbed by hemoglobin in the blood and leads to boiling of blood causing coagulation and tissue damage. The main aim of Laser ablation was to ablate the tumor as much as possible [13,14]. The procedure was supplemented by Chemotherapy with standard Cisplatin, Paclitel and 5 Fu regimen.

The aim of the procedure was to debulk the cancer and leave the normal functioning part of the tongue intact. This was achieved by real time monitoring under ultrasonography control of the laserised area. The tumor is initially Hypoechogenic due to increased vascularity. The Ablated tumour becomes hyperechogenic and the completeness of the de vascularization is checked by needle piercing. An ablated tumour does not draw any blood on pricking with needle.

Patients and methods

The laser used in this procedure was diode 980 nm laser by Gigaa lasers Wuhan China. It has a special proclivity for red color of hemoglobin.

20 patients were selected for the procedure over a 3-year period from July 2016 to July 2019 (Table 1).

Group	Number	Involvement	Expected survival
1	12	Anterior only	2months
2	8	Anterior and Base tongue	1 month

Table 1. The patients were divided into 2 groups.

Criteria for inclusion were as follows

MRI:

1. Cancer in Anterior part of tongue upto and slightly crossing midline.
2. Cancer in Anterior part of tongue and involving ipsilateral base of tongue.
3. Cancer in Anterior part of Tongue and Multiple Inoperable Lymph Nodes.
4. Cancer in both anterior parts of Tongue but no involvement of base of Tongue.

Clinical:

1. Patient able to swallow liquids.

Exclusion criteria:

1. Patients who had been operated before and now had recurrence
2. Patients who had treatment with radiotherapy or chemotherapy.
3. Floor of mouth involvement
4. Lymph nodes more than 4 cms in diameter. (this indicates extra nodal involvement)
5. Patients unable to swallow liquids.
6. Involvement of more than 2 regions of the tongue
7. Old patients with Cardiac or any Medical condition precluding administration of post procedure chemotherapy.

More than two regions of the tongue leaves a patient post laser ablation with a very little tongue tissue so a satisfactory post ablation outcome would not be possible. The procedure was explained to every patient and consent taken for the same. Patients were administered General anesthesia by Nasotracheal intubation. The Tumor was visualized under sonography control using TRUS (Trans Rectal Ultrasonography probe.)

Care was taken to insulate the endotracheal tube by inserting a Copper Malleable retractor which was bent at 2 angles to give a curve in posterior

part of tongue and another curve to adjust to contours of the face. The tumor was laserised by inserting the fiber directly into the center of tumor and monitoring the laserisation on the sonography monitor. In between the probe was taken out to give a better access to the tumor. The end point was hyperechogenecity of the tumor.

The lymph nodes were visualized with Flat high frequency probe and laserised by inserting 18 G needle under direct vision. The fiber was passed through the needle and the lymph node laserised till the capsule and a little beyond. Patients were administered chemotherapy by 1 week of laser procedure. The number of cycles ranged from 6 to 8 of standard Cisplatin, Paclitel and 5FU.

Case Reports

Case 1

Patient is a 70-year-old individual with history of tobacco ingestion since 15 years (Figure 2).

Figure 2. Patient is a 70 year old individual with history of tobacco ingestion for 15 years.

He has involvement of bilateral anterior part of tongue involvement.

Post laserisation he had a full recovery (Figure 3).

Figure 3. Post laserisation he had a full recovery.

There was no cosmetic deformity and full speech with no dietary restrictions.

He is still alive at 3 years with no recurrence

Case 2

Patient is a 35-year-old male with 18-year-old history of tobacco intake (Figure 4).

Figure 4. Patient is a 35 year old male with 18 year old history of tobacco intake.

He had involvement of anterior and left base involvement. He had a full recovery with no residual cancer on MRI at 3 yrs. He had a 20 kg weight gain in 2 yrs (Figure 5).

Figure 5. He had involvement of anterior and left base involvement. He had a full recovery with no residual cancer on MRI at 3 yrs.

Case 3

Patient is a 25-year-old male with 2-year history of gutka intake (Figure 6).

Figure 6. Patient is a 25 year old male with 2-year history of gutka intake.

He had 2/3 tongue involvement with involvement of RMT and Left tonsil

He had a good recovery and was in remission for 8 months (Figure 7).

Figure 7. He had a good recovery and was in remission for 8 months.

Results

All patients had a near total relief of pain after 24 hrs of Laser. Most patients in group 1 were on full liquid diet after 12 hours post operation. All were discharged by 3rd day. Speech was affected due to laser procedure and post laser swelling. This improved significantly over next 2 to 3 weeks. The laserised tumor was seen as whitish avascular structure which separated over next 3 weeks from the normal tongue. Most patients in group 2 were on orals liquids by day 4. They were discharged by 6th day.

Repeated laser minor procedures were performed on a 3-weekly basis for small recurrences under local anesthesia.

Patients were analyzed for effective palliation on following parameters.

1. Speech
2. Diet
3. Pain control
4. Mutilation

Group 1 results

2 patients were alive at 3 years with MRI negative

10 Patients survival time ranged from 8 months to 18 month (Table 2)

	Not acceptable	Satisfactory	Good
Speech	0	10	2
Diet	0	8	4
Pain control	0	2	10
Cosmesis	0	12(Tongue deformity)	0

Table 2. Palliation results were as follows at end of 3 months.

Group 2 results

1 patient was alive at 3 years

6 patients survival time ranged from 6 months to 12 months with an average of 8 months.

1 patient died after 1 year with no evidence of cancer in tongue of Tuberculosis of Brain.

3 patients had bleeding from the laserised area after 1 week of laserisation. This was attributed to the separating of necrosed tissue. It was controlled by local compression only.

There was no facial disfigurement due to the procedure (Table 3).

	Not acceptable	Satisfactory	Good
Speech	2	4	0
Diet	0	5	1
Pain control	0	6	0
Mutilation	1	5	0

Table 3. Results of palliation at end of 3 months.

Discussion

Oral cancer is one of the top three types of cancer in the Indian Subcontinent. This makes it a major Health problem. Tobacco and Gutka use play an important part in causation of this cancer. Tongue cancer constitutes 30% of Oral cancers [1]. The low-income groups in India are affected most due to a wide exposure to risk factors such as tobacco chewing and insufficient exposure to newly diagnostic aids, resulting in a delay in reporting of oral cancer [1]. Survival rates have always been low in late stage oral cancers. They are even worse in Tongue cancers due to involvement of swallowing function [15,16].

Field cancerisation plays an important part in recurrence in late stage oral cancers [17].

Involvement of tongue in late stages is a major impediment in leading a normal life. Conventional management of early Tongue cancer is a relatively straight forward procedure involving Surgery with or without chemotherapy and radiotherapy. Earlier the stage of cancer better are the results. Involvement of multiple nodes is seen to be associated with decreased survival and this was corroborated in our observations [2]. The quality of life after conventional surgery chemotherapy and radiotherapy is extremely poor and leaves the patient in a poor state physically and mentally. Decrease in oral functions means practically ineffective swallowing and speech [18].

Laser ablation is an entirely new way of handling this problem in late stage tongue cancer. Laser works by debulking the tumour as much as possible [19]. Clearance of more than 90% according to visual estimation can be achieved in suitable cases according to our experience.

Addition of chemotherapy in standard cisplatin, paclitaxel and 5-Fu makes for a good palliation and remission in these cases.

Results

The overall results were less satisfactory in group 2 patients because of involvement of base of tongue. The recurrence rate was also higher in these patients. Patients with tobacco use fared worse than patients without Tobacco use due to field cancerisation [17].

Conclusion

Laser ablation has a great potential to become the treatment of choice for palliation in late stage Tongue cancer. Since most of these patients have had a return to their normal activities, these patients can also be considered in remission.

There was no mutilation of face which makes the procedure extremely acceptable to patients.

However, this procedure needs to be performed only by skilled laser surgeons familiar with all aspects of laser surgery.

Intraoral complications during anesthesia, though did not occur in this study should be taken into account.

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