(IJRMST) 2016, Vol. No. 1, Issue 1, Jan-Jun e-ISSN: 2455-5134, p-ISSN: 2455-9059

CLINICAL OUTCOME IN SURGICALLY TREATED TONGUE CANCER

Dr. Mohit Asthana

INTRODUCTION

It has been well recognized that oral cancer is one of the commonest cancers in India. This may be related to the rising trend of paan masala and gutkha chewing in the population. Oral cancer represents 14% of all cancer cases in India. It constitutes 17% of all cancers in males and 10.5% of all cancers in females making it the commonest cancer in males and the third commonest cancer among females. Majority of malignant cases are observed in 50-59 years age. Site wise analysis reveals the tongue as the most common site involved in 42% of all oral cavity cancers.[1] As such carcinoma of the tongue is one of the leading causes of cancer morbidity in India.

The treatment of carcinoma of the tongue has traditionally been based on the findings present on clinical evaluation after staging the patients into groups according to the TNM classification. However the T-stage is not known to be a reliable predictor of either neck node metastases or survival in patients with carcinoma of the tongue. Therefore there is a lot of individual and institutional variation regarding the approach to the N0 neck in early carcinoma of the tongue. Some authors have reported that histologic tumor thickness correlates closely with the presence of subclinical neck node involvement, especially in early-stage cancers.[2] Histologic tumor thickness has also been correlated with survival.[3] This suggests that presurgical determination of tumor thickness might be useful for treatment planning, particularly for deciding whether to perform elective neck dissection.

Previously accurate estimation of tumor thickness and other important characteristics was only available post operatively. This was of no help to the surgeon in planning the treatment. In those patients who were primarily treated by radiotherapy, tumor thickness could never be accurately measured and the clinician was ignorant of an important prognostic variable. This was especially so in cases where clinical examination was difficult as in patients with restricted mouth opening and in patients with posteriorly located lesion.

AIMS & OBJECTIVES

1. To evaluate whether the preoperative imaging characteristics of tongue cancer can be used as a prognostic predictor of disease recurrence and survival
2. To evaluate whether the imaging characteristics of tongue cancer can be used as a predictor of occult regional spread

3. To evaluate the accuracy of clinical examination and MRI in detecting locoregional spread on comparison with post operative pathological examination
4. To validate the imaging parameters with post operative pathological examination.

EPIDEMIOLOGY OF TONGUE CANCER IN INDIA

Due to the wide spread use of smokeless tobacco in India especially among the male population cancer of the oral cavity is the most common malignancy that occurs in the male population across the country. Cancer of the tongue is the most common sub site among the oral cavity cancers. However an analysis of the data from the National Cancer Registry Program shows wide variation in the incidence as well as mortality rate among the different regions in the country.[7]

INCIDENCE AND MORTALITY DUE TO TONGUE CANCER

	BANGALORE		BARSHI		BHOPAL		CHENNAI	
	Male	Female	Male	Female	Male	Female	Male	Female
Cases	146(3.14)	55(0.98)	9(3.72)	2(0.78)	104(9.59)	22(2.06)	242(5.38)	73(1.49)
Deaths	43(2.26)	9(0.51)	-	-	14(3.51)	2(0.76)	107(5.02)	9(0.51)

	DELHI		MUMBAI		AHMEDABAD		KOLKATA	
	Male	Female	Male	Female	Male	Female	Male	Female
Cases	684(5.63)	163(1.5)	507(5.21)	179(1.8)	85(10.34)	7(1.23)	78(4.15)	42(2.35)
Deaths	57(4.17)	10(1.01)	219(4.23)	67(1.45)	38(10.47)	1(0.58)	-	-

%= Relative Proportion of Cancers of All Sites

National Cancer Registry Program 2004-2005[7]

A striking observation is the incidence in the young population with tongue cancer ocuuring as early as the teenage age group. The Population Based Cancer Registry from Delhi shows an incidence of 147 cases (21.5% of all tongue cancer cases) and a death rate of 15 (26% of all tongue cancer deaths) among males less than 50 years of age. An analysis of the data from Mumbai revealed a similar outcome. As such tongue cancer extracts a heavy cost from the productive section of the society.

ANATOMY OF THE TONGUE

Anterior (Oral) Tongue) – The freely mobile portion of the tongue extends anteriorly from the line of the circumvallate papillae to the undersurface of the tongue at the junction of the floor of mouth. It is composed of four areas: the tip, lateral borders, dorsum, and the nonvillous undersurface. The surface epithelium is keratinizing stratified squamous epithelium that is roughened by the presence of papillae. The dorsum of the anterior tongue bears no mucous or serous glands, these being concentrated mainly

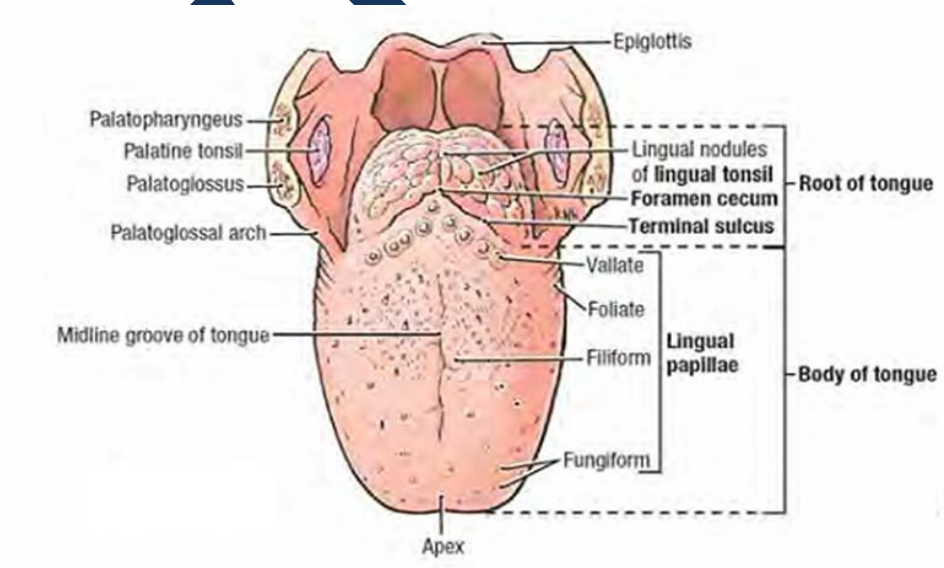
under the tip and the sides. Also under the tip, in a paramedian position on each side, open the tiny ducts of the anterior lingual glands.

The intrinsic muscles of the tongue (superior, inferior, longitudinal, transverse, and vertical) are not attached to bone and serve to alter the shape of the tongue during chewing, swallowing, and articulation. The extrinsic muscles are attached to bone: genioglossus (mandible and hyoid), hyoglossus (hyoid), styloglossus (styloid process), and palatoglossus (hard palate). The genioglossus is the largest and makes up the bulk of the tongue. The extrinsic muscles stabilize the tongue and by their contraction alter its position as well as its shape.

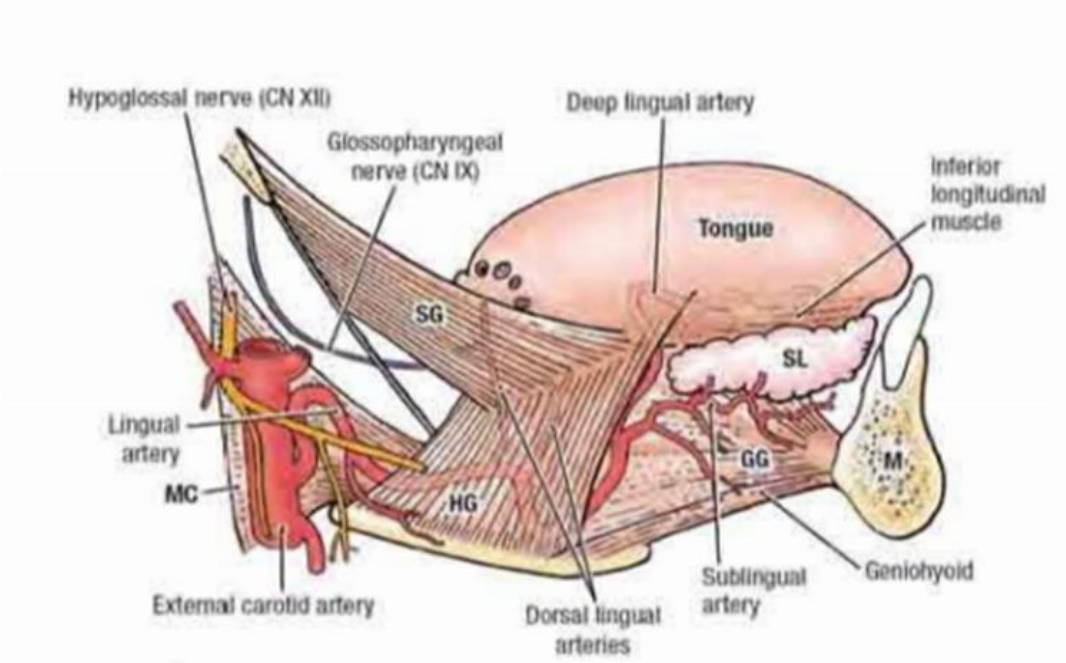
The major arterial supply is from branches of the lingual artery, which is the third branch of the external carotid artery. Minor contributions come from the tonsillar branch of the facial artery and the ascending pharyngeal artery. The midline of the tongue is an avuncular plane due to the tough fibrous septum that prevents anastomosis of blood vessels of the two muscular halves.

The lingual vein accompanies the lingual artery and usually joins the internal jugular vein near the greater cornu of the hyoid. The tip of the tongue is drained by the deep lingual vein that is visible ventrally on each side of the midline. It runs backwards superficially on the hyoglossus and is joined at its anterior border by the vein from the sublingual gland to form the vena comitans of the hypoglossal nerve, draining into either the lingual, facial, or internal jugular veins.

The hypoglossal nerve supplies all the muscles of the tongue except the palatoglossus, which is supplied by the pharyngeal plexus. The trigeminal component (cell bodies in the trigeminal ganglion) of the lingual nerve mediates common sensibility while the chorda tympani component (cell bodies in the geniculate ganglion of the facial nerve) mediates taste.



Features of dorsum of the tongue



Anatomy of the tongue

PROGNOSTIC FACTORS IN PATIENTS WITH TONGUE CANCER

Treatment of head and neck cancer requires accurate risk stratification in order to determine the type and extent of therapy and the expected clinical outcome. Physical examination, diagnostic imaging studies and pathologic review enable the clinician to determine the size and extent of the primary tumor, the status of cervical lymph nodes, and the likelihood of distant metastatic disease, thereby generating an accurate tumor, lymph node, metastasis (TNM) stage for each patient. In addition to TNM staging, other clinical and pathologic factors not routinely incorporated into the staging system have been shown to influence response to therapy and eventual outcome.

These factors may be categorized as follows:
(a) Prognostic factors related to the primary tumor,
(b) Prognostic factors related to the cervical lymph nodes,
(c) Prognostic factors related to patient demographics, and
(d) Prognostic factors related to the patient's general medical condition.

In addition to clinical and pathologic factors, recent interest has focused on identifying molecular factors that may influence clinical outcome. These molecular markers not only provide useful prognostic information but also serve as targets for novel pharmacotherapies that antagonize cellular proliferation by interfering with specific cellular processes.
Molecular factors that influence tumor behavior fall into several broad categories including proto-oncogenes, tumor suppressor genes, growth factors, immune-related factors, loss of heterozygosity at

various genetic loci, total cellular DNA content, and parameters related to the kinetics of in vivo tumor growth.

PATIENTS AND METHODS

Patients who underwent complete surgical resection of histologically proven tongue cancer with a curative intent from March 2008 to October 2010 at Rajiv Gandhi Cancer Institute and Research Centre were studied . These patients underwent MRI staging before surgical resection as a part of routine preoperative workup. Clinical, radiological and pathological features, including age, sex, tumour location, histological grade, perineural invasion, lymphovascular invasion and nodal status and stage, were evaluated. and staged according to the pathological TNM system. In our institution, the neck was routinely treated with a comprehensive neck dissection in clinical or preoperative MRI node-positive neck. In clinical and MRI node-negative neck, the patients were subjected to a supraomohyoid neck dissection (SOHND). Neck dissection was carried out in the contralateral neck if clinical or preoperative MRI was positive.

Tumour volume measurement was done according to the modified Simpson rule with the help of an in house developed software.

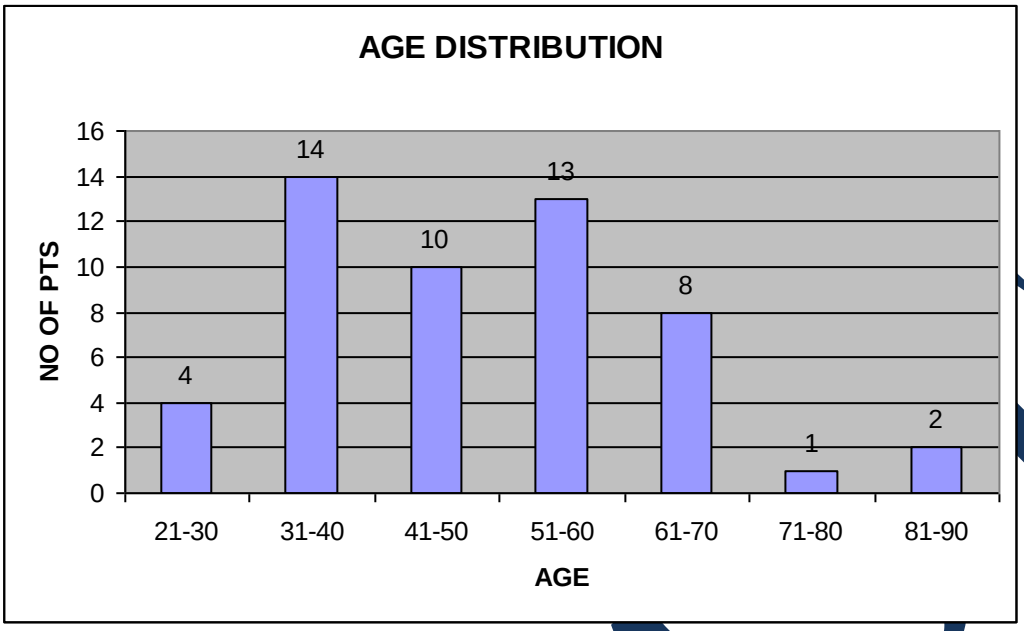
$$V(ml) = 0.6 \times \left(\sum_{i=1}^{n} A_i \right)$$

where 'i' is the individual slice number and 'n' is the number of slices.[101] Imaging was carried out using a 1.5-T MRI scanner (Avanto, Siemens AG, Germany). Fast-spin echo T1-weighted image (repetition time range 500–722 msec; echo time range, 11–15 msec) sequence and STIR T2-weighted images (repetition time range 4000–7280 msec; echo time range 14-19 and 85-104 msec with TI 150-160 msec) were acquired in both axial and coronal planes with 256 x 256 or 512 x 512 matrix, field of view, 200-220 mm; slice thickness 5mm and interslice gap 10% of slice thickness. Though contrast enhanced images T1-weighted images were also taken in selected cases, for evaluation of tumor volume precontrast images were only used. The radiologists could, however, refer to all the other images acquired in the imaging protocol to aid in the accurate delineation of the tumor.

RESULTS

A total of 124 patients underwent upfront surgery for carcinoma tongue between March 2008 and October 2010 at Rajiv Gandhi Cancer Institute and Research Centre, Delhi. Sixty one patients had undergone imaging outside the Institute and were excluded from the study. Five patients were also excluded because they had undergone excision biopsy before presenting to the institute. Six patients were excluded because of suboptimal MRI study. Thus a total of 52 patients were evaluated. Average follow up period was 16 months (range: 6 months to 3 years). Nine patients were lost to follow up.

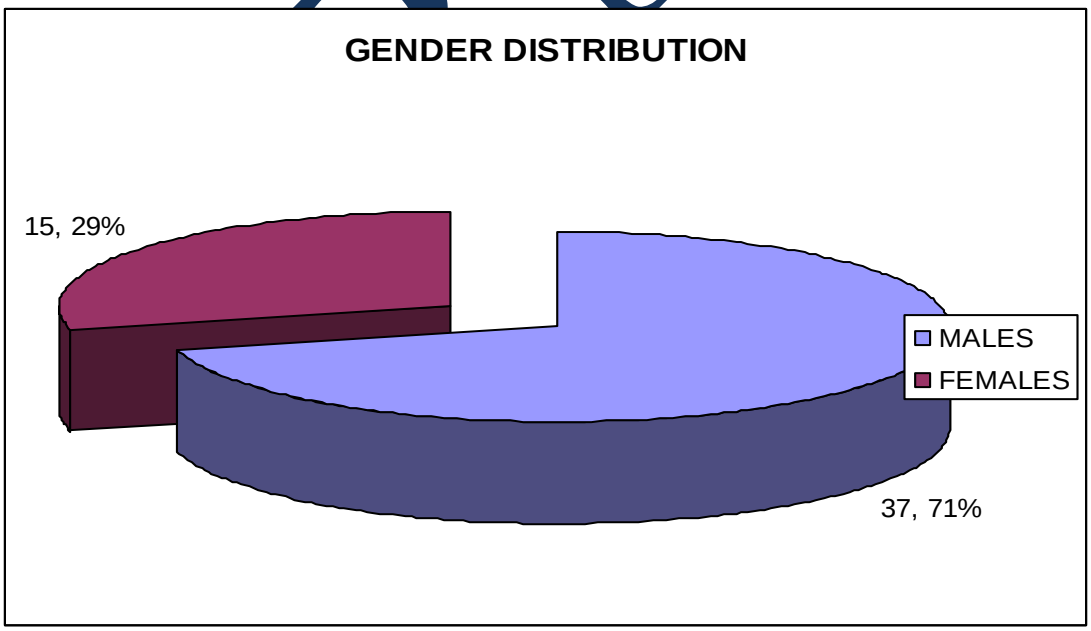
AGE



The age of the patients included in the study ranged from 23 years to 88 years with the mean age being 49.48 years (S.D:14.59 years) and the median age being 49 years.

SEX

The study population included 15 females (28.8%) and 37 males (71.2%) out of 52 patients. The mean age of the females was 56 years and the mean age of the males was 46.84 years.



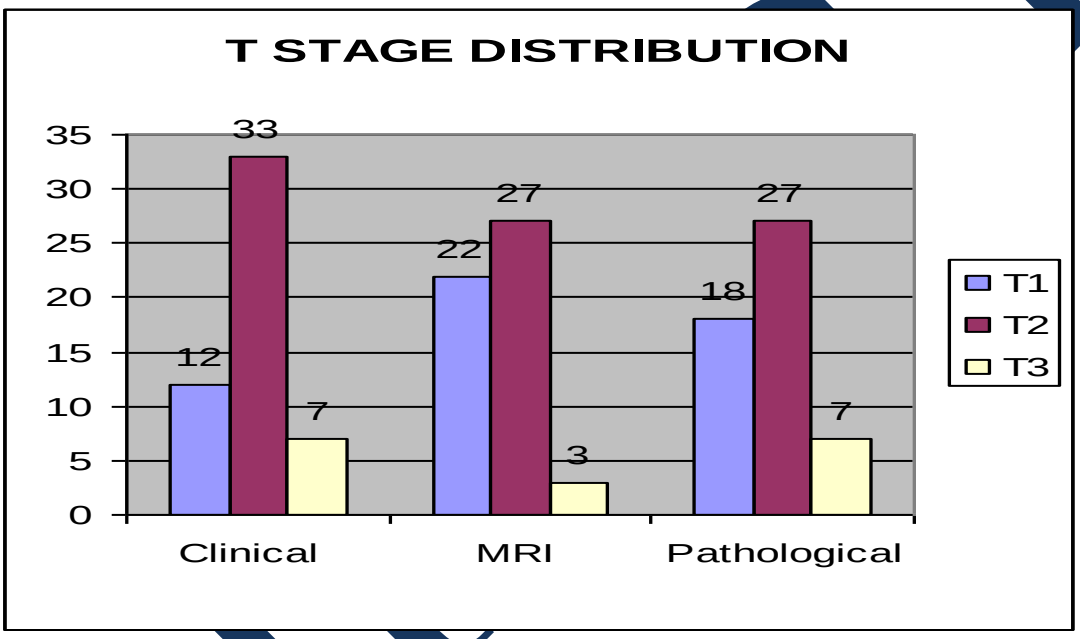
TUMOR CHARACTERISTICS

STAGE

The Tumour and Node classification and the stage grouping according to the AJCC 7th 2009 system is as shown below in Tables 1,2 and 3

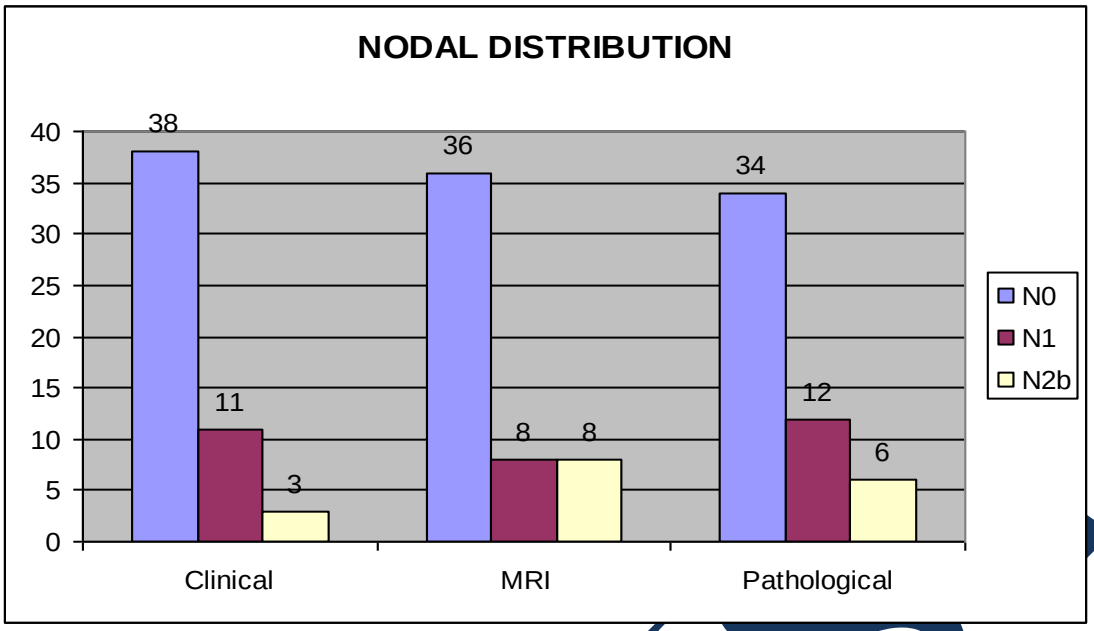
T stage	Clinical (%)	MRI (%)	Pathological (%)
T1	12 (23.1)	22 (42.3)	18 (34.6)
T2	33 (63.5)	27 (51.9)	27 (51.9)
T3	7 (13.5)	3 (5.8)	7 (13.5)
	52	52	52

Table-1: Tumor classification



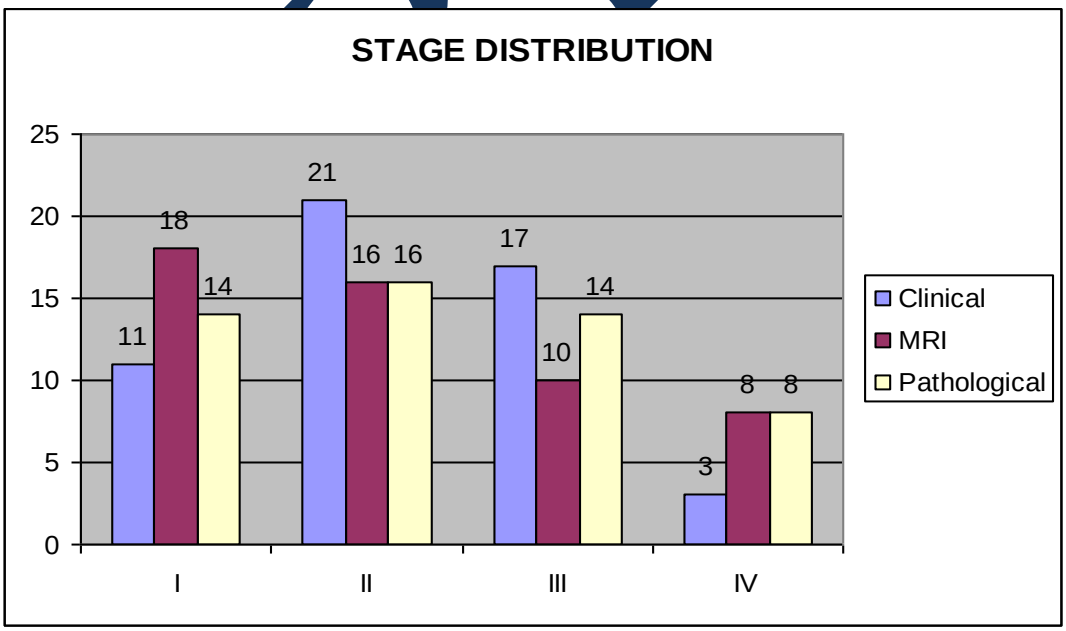
Nodal stage	Clinical (%)	MRI (%)	Pathological (%)
N0	38 (73.1)	36 (69.2)	34 (65.4)
N1	11 (21.2)	8 (15.4)	12 (23.1)
N2b	3 (5.8)	8 (15.4)	6 (11.5)
	52	52	52

Table-2: Nodal classification



Stage	Clinical(%)	MRI(%)	Pathological(%)
I	11 (21.2)	18 (34.6)	14 (26.9)
II	21 (40.4)	16 (30.9)	16 (30.8)
III	17 (32.7)	10 (19.2)	14 (26.9)
IV	3 (5.8)	8 (15.4)	8 (15.4)
	52	52	52

Table-3: Stage grouping



DEPTH AND VOLUME

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
MRI Depth	52	.37	2.30	1.0977	.4624
Path depth	52	.10	2.50	.9923	.5827
MRI Volume	52	.12	19.32	2.9332	3.6504
cal clinical volume	52	.03	16.92	3.1528	4.1087
Valid N (listwise)	52				

OTHER CHARACTERISTICS

Grade – There were 21(40.4%) patients with well differentiated tumor and 31(59.6%) patients with moderately differentiated tumor out of a total of 52 patients. There were no patients with poorly differentiated tumor

Perineural invasion – was present in 16(30.8%) of the patients and absent in 36(69.2%) of the patients

Lymphovascular invasion – was was present in 7(13.5%) of the patients and absent in 45(86.5%) of the patients

Mandibular invasion – was present in 1(1.9%) of the patients and absent in 51(98.1%) of the patients

Extrinsic muscles involvement - was present in 1(1.9%) of the patients and absent in 51(98.1%) of the patients

Extracapsular extension - was present in 7(13.5%) of the patients and absent in 45(86.5%) of the patients

CONCLUSIONS

Tumor depth and volume as measured on MRI have a significant correlation to that measured on histopathological examination.

Tumor depth also has a good correlation with incidence of nodal metastasis, recurrence, disease free survival and overall survival . Tumors with depths less than 0.5 cm had a 16.7% incidence of nodal metastases, no recurrences, 100% disease free survival and overall survival.

Tumors with depths of 0.6-1cm had a 26% incidence of nodal metastases, recurrence rate of 21%, disease free survival of 79% and an overall survival of 95%.

Tumors with depths of more than 1cm had a 48% incidence of nodal metastases, recurrence rate of 39%, disease free survival of 61% and an overall survival of 66.7%.

Tumor volume too correlates well with recurrence and disease free and overall survival but did not correlate significantly with the incidence of nodal metastases. Tumors smaller than 6cc had a recurrence rate of 19%, disease free survival of 81% and an overall survival of 95%. Tumors larger than 6cc had a recurrence rate of 66.7%, disease free survival of 33.3% and an overall survival of 66.7%.

Tumor dimensions can be useful in predicting outcome in patients with cancer of the oral tongue.

REFERENCES

1. Mehrotra R, Singh M, Kumar D, Pandey AN, Gupta RK, Sinha US. Age specific incidence rate and pathological spectrum of oral cancer in Allahabad. Indian J Med Sci 2003;57:400

2. Spiro RH, Huvos AG, Wong GY, Spiro JD, Gencco CA, Strong EW. Predictive value of tumour thickness in squamous cell carcinoma confined to the tongue and floor of mouth. Am. J. Surg. 1986; 152: 345–50.

3. O-charoenrat P, Pillai G, Patel S et al. Tumour thickness predict cervical nodal metastases and survival in early oral tongue cancer. Oral Oncol. 2003; 39: 386–90.

4. Lam P, Au-Yeung KM, Cheng PW et al. Correlating MRI and histologic tumour thickness in the assessment of oral tongue cancer. AJR Am. J. Roentgenol. 2004; 182: 803–8.

5. Chew MH, Khoo JBK, Vincent F et al. Significance of tumour volume measurements in tongue cancer: a novel role in staging. ANZ J. Surg. 2007; 77: 632–637

6. Iwai H, Kyomoto R, Ha-Kawa SK et al. Magnetic resonance determination of tumour thickness as predictive factor of cervical metastasis in oral tongue carcinoma. Laryngoscope 2002; 112: 457–61.

7. National Cancer Registry Programme (ICMR). Population based cancer registry 2004–2005. http://www.pbcrindia.org

8. Ganly I, Ibrahimpasic T, Patel SG, Shah JP. Tumors of the Oral Cavity. In, Montgomery PQ(ed). Principles and Practice of Head and Neck Surgery and Oncology, 2nd edition, London, Informa Healthcare, 2009; 180-191

9. AgurAMR, Dalley,AF. Tongue. In, Grant's Atlas of Anatomy, 12th edition, Philadelphia, Lippincott Williams & Wilkins, 2009; 677-78

10.Standring S. Neck and upper aerodigestive tract – oral cavity. In, Gray's Anatomy The Anatomical Basis of Clinical Practice, 39th edition, Philadelphia, Elsevier, 2008, 587-88

11. Jamieson JK, Dobson JF. The lymphatics of the tongue with particular reference to the removal of lymphatic glands in cancer of the tongue BJS 1920; 8: 80-87

.

12. Lindberg R. Distribution of cervical lymph node metastases from squamous cell carcinoma of the upper respiratory and digestive tracts. Cancer 1972; 29: 1446–9