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CT SCAN- An Aid to the Diagnosis to Tumours of Oral Cavity and Oropharynx

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Abstract: ***The predominant disease in the oral cavity and oropharynx is cancer and forms a major oncology concern in India constituting about 30% of all the malignancies due to the high prevalence of tobacco chewing in the form of Gutka, Khani or Mawa, betel tobacco quid (Paan) or Areca nut in India. Squamous cell carcinoma accounts for 90% of cases of malignancy to affect this region. The development of modern cross section imaging techniques i.e. CT and MRI has substantially altered the treatment and management of malignancies of oral cavity. ANA staging accuracy of clinical examination with endoscopy was only 58%, but it was increased significantly when combined either with CT (accuracy 80%) or with MR imaging (accuracy 85 %). These cross – sectional imaging techniques are also important for localization of potential biopsy sites in patients with occult primary and helped the surgeon in taking biopsy from the exact site instead of taking random multiple biopsies on a clinical assessment. Other latest imaging modalities like color Doppler and PET have also contributed to head and neck imaging specially in evaluation of nodal status.***

Keywords: CT, Oral Cavity, Tobacco, Alcohol, Tumour

Aims & Objectives

1) To compare and correlate CT staging of oropharyngeal neoplasm with clinical staging.
2) To evaluate the contribution of CT in providing additional information about the lesions.
3) To assess the extent of local, regional spread depth of inversion and extent of lymphadenopathy for staging and treatment planning in advanced oral cavity and oropharyngeal malignancy.
4) To evaluate Bony erosion.

1. Material and Methods

50 patients diagnosed clinical, between Jan 2013 - Jan 2014 to be having oral cavity and oropharyngeal malignancies, in the department of E.N.T. and Radiology SBKS MIRC were included in this study provided the clinical diagnosis was confirmed on histopathological examination.

The following were excluded from the study:
1) Un-cooperative or very sick patients.
2) Patients in whom tumor is secondary to a primary elsewhere.
3) Patients who have received some form of therapy (RT/CCT/Surgery).
4) Patient's allergic to iodinated contrast media.

Patient's names, age, gender, dietary habits, life style, presenting symptoms and signs were recorded as per the proforma.

Each patient was subjected to a clinical examination including neck palpation, direct /indirect laryngoscopy, fiberoptic/rigid endoscopy and clinical staging was there by obtained. Thereafter, the patient underwent baseline computed tomographic examination of the relevant area.

2. Scanning Protocol

The computed tomographic examination was performed on Seimens Emotion 16 MDCT. The patient lies supine on die gantry table and was instructed against swallowing, moving or talking during scanning. Contiguous 5 mm sections will be obtained from die level of soft palate to die hyoid bone (to include the oropharyngeal region).

The axial sections were taken parallel the body of the mandible. Coronal sections were obtained in the region of interest with X-ray beam as nearly perpendicular to the ramus of the mandible as possible.This was accomplished by tilling the patient's head and angling the gantry to approximate the coronal plane of the mandibular condyle [49]. In cases of extensive primary lesion the sections was extended till the superior or inferior limit of the lesion. The CT study was carried out after administration of bolus of 100 ml of contrast media administered intravenously, after obtaining a few pre-contrast sections in the region of interest.

For the purpose of staging, the staging schemes in common use currently (viz. TNM primary tumor staging, AJCC radiological nodal staging, clinical classification of nodes, (details in Annexure A,B,C,) were followed in each case. Radiological Criteria for lymph nodes metastasis included:

1. Minimal axial diameter of 1cm
2. Central Necrosis.
3. Irregular ill-defined outline.
4. Grouping of two or more lymph nodes 8-15mm. in size.

3. Criteria used for Extra Nodal Extension

1) **Intranodal tumor** - well circumscribed mass with a distinct interface between it and surrounding fat.
2) **Extranodal tumor** - Ill-defined staining margin without clear distinction between it and surrounding fat. Evidence of edema of thickening of surrounding fibro adipose tissue or muscles.
3) **Fixation** - combination of extra-nodal characteristics and loss of plane between mass and structure in question (e.g. carotid, sternocleidomastoid muscle).
4) **Adherent or abutting** - Combination of intra-nodal characteristics and loss of plane between mass and loss between mass and structure in question.

Perineural extension of the tumor was defined as:

1) Enlargement of neural foramen.
2) Thickening or abnormal enhancement of the nerve.
3) Abnormal soft tissue density m relation to the nerve, not contiguous with the primary lesion.
4) Atrophy of the muscles supplied by the nerve.

Interpretation of images was done without detained prior information of the results of clinical examination and the malignancy was staged independently (according to the guidelines mentioned in the AJCC Manual for Staging of Cancer, *Edge SB, Byrd DR, Compton CC, et al., eds.: AJCC Cancer Staging Manual. 7th ed. New York, NY: Springer, 2010, pp 29-40.*)[86]
A comparison was made of the two staging methodologies. Note was made of the change in the therapeutic management in these cases, if any, after comparisons of both methods. All findings were recorded in specially designed proforma, which was developed for this study.

Annexure -A
TNM Classification of primary tumor for carcinoma of the Oropharynx and oral cavity (Including Lip).

TX	Primary tumor cannot be assessed.
T0	No evidence of primary tumor.
Tis	Carcinoma *in situ*.
T1	Tumor ≤2 cm in greatest dimension.
T2	Tumor >2 cm but ≤4 cm in greatest dimension.
T3	Tumor >4 cm in greatest dimension.
T4a	Moderately advanced local disease.
	(Lip) Tumor invades through cortical bone, inferior alveolar nerve, floor of mouth, or skin of face, that is, chin or nose.
	(Oral cavity) Tumor invades adjacent structures only (e.g., through cortical bone [mandible or maxilla] into deep [extrinsic] muscle of tongue [genioglossus, hyoglossus, palatoglossus, and styloglossus], maxillary sinus, or skin of face).
T4b	Very advanced local disease.
	Tumor invades masticator space, pterygoid plates, or skull base and/or encases internal carotid artery.

Annexure-B
Nodal Classification

NX	Regional lymph nodes cannot be assessed.
N0	No regional lymph node metastasis.
N1	Metastasis in a single ipsilateral lymph node, ≤3 cm in greatest dimension.
N2	Metastasis in a single ipsilateral lymph node, >3 cm but ≤6 cm in greatest dimension.
	Metastases in multiple ipsilateral lymph nodes, none >6 cm in greatest dimension.
	Metastases in bilateral or contralateral lymph nodes, none >6 cm in greatest dimension.
N2a	Metastasis in single ipsilateral lymph node, >3 cm but ≤6 cm in greatest dimension.
N2b	Metastases in multiple ipsilateral lymph nodes, none >6 cm in greatest dimension.
N2c	Metastases in bilateral or contralateral lymph nodes, none >6 cm in greatest dimension.
N3	Metastasis in a lymph node >6 cm in greatest
N3en	Extra nodal malignant spread

Annexure-C
Clinical Classification of nodes

Level	Location
I	Sub mental and submandibular nodes
II	Internal jugular nodes from the skull base to level of carotid bifurcation (up to hyoid bone)
III	Internal jugular nodes from carotid (supra omohyoid portion)
IV	Infraomohyoid portion of internal jugular chain
V	Posterior triangle nodes (lateral to posterior border of the sternocleidomastiod muscle)
VI	Nodes related to the thyroid gland
VII	Tracheoesophageal groove nodes and superior mediastinal nodes

The retropharyngeal nodes when present are mentioned separately.
Oral cavity tumor primary drains into level I, II, III.
Oropharynx tumor drains primarily to level II, III, and IV.

4. Observations & Results

Out of Fifty cases of oral cavity and oropharyngeal malignancies included in this study 34 cases (68%) were from oral cavity and 16 cases (32%) were from oropharynx. These cases were further categorized according to the subsites and M/F ratio. There were 44 males & 6 females pts. Male : Female Ratio = 7.3 : 1

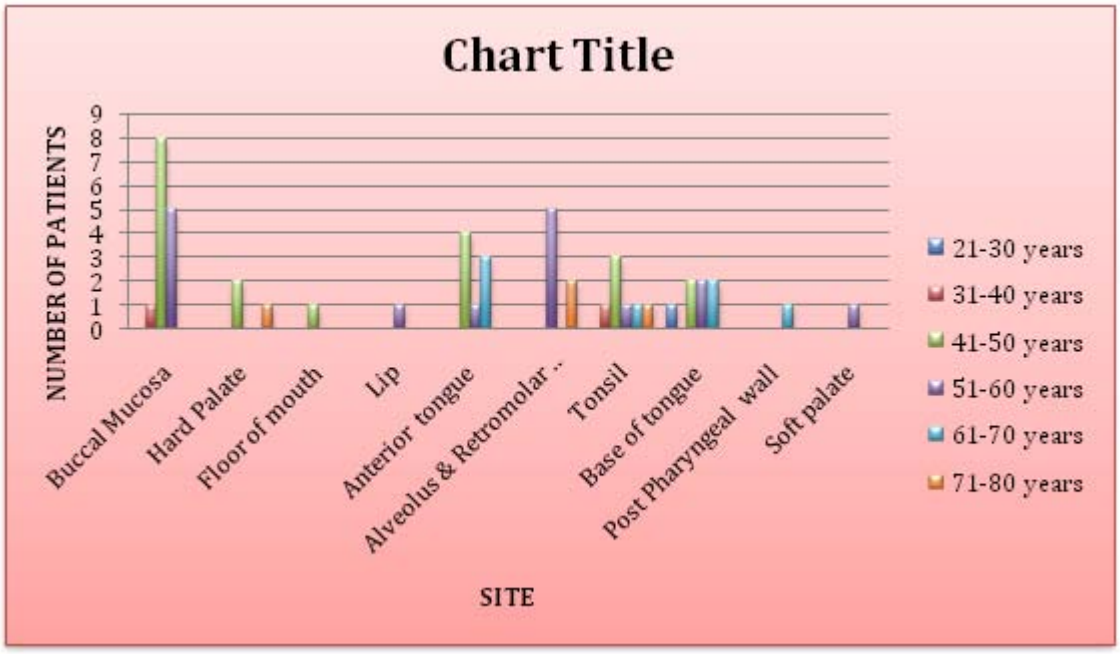


CHART 1 AGE

Of the total no. of cases maximum no. of cases were seen in 5th and 6th decade i.e. 72%.
About 22% of cases were seen above 60 years of age.
And only 6% cases below 40 years.

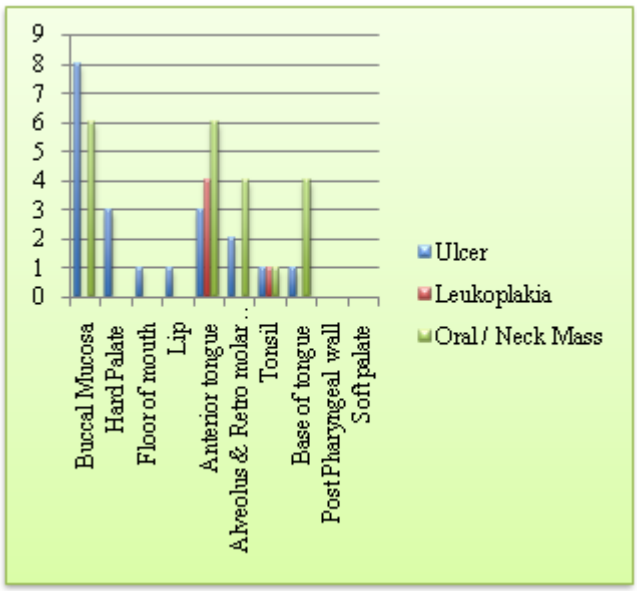


CHART 2: Presence of preexisting lesions according to site

42% of patients presented with oral or neck mass. About 40% of cases had a preexisting oral ulcer and in 10% cases there was a history of leukoplakia

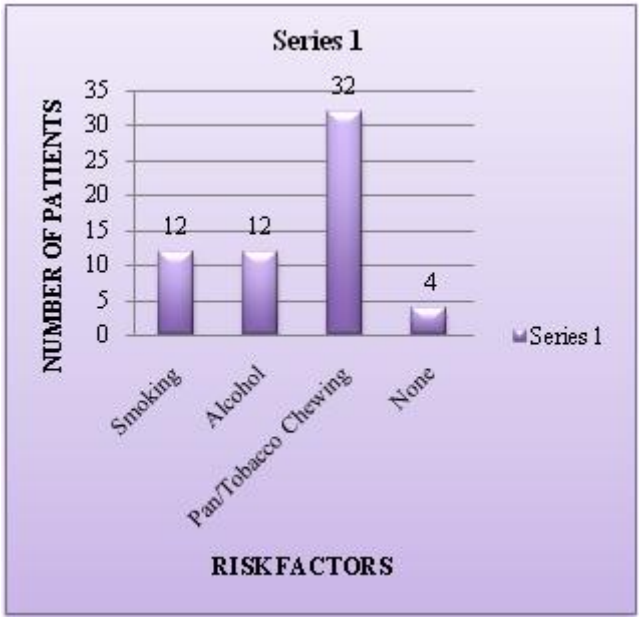


Chart 3: Presence of Risk factors according to site

88% of the cases studied had a history of tobacco use commonly in term of bidi or cigarette. 24% of patients had history of long-term alcohol abuse. Only 8% patients had no history of tobacco or alcohol abuse of which most were females.

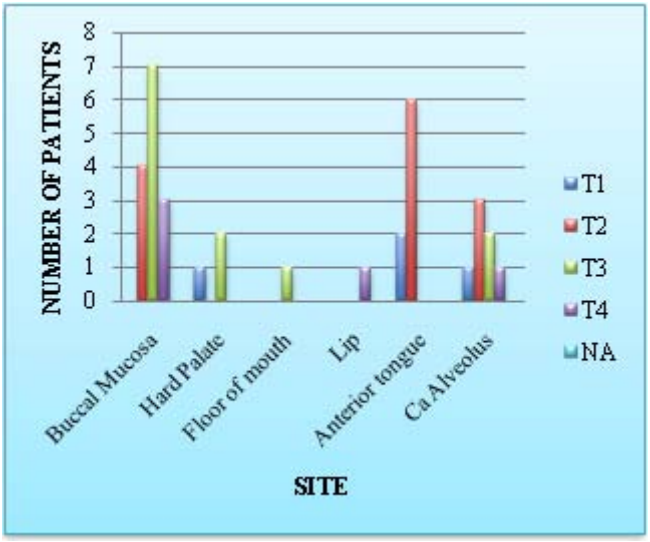


Chart 4: T – Staging according to primary site in oral cavity as evaluated by clinical examination

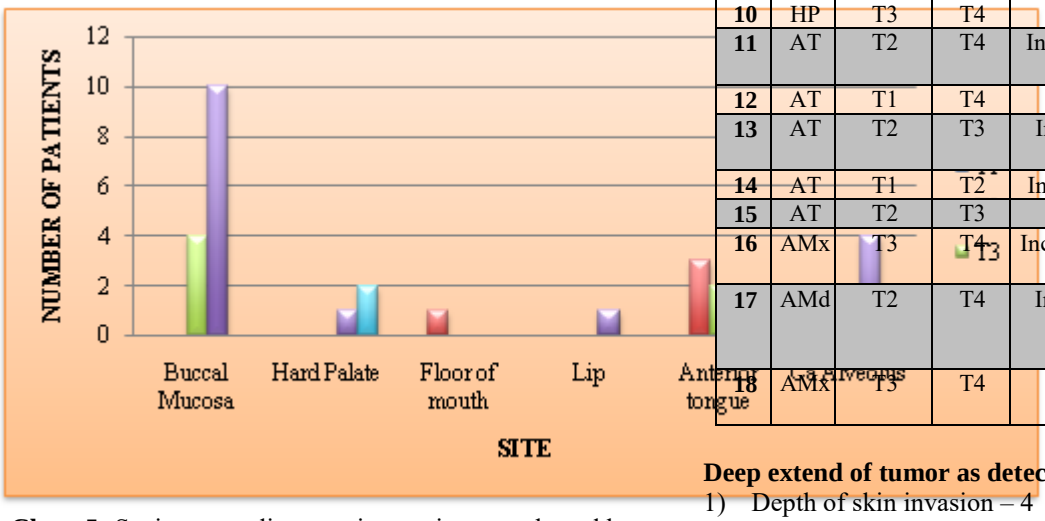


Chart 5: Saging according to primary site as evaluated by CT – staging

- Most of the primary malignant lesions evaluated clinically for oral cavity were T2 lesions (38.2%)
- However on CT most cases were stage T4 (50%)
- In 15/34 cases (44.1%) the T-stage of CT correlated well with clinical stage.
- In 14/34 cases (41.1%) the T-stage was upgrade by CT stage as compared to clinical evaluation.
- 4 cases (11.7%) two each of hard palate and anterior tongue were graded as NA on CT Scan because of the superficial ulcerative nature of the lesions. CT could only diagnosis some thickening of hard palate in these cases even on coronal scanning.
- Another case of carcinoma of floor of mouth was under staged by CT even on coronal scan because of superficial ulcerative nature of the lesions.
- Significant additional information was however provided by CT in the above 5 cases of oral cavity that was important during surgery.

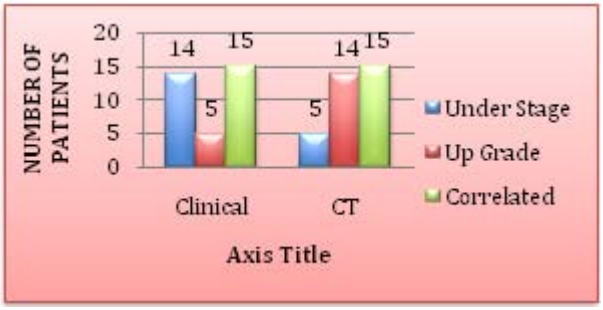
Table 1: Additional information provided by CT for upgrading T-Stage in 18 cases

S NO.	Site	Clinical T- stage	CT-T stage	Add. Information provided by CT
1	BM	T2	T4	Increase size, extn. -B, Ma, ITF.PT, SK
2	BM	T2	T4	Increase size, extn. - B, Ma, osseous involvement of Mx.
3	BM	T2	T4	Increase size extn. - B, Ma, ITF.PT, PTM
4	BM	T2	T4	Increase size, osseous involvement Md.
5	BM	T2	T4	Increase size, extn - B, Ma low ITF .
6	BM	T3	T4	Increase size, osseous involvement Md.
7	BM	T3	T4	Increase size, extn B, Ma ..
8	BM	T3	T4	Increase size, extn RMT , osseous involvement Md
9	BM	T3	T4	Increase size, extn. - B, Ma, osseous involvement of Md.
10	HP	T3	T4	Extn. -mx, FO.
11	AT	T2	T4	Increase size, extn. -FM, LPW, Lx, V, T. & Branchial cyst
12	AT	T1	T4	Extn. -B, GBS.
13	AT	T2	T3	Increase size, involvement of Hypoglossal N.
14	AT	T1	T2	Increase size, extn. -CM, GEF.
15	AT	T2	T3	Increase size, extn. -T, FM
16	AMx	T3	T4	Increase size, extn. -LPW, GBS, FM, SMG.
17	AMd	T2	T4	Increase size, extn. -B, SMG, BM, DM, Inferior N. Involvement.
18	AMx	T3	T4	Extn. -PTF, PPW, ITF, SP. Erosion of Mx, PT.

Deep extend of tumor as detected by CT examination

1) Depth of skin invasion – 4
2) Pterygomandibular raphe invasion – 3
3) Maxilla invasion – 3
4) Mandible invasion - 4
5) Pterygopalatine fossa invasion secondary to retromolar trigone invasion–2
6) Perineural extension – 2
7) Intra cranial extension – 1

Change in T - Stage of Primary lesion of Oral Cavity by Clinical and CT Evaluation - CHART 6



Accuracy of CT in T-stage - 29/34 = 85.2 %
Accuracy of Clinical T-Stage - 20/34 = 58.8%,
In 41.1% of case CT upgrade the primary tumor stage

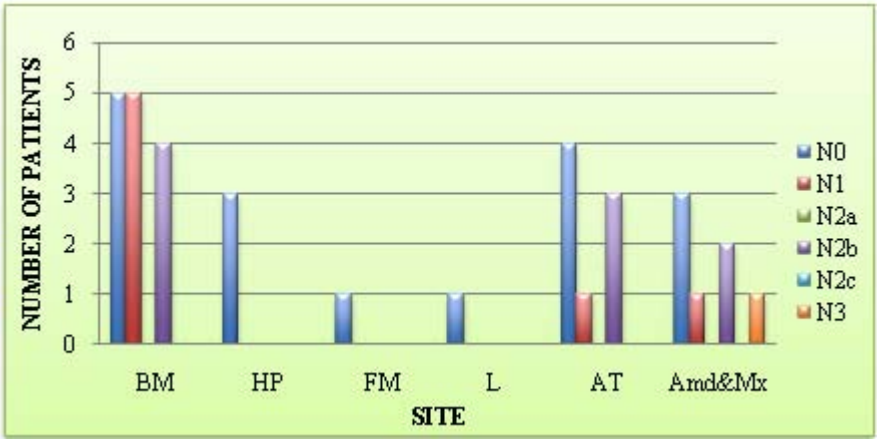


Chart 7: Nodal staging of patients according to primary site as detected by Clinical examination in oral cavity malignancies

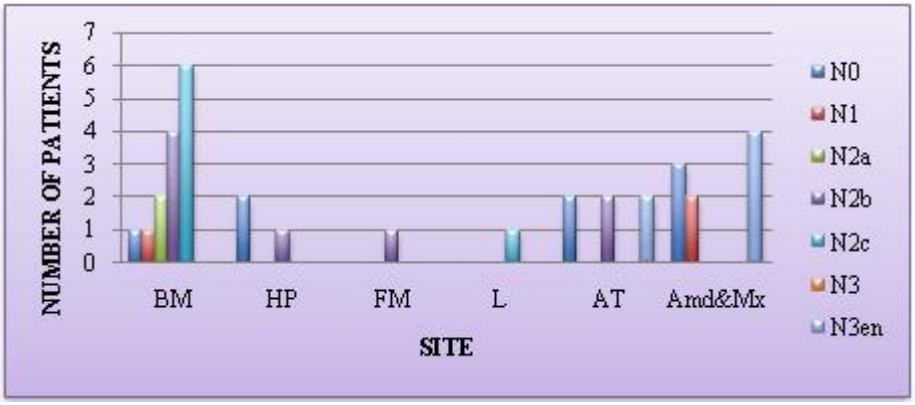


Table 8: Nodal Staging of patient according to primary site as detected by C

Table 2: Additional Information Provided by CT in N - Stage in 18 cases

S. NO	SITE	CLINICAL N- Stage	CT N-Stage	Add. Inform. Provided By CT
1	BM	N0	N2c	CN, B\L
2	BM	N0	N2c	CN, B\L
3	BM	N0	N2c	CN, B\L
4	BM	N0	N2c	CN, B\L
5	BM	N1	N2a	CN
6	BM	N1	N2a	CN
7	BM	N1	N2c	CN, B\L
8	HP	No	N2b	MN
9	FM	N0	N2b	MN
10	L	NO	N2c	B\L, MN
11	AT	N2b	N3en	CN, B\L, ExS
12	AT	N0	N1	CN
13	AT	N2b	N3en	B\L, CN, ExS
14	AT	N0	N2b	B\L, MN
15	AMd	N2b	N3en	CN, ExS
16	AMx	N1	N3en	MN, CN, ExS
17	AMx	N2b	N3en	B\L, CN, ExS
18	AMd	N3	N3en	CN, ExS

- Central necrosis was seen in 15 cases.
- Extra capsular spread was noted in 6 cases
- In all cases minimum axial diameter of nodes was > 1 cm each

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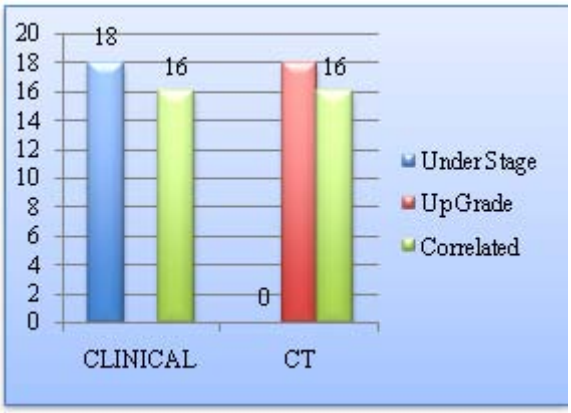

Chart 9: Change in N-stage of primary lesion of oral cavity by clinical and CT evaluation

Accuracy of CT in N-staging 32/34 – 94.1%
Accuracy of Clinical N-Staging 16/34 – 47.0%
In 52.9% cases CT up graded the N-stage of the primary tumor.

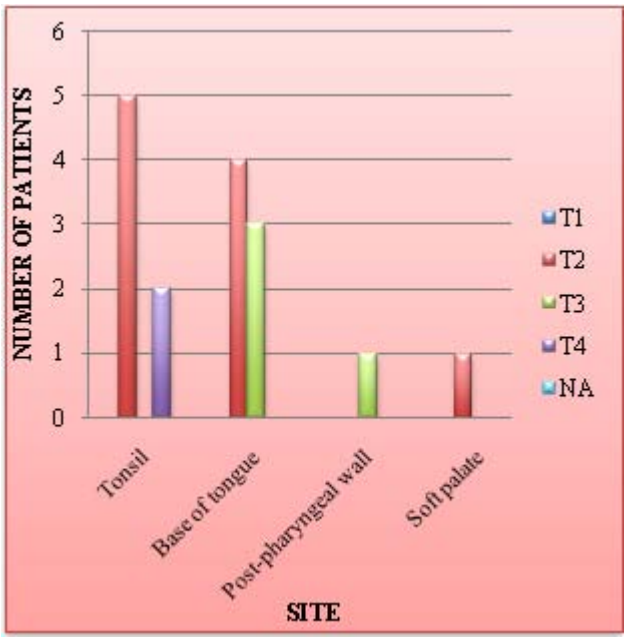

Chart 10: T- Staging According to Primary Site in Oropharynx As Evaluated by Clinical Examination

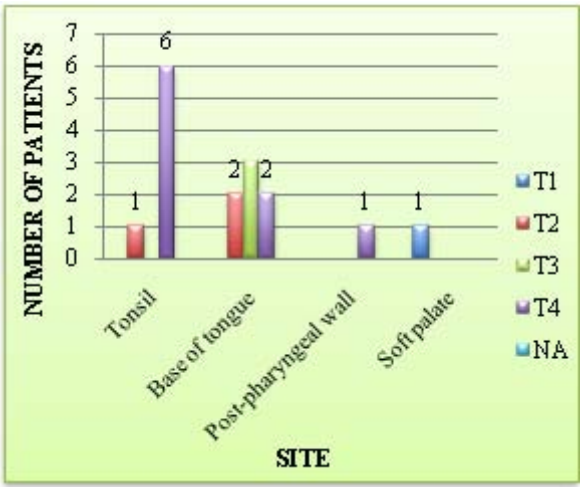

Chart 11: T-Staging According to Primary Site In Oropharynx as Evaluatedby CT

Most of the primary malignant lesions evaluated clinically in our study were T2 lesions (62.5%)
However on CT most cases were stage T4 (56.2%)
8/16 cases (50%) the T- stage of CT correlated well with clinical staging.
7/16 cases (43.7%) the T-stage was upgraded by CT staging as compared to clinical evaluation. One case of soft palate was under estimated by CT because of the superficial ulcerative nature of the lesion.

Table 3: Additional Information Provided by CT in 7 Cases of Oropharynx

SITE	*Clinical T- Stage*	*CT T-Stage*	*Add. Information Provided By CT*
T	T2	T4	Inc. Size, ExT-BT, SMG
T	T2	T4	ExT-SP, SMG, BT, PTM
T	T2	T4	Inc. Size, ExT-BT, LT, SMG
T	T2	T4	ExT-B/LT, PPW, SP
PPW	T3	T4	ExT-SP, NP, LP
BT	T2	T4	Inc. Size, ExT-PPW, T, CM
BT	T2	T4	ExT-AT, SP, V Inc. Size

Oropharyngeal Carcinoma Deeper Invasion Assessed by CT

1) Pre epiglottic fat – 3
2) Pre vertebral musculature – 4
3) Pterygopalatine fossa – 3
4) Pterygomandibular fossa – 1
5) Midline crossing into base of tongue – 5

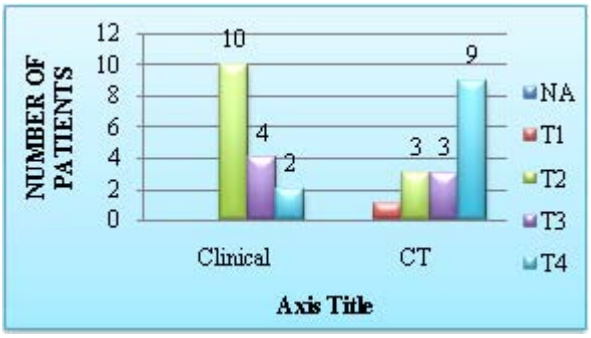

Chart 12: Comparison of Clinical and CT T-Stage Accuracy

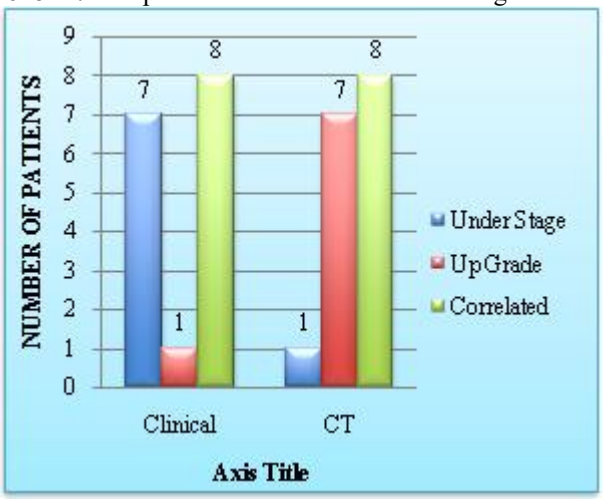

Chart 13: Change in T-Stage of Primary Lesion by Clinical and CT Evaluat

Accuracy of CT m T-Stage - 15/16 = 93.7%
Accuracy of Clinical T-Stage - 9/16 =56.2%
In 43.7% cases CT upgraded the primary tumor stage in malignancy of oropharynx
In 6.2% cases were understaged by CT

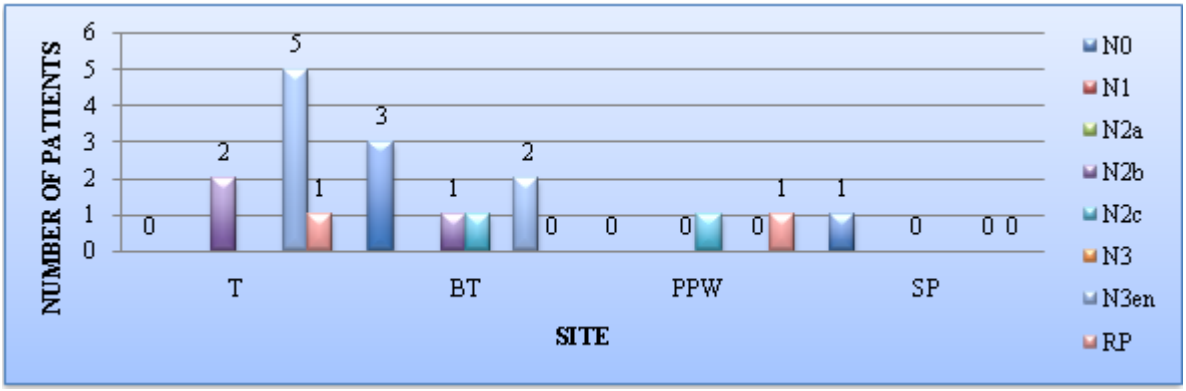

Chart 14: Nodal Staging of patient according to primary site by CT

Additional Information Provided by CT in 8 cases

- 8/16 cases (50%) correlated with N-stage of clinical examination. Central Necrosis was seen in 8 cases.
- Extracapsular spread was noted in 7 cases.
- In all cases minimum axial diameter of node was > 1cm
- In 2 cases additional Retropharyngeal nodes was involved [42]

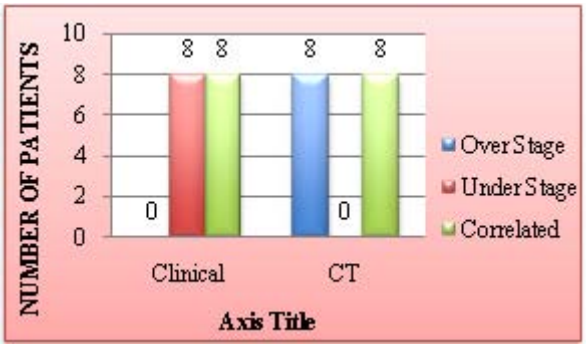

Chart 15: Change in N-stage or Primary Lesions of Orophagynx by Clinical and CT Examination

Accuracy of CT in N-stage 16/16 = 100%
Accuracy of Clinical N - Stage 8/16 = 50%
In 50% cases CT upgrade the N-stage of primary tumor.

5. Discussion

This study conducted in the Department of Radiology, SBKS MIRC, Sumandeep Vidyapeeth included 50 new cases of oral cavity and oropharynx.

Sex Distribution

The distribution of cases according to the sex was 44 males and 6 females, constituting the sex ratio of 7.3 : 1. Men are more commonly affected than females with a ratio of 5:1 [4].

Age Distribution

Our study also demonstrated that 65% of cases were in the age group of 40 to 60 years, in accordance to observations made by **Notani et al** [5], Hospital Cancer Registry [21] and by **Mridu Manjari et al** [16]. About 22% of cases were seen above 60 years of age. And only 6% of cases below 40 years of age. Thus the primaries in the oropharyngeal region show a uniform distribution of cases in the forth to eight decade, with only a few cases in younger age group. This data is in confirmation to the figures published by the cancer registries nation wide [8,9]

Risk Factors

In our study 88% cases gave a history of the use of tobacco in one of its forms, bidi, cigarette, pan, gutkha etc.
Another 24% patients had a history of alcohol intake, which is known for its synergistic affect in the cancer causation [10]. These findings corresponded to the data published by Notani et al [5], who reported a 90% attributable risk of oropharyngeal tumors associated with the use of tobacco in one of its forms. **Desai et al** [11.12] also stressed on the role of tobacco in causation of the malignant lesions in oral cavity.

It is of interest to note that none of the patients had a risk associated with alcohol when the risk of smoking is removed in agreement to the observation by **Mayers** [13] and **Notani et al** [5], who commented that though alcohol is not carcinogenic by itself, it exerts a strong synergistic action when present with tobacco.

6. Distribution of Malignancies According to the Primary Site

Most of the cases in our study were of oral cavity (68%) and 32% were of oropharynx. Our data corresponded to the cumulative data published by the **National Cancer Registry Programme** [14], **and the Delhi Cancer Registry** [8].

In oral cavity maximum no of cases were of Buccal mucosa. Tonsil and base of tongue constituted most of the cases, which correlated with the data provided by **Mridu Manjari et al** [16] **& Vincent Devita** [4].

Classification of Oropharyngeal Malignancies by Histological Type

In our series 92.5% cases were of squamous cell carcinoma. 5% cases were adenocystic carcinoma of minor salivary glands. And only 2.5% cases were of NHL. The above percentage correlated well with **V. Devita et al** [4].

Stage Distribution

Most of the tumor (70%) in this study were advanced lesion as evaluated by CT in T3 and T4 stages at the time of presentation to our institution, probably secondary to the hospital bias related to the delay in the patient presentation to a tertiary institution like our hospital.

A large number of studies are available comparing the CT findings of the extra-cranial head and neck malignancies with histopathological findings. However, only a few of these compare the CT findings with the clinical findings [15,16].

Easy accessibility of this region to the clinical inspection and palpation allows for a thorough clinical assessment of the tumors. Therefore, the majority of cases diagnosed in this area were correctly staged by clinical examination in our study - 19/34 (55.8%) cases of **oral cavity** and 9/16 (56.2%) cases of **oropharynx**. The T-description of the tumor by CT and clinical examination were in correlation in 36% cases, CT was able to demonstrate additional findings in the rest. **F. Aspestrand et al**[26] in his study of 36 patients with tumor of oral cavity, pharynx and larynx concluded that a positive correlation between the CT and clinical examination was found in 53% cases.

However CT was unable to define 4 primary lesions of **oral cavity**, two each of hard palate and Anterior 2/3rd of tongue due to superficial ulcerative nature of the lesion. In one case of floor of mouth CT could not evaluate the exact size even on coronal scanning because of large superficial component of the lesion.
CT demonstrated perineural extension in 2 cases of oral cavity by demonstrating the denervation atrophy of muscle of tongue in one case and mandible involvement in another case. This correlated well with the study conducted by **Mukherji MD et al** [10] who demonstrated the CT criteria for perineural or vascular invasion by aggressive nature or the tumor margins and invasion of the sublingual space.

In 3 cases of oral cavity CT demonstrated maxillary invasion, which was diagnosed only in one case clinically thus, altering the surgical planning. Skin involvement was seen in 4 cases, where it was clinically suspected in only 2 cases. Intra cranial extension was seen in one case of tongue, in which case although primary tumor was not discernable on CT due to superficial nature of lesion but osteolytic metastasis was seen in occipital bone making the staging – MI. Erosion of pterygoid plates was seen in another 2 patients.

In malignancies of oropharynx CT upgraded the primary tumor stage in 43.7% cases and correlated with clinical T-stage in 50% cases. However only in one case of soft palate CT under estimated the true extent of the lesion due to its superficial nature. CT was able to demonstrate the extension across the midline into base of tongue in 5 cases, of which only 2 were diagnosed clinically.

The demonstration of the pre - epiglottic fat space involvement and pterygopalatine fossa involvement in 3 cases each which did not alter the T – Stage description of tumor, where important to demonstrate as they were considered poor prognostic indicator of tumor control by radiotherapy. **Schaefer et al** [17] concluded that CT is helpful in detection and delineation of pharyngeal tumors. In 2 cases carotid involvement was demonstrated, not suspected clinically, thus obviating the possibility of dissection of the tumor.

Thus CT is a valuable adjunct to clinical examination in T – staging as also demonstrated by **Larrson et al** [18] who concluded that CT is not a substitute for thorough clinical examination but adds to the information about the greater & deep extent of the lesion. These findings are also in correlation to the reports of various other authors. **Muraki et al** [1] reported an increase in T-stage description of 33.3% cases post CT evaluation. Schafer et al [19] reported that the CT was moderately useful in evaluation of tongue & floor of mouth lesions.

Study by **Prehn et al** [16] showed a change clinical description in 25% of oral cavity lesions and defined the true extent of tumor infiltration in many more by CT. **Larsson SG et al** [20] in his study concluded that normal mucosal layer of the base of the tongue often show contrast enhancement of the same magnitude as the tumor and can at times be irregular in outline because of co – existing lymphoid tissue. This superficial tumor spread can therefore be difficult to ascertain on CT but be quite obvious for the clinician.

7. Lymph Nodes

In the present study 44% cases were classified as clinically negative nodes. Post contrast enhanced CT examination, 10 of the 22 clinically negative necks (45.45%) showed evidence of nodes of more than 1cm in size with unequivocal signs of metastasis (central necrosis, extra-capsular spread). CT also altered the description of N-stage of 32% cases (16) by upgrading the N-stage to N3 en in 24% cases and 4% in N2c nodal stage.

This upgrading was done by demonstrating.

- Central necrosis in 22 cases
- Multiple nodes in 7 cases
- 2 cases showing Retropharyngeal nodes in oropharyngeal malignancies. In 14 cases CT demonstrated bilateral involvement.
- **Mancuso et al** [3] in 1983 had reported the presence of Retropharyngeal nodes in primary/recurrent squamous cell carcinoma of head and neck as a poor prognostic indicator.

The extracapsular spread was demonstrated by CT in 26% cases, which was not suspected clinically. This finding was important because apart from being a poor prognostic indictor, it rules out the possibility of radical neck dissection in such patients for regional control of disease.

Earliest reports by Mancuso et al [25] described that 21,1% patients with clinically negative neck should positive nodes on CT which was confirmed by histopathological studies. Further study by same authors (42) showed a change in 5% cases of clinically negative neck.

Friedman et al [21] reported a 23.3% rate of detection of occult regional metastasis by CT. Lydiatt et al [24] reported positive predictive value of 93% by CT or MR and 67% for clinical examination, thus recommending CT or MR as a routine investigational procedure in all cases of head and neck. Studies by Van den Brekel et al [22] and Caruelho et al [23] substantiated the efficacy of CT in demonstration of tumour positive nodes. Harsson SG et al [20] reported that more than 50% contralateral nodes detected by CT, were missed by clinical examination and started that the diagnostic accuracy of CT superpasses that of the clinical examination.

The findings of our study was in good correlation with those of previous authors. CT also has an impact in patient management, because detection of accult metastasis to regional nodes, contralateral side, as well as extra capsular spread are poor prognostic. Predicator and alter the patients management. Extracapsular spread when present rules out a radical neck dissection in cases, where it is planned for regional tumor control.

8. Summary and Conclusions

1) Our study included 50 new cases of malignancies of oral cavity and oropharynx. 44 males and 6 females.
2) Maximum cases were grouped in the fifth and sixth decades, with a few cases in higher age group.
3) 88 % of all cases had risk of malignancy associated with long term tobacco exposure, 24% cases showed additional risk of alcohol abuse. These risk factors were more pronounced in the male patients.
4) The distribution of malignancies according to the primary site was 68% oral cavity and 32% oropharyngeal malignancies. Anterior tongue constituted maximum number of cases in oral cavity and tonsil & base of tongue in oropharynx.
5) 92.5% cases in our study were squamous cell carcinoma.
6) Most of tumors were advances stage T3, T4 as evaluated by CT.
7) Accuracy of CT in diagnosing T stage was 88% were as of clinical evaluation was only 58%
8) CT upgraded the T-stage in 42% of cases by demonstrating – greater extent of tumor, osseous involvement, perineural extension, skin invasion, pre-epiglottic fat invasion, and midline crossing into base of tongue.
9) One of the shortcomings of CT was its inability to detect small superficial mucosal primary tumors. Such cases constituted 15% of all the cases included in our study.
10) CT was able to detect occult nodal metastasis in 45.45% cases and upgrade the nodal stage in 32% of cases. Demonstrating central necrosis, extra capsular spread, and contra lateral involvement did this. In 2 cases Retropharyngeal nodes were discovered which is a poor prognostic indicator.
11) In 2 cases CT also demonstrated extension into the cranium and base of skull, one case was direct extension of the primary tumor and second case was due to haematogenic spread.

Thus routine use of CT is strongly recommended in all the malignancies of extra cranial head and neck.

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