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Clinico- pathological correlation of pattern of cervical lymph node metastases in oral cavity cancers

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Abstract
Introduction: The Oral Squamous cell carcinoma spreads by lymphatics. Hence it is the important prognostic factor in oral carcinoma. The involvement of lymph nodes guides in the treatment of oral carcinoma and neck dissection. By knowing the level of involvement of oral carcinoma, the staging can be done and the type of neck dissection can be planned accordingly and decrease the morbidity of the radical neck dissection.
Aim: To determine the clinico pathological correlation of pattern of cervical lymph nodes metastases in oral cavity cancers.
Methodology: It is a prospective study of histologically proven oral carcinoma of 50 patients. Data for the study collected from the patients coming to the General Surgery OPD at SS Institute of Medical sciences and Research Centre, Davangere, over a period of two years from October 2016 to August 2018. Inclusion Criteria included are patients with clinical suspicion of oral cancer with positive/negative lymph nodes, previously untreated oral cancers, histologically proven oral carcinoma cases. Exclusion Criteria are patients not willing to give informed consent, patients who are unfit for general anaesthesia, prior treatment of other head and neck cancers by surgery, chemotherapy and radiotherapy, previous surgery in the neck, presence of distant metastasis. Clinical neck examination done along with other necessary radiological investigations. The neck examination is compared with histological examination. The analysis done by Sensitivity, Specificity and Accuracy of the neck examination.
Results: In our study, Pathologically level II (56.3%) was the most commonly involved lymph node station in patients with oral cancer. Most of the patients presented in an advanced stage clinically. Stage IV was the commonest with 20(40%) patients. The Sensitivity and Specificity of the clinical neck examination were 76.9% and 61.8% respectively in patients with oral cancer. The accuracy of clinical examination is 78%. In our study, tumour stage had a positive correlation (r=0.987) with the pathological nodal status, that was significant (p=<0.001). In our study, there was significant positive correlation (0.435) between pathological T stage and pathological level of involvement in oral cancer and it was significant (p=0.0001). The drawbacks of the study were there might be sampling errors and small size of the study.
Conclusion: In our study it was found that there was had increased sensitivity and specificity on clinical examination. Course of pre operative antibiotics can increase the specificity of clinical neck examination. From our study we recommend that supraomohyoid neck dissection as a staging procedure. The use of pre operative radiological imaging can increase the involved lymph node and can be used in staging.

Keywords: oral carcinoma, clinical examination, histopathological examination, sensitivity, specificity

Introduction
The oral carcinoma occurs in the sub sites of oral cavity that includes the mucosal lip, buccal mucosa, oral tongue (Anterior two thirds), floor of mouth, upper and lower alveolus, hard palate and retromolar trigone.
It is a serious and growing problem in many parts of the globe. Oral cancer ranks sixth in the overall incidence for the 10 most common cancer sites worldwide and third in the developing countries [1]. In the Western world, oral cancer is relatively uncommon, and in the context of all malignant tumors, incidence in the United States and Great Britain ranges from 2 to 3%. In the Asian subcontinent of Bangladesh, India, Pakistan, and Sri Lanka, oral cancer is the most common malignancy, accounting for about one-third of all malignancies within the subcontinent [2, 3] Worldwide, it is estimated that about 300,000 people will be diagnosed with oral cancer in 2010 [4]. Of these, 126,000 will die from the disease. It constitutes approximately 5% of all cancers globally, with 60,000 new cases of oral cancer is reported every year in India [5].

Of the 0.3 million annual cancer related deaths in India, nearly 33% arise from tobacco-related cancers.

The pathogenesis of oral cancer is equally complex, and exposure to carcinogens does not inevitably result in the development of oral cancer. This is because a number of familial, dietary, hormonal, and sex-related factors are known to modulate neoplastic processes [6].

Tobacco and alcohol have emerged as the most important culprits contributing to the etiology of oral cancers. Tobacco users have a five fold to 25-fold higher risk of oral cancers. Other factors frequently cited are ultraviolet light, nutritional and dietary factors, precancerous lesions, immune suppression, genetic, and dental factors. Approximately 80 percent of oral cancer patients are smokers, and this is two to three times greater than that of the general population [7]. There is proof that significant tobacco and alcohol use is associated with a high frequency of p53 mutations [8].

Even though the oral cavity is an accessible site for the patient and the physician, a large number of oral cancer present late because of the painless and vague nature of the symptomatology. In general a patient with carcinoma of the oral cavity may have some of the following symptoms: An ulcer that bleeds on touch, Slurring of speech, Otalgia, Ankylosglossia, Trismus, Profuse salivation, Halitosis, Swellings in the neck

Cervical lymph node metastasis are the common modes of spread in squamous cell oral cancers. The single most important factor in guiding the treatment for squamous cell carcinoma of the oral cavity is the presence of metastasis to neck nodes, and it is the most important prognostic factor in patients with squamous cell carcinoma of the oral cavity [9]. The presence of nodal metastasis reduces survival by nearly 50%, compared to approximately 90% of patients without the metastasis. Survival rates are further decreased to 20-30% in patients with nodal metastases that have spread beyond the lymph node capsule, or extracapsular spread (ECS) [10].

The term clinically occult metastasis is usually used to indicate a metastatic deposit undetected by clinical or radiographic examination [11, 12] It is reported that over 30% of clinically node-negative patients harbor occult metastases.[13] The risk of occult metastases is particularly high for cancers of the oral cavity. Several studies have suggested that new and highly sensitive investigations, in particular immunohistochemistry, molecular analysis, and serial sectioning of cervical lymph nodes have increased the detection rate of micro metastases in head and neck cancers [12, 14].

Understanding the sequential patterns of neck metastasis therefore greatly facilitates surgical management of regional lymph nodes in cases in which findings of the neck are clinically negative but the lymph nodes are at risk of harboring micro metastasis. Spread of metastatic cancer to regional lymph nodes in the neck from oral cancer occurs in a predictable and sequential fashion. The Memorial Sloan-Kettering classification is a more precise system of describing the cervical nodes and is now well accepted [15].

The regional lymph nodes at highest risk for early spread by metastatic cancer of squamous cell carcinoma of oral cavity are limited to levels I, II, and III. About 15% of patients with a node positive neck are at risk of developing metastases at level IV in addition to the upper three levels.

A number of normal structures can be confused with a lymph node in the neck. The lateral tips of the transverse processes of both C1 and C2 can simulate lymph nodes, as can the parotid tail, superior horn of the thyroid cartilage and the carotid bulb. Irradiated and obstructed submandibular glands may also simulate lymph node enlargement.

There is considerable error in palpating the neck, with significant variation between experienced observers. The use of calipers or another measuring tool is therefore advised [16].

The prime objective of oral cancer management is to prevent mortality and to improve the quality of life of the patient. The choice of treatment depends upon the site and size of the primary lesion, cell type and degree of differentiation, presence or absence of lymph node metastases, assessment of potential complications of each therapy. Surgery is the most commonly accepted in the treatment of oral cancer, followed by radiotherapy. Chemotherapy is an adjunct to the principal curative modalities of surgery and radiation.

The treatment modalities for oral carcinoma include Surgery, Radiotherapy and Chemotherapy. Surgery includes wide excision and Reconstructive surgery, Fluorescence visualization (FV) guided surgery, Laser microsurgery, Transoral robotic surgery (TORS), Cyber knife robotic radiosurgery system [17].

Radiotherapy (RT) is an extremely effective treatment for head and neck cancer, as a neoadjuvant or as an adjuvant treatment following surgery. In early-stage disease, radical RT can cure > 90% of cancers. In more advanced-stage diseases, RT is usually used in combination with cisplatin chemotherapy, either as radical chemo radiotherapy [18] or more recently tried with Methotrexate or 5-FU to attain a surgically resectable stage [19] or chemotherapy used in an adjunctive fashion after ablative surgery [20] RT or surgery alone can be effective in early stage [Stage I and II] HNSCC. RT can be delivered via external beam and/or brachytherapy. For stage III and IV HNSCC, surgery and postoperative chemoradiation or definitive chemoradiation are effective [21, 22].

The treatment of lymph node metastasis to the neck is the neck dissection. The American Academy of Otorhinolaryngology proposed various modifications i.e., modified radical neck dissections, extended neck dissection where, non-lymphatic structures are preserved initially and selective neck dissections preserving some groups of lymph nodes later for a clinically N0 neck.

These modifications have resulted in significant reduction in the morbidity following neck dissections. This has been possible due to the accurate knowledge of the predictable and sequential mode of spread to the lymph nodes. A study to document the pattern of lymph node metastasis from squamous cell carcinoma of the oral cavity could be very useful to determine the extent of neck dissection required for various sites in the oral cavity depending on the clinical status of neck node involvement.

Materials and Methods

It s a Prospective study done during October 2016-August 2018. Data are collected from patients who attend the General Surgery department of SS Institute of Medical Sciences & Research Centre, Davanagere by questionnaire and by clinical examination. The sample size of 50 are considered by consecutive sampling method

Study setting

Patients who satisfy the inclusive criteria for the study and who attend the OP/IP of Department of General Surgery, SS Institute Of Medical Sciences Research Centre, Davanagere.

Inclusion Criteria

1. Histologically proven, squamous cell carcinoma of the oral cavity with a curative surgical intent on the primary tumour and neck.

2. Previously untreated oral cancers.
3. Patients with oral cancer with positive/negative lymph nodes.
4. Patients of age more than 18 years

Exclusion Criteria

1. Patients below the age of 18 years
2. Not willing to give an informed consent
3. Non squamous cell carcinoma
4. Presence of distant metastasis
5. Prior treatment of head and neck cancer by surgery, radiotherapy and chemotherapy
6. Prior surgery in the neck.
7. Unfit to undergo general anesthesia.

Study Procedure

Clinical Assessment

All patients who fall within the inclusion criteria, within the study setting and study duration will be included in the study. After getting an informed consent, complete history and thorough clinical examination was preformed with emphasis on site, size, extent of involvment of lymph nodes and clinical staging,

Pathological assessment

For each patient and before surgery six containers with 10% buffered formalin were prepared:

- Container I for level I lymph nodes (Submental + submandibular),
- Container 2 for level II Lymph nodes (upper jugular),
- Container 3 for level III lymph nodes (middle jugular),
- Container 4 for level IV lymph nodes (lower jugular),
- Container 5 for level V lymph nodes(posterior triangle)
- Container 6 for the primary resected lesion.

In nodes with obvious metastatic involvement, fixation to the perinodal adipose tissue or adjacent structures, fusion of adjacent nodes or spread into extranodal tissue was recorded (macroscopic extracapsular spread).

Statistical analysis

Statistics such frequency, proportion, mean along with standard deviation will be used to study the presence of cervical lymph node metastases in different levels of the neck by clinical and histopathological examination. Sensitivity, specificity, positive and negative predictive values will be estimated to determine the accuracy of clinical examination in the detection of lymph node metastases in the neck vs. histopathological examination. Spearman Rank correlation will be used to study the correlation between tumour stage and lymph node metastasis.

Results

The study was conducted in S S institute of medical sciences and research Centre, Davangere. 50 patients took part in our study which was conducted between October 2016-August 2018.

The results have been classified as oral cavity as a whole and by the major sub sites involved namely buccal mucose, retromolar trigone, tongue, floor of mouth and lower alveolus.

Sex and age distribution

The study group consisted of 34(68%) males and 16(32%) females. The male female ratio was 2.1:1.

The majority of the patients 19(38%) were in the fifth decade of life. Among them, 7 had carcinoma of the buccal mucosa, 5 had carcinoma of retromolar trigone, 5 had carcinoma of tongue, 1 each of floor of the mouth and lower alveolus. Only one patient (2%) presented before the age of 30. One patient presented above the age of 70 years. The mean age of patients was found to be 53.04 with a range of 28 to 78 years. The mean age and standard deviation of age for patients with carcinoma buccal mucosa, retro molar trigone, tongue were 50.41 ± 9.96, 52.75 ± 5.71 and 54.30 ± 8.10 respectively.

Duration of Symptoms

Of the 50 patients, 25(50%) of the patients presented with in 6 months of developing symptoms. 14 (28%) patients presented within 6 to 12 months, 11(22%) patients more than 12 months of developing symptoms.

Habits

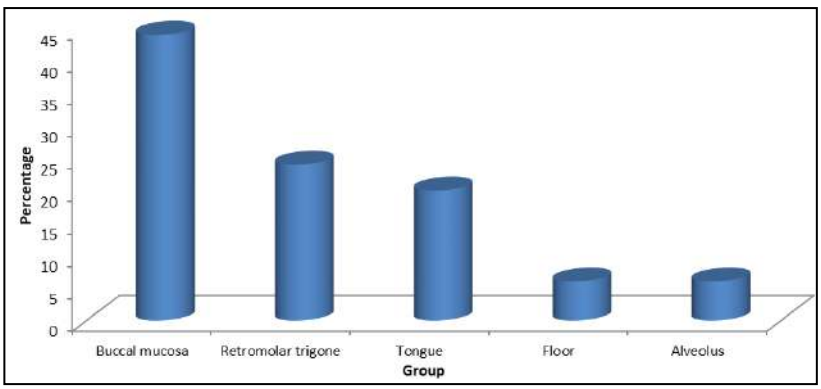
The habits of patients included in the study are smoking, alcohol, Gutkha, tobacco. Out of 50 patients, 31 were smokers. 14 (28%) smoked only cigarettes while 17 (34%) smoked only beedis. Tobacco and Gutkha chewers are 23 in number. Out of 50 patients, 33(66%), 16(32%), 22(44%) had tobacco chewing, Gutkha chewing, and alcohol consumption respectively.

Premalignant condition/Lesion

The most common premaligant lesion, oral submucous fibrosis was found in 26(52%) patients. The oral submucosal fibrosis were present singly or in combination with other lesions like Erythroplakia or Leukoplakia.

Table 1: Site of primary tumour

Site	Frequency	Percentage
Buccal mucosa	22	44%
Retro molar trigone	12	24%
Tongue	10	20%
Floor	3	6%
Lower alveolus	3	6%
Total	50	100%



Clinical T Stage of Sub Sites

Out of the 22 patients who presented with carcinoma buccal mucosa, T2 was the most common T stage 12(54.5%). Patients in T1 and T3 stages 5(22.7%) and 4(18.2%). There was only 1(4.5%) patients with T4 stage. Out of 12 patients that presented with carcinoma RMT, T1 was the most common T stage with 7(58.3%) patients followed by T2 stages with 4(33.3%) and T3 with 1(8.3%) respectively and no patients had T4 lesion. Out of 10 patients that presented with carcinoma tongue, T2 was the most common T stage 4(40%). T3 was the second commonest stage with 3(30%) patients, followed by T1 in 2(20%) and T4 in 1(10%) patients.

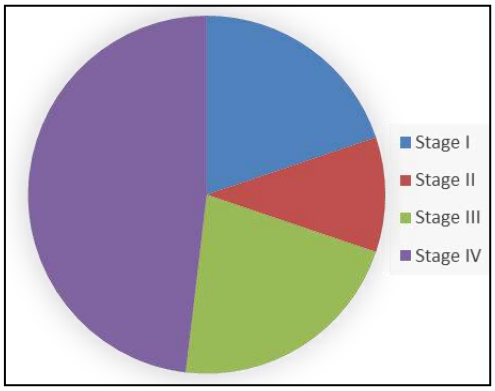
Table 2: Clinical cervical nodes involvement by level

Subsite	BM		RMT		Tongue		Floor		Alveolus		Total	
Level	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Level 1A	1	4.5	1	7.1	0	0	1	33.3	0	0	3	6.1
Level 1B	8	36.4	5	35.7	1	14.3	0	0	2	66.7	16	31.6
Level 2	10	40.9	8	57.1	5	71.4	2	66.6	1	33.3	26	53.8
Level 3	3	13.6	0	0	1	14.3	0	0	0	00	4	8.2
Level 4	1	4.5	0	0	0	0	0	0	0	0	1	2.3
Level 5	0	0	0	0	0	0	0	0	0	0	0	0

Clinical N Stage of Sub Sites

Of the 22 patients that presented with carcinoma of the buccal mucosa the majority of patients presented in clinically N2 stage 11(50%) while 9(40.9%) patients had N0 stage and 2 (9.1%) patients had N1 Stage. Out of the 12 patients that presented with carcinoma RMT, the majority had a clinically N1 neck 6(50%) while 4(23.3%) patients were in N2 Stage and 2(16.7%) patients were in N0 Stage. Out of the 10 patients that presented with carcinoma tongue, the majority had a clinically N0 neck 5(50%) while 3(30%) patients had N2 Stage and 2(20%) patients were in N1 Stage.

Clinical Composite Stage



In our study group of 50 patients the majority 20(40%) had stage IV disease clinically, followed by stage III 14(28%). Stage I and II were 10(20%) and 6(12%) respectively

Of the 22 patients with carcinoma buccal mucosa the majority of cases were stage IV 11(50%), followed by stage I i.e., 5(22.7%), stage II and stage III were 3(13.6%). Of the 12 patients with carcinoma RMT the majority of cases were stage III 6(50%), followed by 4(33.3%) in stage IV, stage I in 2(16.7%) patients. No patients in stage II. In carcinoma tongue, Stage I and II had 2 patients each and stage III and IV had 3 patients each. The patients with carcinoma Floor of mouth, stage I, III, and IV had 1 patients each. Lower alveolus had 1 each patient in stage II, III, IV. Overall majority patients presented with stage IV disease.

Surgery for the neck

Ipsilateral: Of the 50 patients in our study group the most common surgery to address the ipsilateral neck was a modified radical neck dissection which was done in 40 patients. In 8 patients a supraomohyoid neck dissection was undertaken. Only 2 patients underwent an extended supraomohyoid neck dissection.

Out of the 22 patients in Buccal mucosa, 18 patienta underwent MRND, 4 patients underwent SOND. No patients in Extended SOND. In Carcinoma Retromolar trigone, 10 patients underwent MRND, 1 patient each in SOND and Extended SOND**.** In Carcinoma Tongue, 8 patients underwent MRND, 1each underwent SOND and Extended SOND.

Contralateral: Only 7(14%) out of the 50 patients underwent a contralateral neck dissection, of which 6(12%) had a supraomohyoid neck dissection, and 1(2%) had a modified radical neck dissection.

Pathological T Stage for Major Sub Sites

Out of the 50 cases, in carcinoma buccal mucosa the majority were of T2 stage with 11(50%) and T3 with 7(16.7) cases. Of the 12 patients with carcinoma RMT the majority of cases were t1 and T2 with 5(41.7%), followed by T2, T3 2(16.7%) and no cases in T4. Out of the 10 patients with carcinoma tongue, the majority of cases were T2 with 8(40%), followed by T3 3(30%) and T1 4(20%) and T4 had 1(10%) case.

Pathological Nodal Status

Out of the 50 patient involved in the study 11 (22%) had a N0 neck and 39 (78%) had a N+ neck.

Table 3: Pathological levels of cervical nodal metastases

Level	BM (22)		RMT (12)		Tongue (10)		FOM (3)		LA (3)		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No	%
Level IA	2	9.1	2	16.7	0	0	1	33.3	0	0	5	10
Level IB	9	36.4	7	58.3	0	0	0	0	2	66.7	18	34.3
Level II	14	63.6	7	58.3	6	60	2	66.6	1	33.3	25	56.3
Level III	2	9.1	1	8.3	1	10	0	0	0	0	4	10
Level IV	1	4.5	4	0	2	20	0	0	0	0	3	6.4
Level V	0	0	0	0	0	0	0	0	0	0	0	0

In our study of 50 patients, the most common level involved was Level II (56.3%), followed by level IB (34.3%). Level IA, III, IV follows. There were no involvement of level V in our study. There were involvement of contralateral nodes in level IB and Level II.

Pathological N stage in oral cancer

Of the 50 patients in our study, 11(22%) were pathologically N0. 26(52%) patients were N1 and 13(26%) were N2. There were no patients with pathological N3 disease.

Out of the 22 cases of carcinoma buccal mucosa, 2(9%) had N0 disease and the remaining 14(63.6%) had N1 and 6(27.2%) had N2 disease. Out of the 12 cases of carcinoma tongue the majority had a pathologically N1 neck 8(66.6%). N0 and N2 were 1(8.33%) and 3(25%) respectively. Out of the 10 cases of carcinoma Tongue, the majority had a pathologically N0 neck 6(60%) and 2 each in N1 and N2 (20%). There were no patients with N2 disease.

Pathological composite stage in sub sites

Out of the 22 patients with carcinoma of the buccal mucosa, majority of the patients were of stage III 14(63.3%) followed by stage IV (27.3). Out of the 12 patients with carcinoma RMT, stage III was 8(66.7%) followed by stage IV was 3(25%). Out of the 10 patients with carcinoma of tongue, 3 patients belonged to stage II and III.

Table 4: Sensitivity and specificity of clinical neck examination in oral cancer

Clinical Nodal Status	Pathological Nodal Status		Total
	N+	N0	
N+	30	2	32
N0	9	9	18
Total	39	11	50

	(%)	95% confidence interval
Sensitivity	76.8	69.2 – 79.2
Specificity	81.82	74.3 – 87.9
Positive Predictive Value	93.75	81.1 – 95.3
Negative Predictive Value	50	41.3 – 61.3

Of the 32 necks found clinically positive, 30 were true positive while 2 were false positive. 9 patients were true negative while 9 were false negative. The sensitivity of clinical examination was found to be 76.8%, specificity was found to be 81.8%, positive predictive value 93.7% and negative predictive value 50%. Accuracy of clinical examination was 78%.

Table 5: Pathological T Stage Vs Pathological N Stage

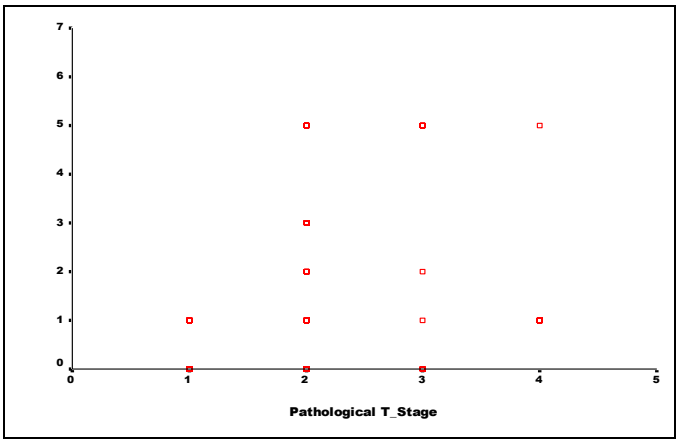
pT	Pathological N Stage					
	pN0		pN1		pN2	
pT1	6	54.5	5	19.2	1	7.7
pT2	4	36.4	15	57.7	1	7.7
pT3	1	9.1	6	23.1	7	53.8
pT4	0	0	0	0	4	30.8

Table 6: Spearman rank correlation pathological T stage vs. pathological N stage

Site	Spearman Rank Correlation(r)	p value
Oral cancer	0.987	<0.001
Buccal mucosa	1.000	<0.001
Retromolar Trigone	0.907	<0.001
Tongue	1.000	<0.001

Table 7: Spearman rank correlation - pathological t stage vs pathological nodal level

Site	Spearman Rank Correlation (r)	p value
Oral cancer	0.435	0.001
Buccal mucosa	0.388	0.008
Retromolar Trigone	0.536	0.001
Tongue	0.387	0.112



In our study there was positive correlation (0.435) between pathological T stage and pathological level of involvement of the neck nodes in oral cancer and it was statistically significant (p=0.0001).

Discussion

As approximately one third of all the lymph nodes in the body found in the neck, unarguably, the oral cavity has got rich lymphatic supply. Undetected nodal metastasis is the commonest cause of treatment failure in oral cancer. Hence regional control of nodal metastasis in the neck is an important factor in predicting the clinical course and outcome of the patient with oral cancer [23]. If regional node involvement is seen at initial examination or develops subsequent to initial therapy, the 5-year survival is generally significantly reduced [24].

Distribution of patients by age

Most oral squamous cell carcinomas appear in older patients (6-8th decade). In our study, the majority of the patients presenting with oral cancers were in the sixth decade (38%) of life irrespective of the site affected. The mean age of patients with oral cancer was 53.04±9.12 years. Shah *et al* has found mean age to be 60 years in patients with oral cancer [25]. The occurance in age groups of 50-60 can be attributed to environmental factors, especially tobacco chewing or smoking [1].

Distribution of patients by sex

In our present study, men are more commonly affected with oral cancer. This is probably because more men are habituated to tobacco chewing, Gutkha quid, smoking population compared to women that accounted for 66% in our study.

Distribution of patients by tumour size

In our study, each patient was categorized depending on the clinical T stage of the disease. Patients with oral cancer presented at an early stage (T1-T2). Patients with cancer of the Retromolar Trigone were the most common to report early when the lesion was relatively small size of the tumour followed by buccal mucosa (T1 and T2). Whereas, patients with cancer of the tongue reported at relatively later stage of the disease.

The findings can be attributed to functional importance i.e., restriction of mouth opening, pain due to bone involvement and infilteration of muscles of mastication [26].
These results are contrary to that of Pradhan who reported buccal mucosa cancer to be common in India with T4 tumours being the most common [27].

Distribution of patients by involvement of cervical nodal status

Nodal metastasis was histologically detected in 39 (78%) of the 50 patients with oral cancer. Of these, buccal mucosal carcinoma, maximum with 20 patients with nodal involvement. Lee *et al*. and Woolgar *et al*. reported the incidence of neck metastasis in oral SCC to be as high as 34-50% which is not comparable to our study [28].

Pattern of lymph node metastases to the neck

Squamous cell carcinoma of the oral cavity usually metastasize to levels I, II and III. Most of the initial focus of metastatic tumour develops within a 'local' lymph node, i.e; a node in the first echelon draining the primary site, and then there is an orderly progression to subsequent levels. However, there may occur skip metastasis in which the disease will bypass levels I or II or both and go directly to levels III or IV. This phenomenon is anatomically possible.
The present study shows level II to be the most commonly involved lymph node station in patients with oral cancer (56.3%). In the case of carcinoma buccal mucosa, level II was the most commonly involved lymph node station with 40.9% which is supported by Woolgar, in which, documented simple overflow to levels I and II in carcinoma of the buccal mucosa and more common involvement of level II. Level I involvement in 19 patients (38%). Level III involvement in 8%.
Isolated involvement of level III occurred in patient of tongue cancer bypassing the level I and II, which is also supported by Rouviere in his dissertation of the lymphatic pathways associated with the oral portion of the tongue [29]. Woolgar *et al*. found involvement of level IV in 18% of 50 patients110. Level IV was involved only in 1 patient of buccal mucosa. Shah *et al* documented 3.5% metastasis to level IV in the clinically node negative patients with oral SCC. Hence, they suggest that a supraomohyoid neck dissection would be sufficient surgical treatment for N0 neck [30]. The addition of adjuvant postoperative radiation therapy to the dissected neck has been shown to reduce the rate of local recurrence [31].

There were no involvement of Level V in our study

In patients with oral cancer, the pattern of metastasis was in an orderly manner. And only 1 patient of carcinoma tongue had skipped level I and II. On the other hand, metastasis from oral carcinoma in our study group either involved Level I or Level II. Extended Supra omohyoid neck dissection is accomplished when level IV is involved or in occult disease as evidenced by Ferlito *et al* documented that level IV nodes can be significantly affected by occult disease with and without metastases in level I-III lymph nodes [32].
In our study, 9 cases of buccal mucosa tumours had N0 stage, in connection with study of Borges *et al*, recorded low incidence of neck node metastases even in large buccal mucosa tumours and virtual absence of skip metastasis to lower nodal sites. This makes supraomohyoid neck dissection a logical alternative to conventional neck dissection for T3 and T4 buccal mucosa tumours [33].
Shear *et al* documented that SCC of the buccal mucosa had a significantly lower metastatic rate when compared to other sites in the oral cavity [34].

Sensitivity and specificity of clinical examination

In the present study, the sensitivity and specificity of clinical examination was 76.9% and 61.8% respectively in patients with oral cancer. The results are comparable to Woolgar *et al*., reported a sensitivity of 68% and specificity of 86% in patients with oral cancer. She attributed the poor sensitivity to the fact that many of the lymph nodes in the submandibular or submental region and within the deep cervical chain are normally small (less than 10mm) in size [35].
The Sensitivity and Specificity being 100% and 57.1% respectively in patients with cancer of the buccal mucosa and 80% and 51.4% respectively in patients with cancer of tongue, 100% and 33.3% respectively in carcinoma Retromolar trigone. The number of false positive nodes i.e., 2 patients with oral cancer may be attributed to lymphadenitis. There were 9 patients that were false negative. The positive Predictive valve of clinical neck examination is 93.75%. Accuracy being 78%.
Sajeeda *et al*. documented that ultrasonography (US) is not only useful in detecting neck nodes but is also useful in assessing their characteristics and the degree of vascular invasion.[36]
Dhawan *et al* stated that reasons for the variation between the clinical and histological assessments of lymph node disease were attributed to hyperplasia of neck nodes, mandibular expansion into the submandibular triangle which may give a false impression of level IB lymph node involvement. The submandibular salivary gland may be enlarged due to chronic infection and may become palpable.
Saafan *et al* reported a sensitivity and specificity of clinical examination as 71.43% and 75.86% respectively and sensitivity and specificity of ultrasound as 97.1% and 93% respectively.[37]

Correlation between T Stage and N Stage

Woolgar *et al*. in the study documented tumour size to be a major determinant in lymph node metastasis [38].
In our study, tumour stage had a positive correlation (r=0.987) with the pathological nodeal status, that was significant (p=<0.001). Carcinoma of buccal mucosa had a positive correlation (r=1.000) that was significant (<p=0.001), carcinoma Retromolar trigone had a positive correlation (r=0.907) that was significant (p=<0.001). Carcinoma of the Tongue had a positive correlation (r=1.000) that was significant (p=0.001).
Similarly, Fukano *et al*. too documented that the occurrence of cervical metastasis was related to advanced tumour stage [39].
Tumour thickness has been shown to be a better predictor of nodal metastasis than surface diameter [40] This was explained by Ditroia, who pointed out the difficulty for tumour emboli to form in the small caliber lymphatics of superficial areas compared with wider lymphatics of deeper tissues [41]. However, tumour surface dimension has the advantage over tumour thickness that it can be assessed clinically. Hence, it is routinely used in the initial staging procedures.

Correlation between tumour stage versus level of lymph node involvement

In our study, there was significant positive correlation (0.435) between pathological T stage and pathological level of involvement in oral cancer and it was significant (p=0.001). In carcinoma of buccal mucosa there was a positive correlation (0.536), which was significant (p=0.001). In carcinoma Retromolar trigone, there was a positive correlation (0.387) but it was not significant (p=0.002). In carcinoma tongue also there

was positive correlation (0.388) and it was not significant (p=0.0108). Tankéré F *et al* in his study too documented that there was a correlation between tumour stage and level of lymph node involvement in patients with oral cancer [42].

Summary

This study was carried out in SS Institute of Medical Sciences, Davangere. The study period was from October 2016 to August 2018.

50 patients enrolled for the study had 22 patients of carcinoma buccal mucosa, 12 patients of carcinoma Retromolar trigone, 10 patients of carcinoma tongue and the remaining three in each of carcinoma floor of mouth and lower alveolus.

The distribution of patients by age showed that majority of the patients were in the sixth decade of life. The mean age of oral squamous cell carcinoma was 53.04±9.12. The distribution of patients by sex showed that males were mostly affected and comprised of 68%. Male: Female ratio was 2.1:1. The most common premaligant condition was oral submucous fibrosis which was seen in 26 (52%) patients with no lesions in 17(34%). Most common side is the right aspect of the oral cavity. Most of the patients presented within 6 months of developing symptoms. Most of the patients presented in an advanced stage clinically. Stage IV was the commonest with 20(40%) patients. The commonest surgery performed in patients with oral cancer to address the neck was a modified radical neck dissection of the ipsilateral side in 40(80%) patients.

Most of the primary tumors in the oral cavity were pathologically well differentiated tumours – 37(74%) of the patients and 3 patients had poor differentiation. 31 (62%) specimen of patients had negative margins after surgery.

Pathologically level II (56.3%) was the most commonly involved lymph node station in patients with oral cancer. Level II was the commonest station involved in carcinoma of buccal mucosa and tongue. Level IB was the commonest in carcinoma retromolar trigone. Level V was not involved in the study. The sensitivity, specificity and accuracy of clinical examination of oral cancer were found to be 76.8%, 61.8% and 78% respectively. There was a positive correlation (r=0.298) that was significant (p value – 0.001) between tumor stage and lymph node metastases in oral cancer. There was also positive correlation (r=0.435) that was significant (p value- 0.0001) between tumour stage and level of lymph node involvement in the neck.

Conclusion

In our study it was found that there was had increased sensitivity and specificity on clinical examination in the preoperative assessment of the neck in patients with oral squamous cell carcinoma.

Course of pre operative antibiotics can increase the specificity of clinical neck examination. Additional investigatory methods like ultrasound and CT scan should be considered in preoperative evaluation of patients to increase detection of nodal metastasis.

We found that nodal metastases from buccal mucosa and retromolar trigone had a predictable and less aggressive behavior with a pattern of neck nodal involvement mainly involving level I, II and III without any evidence of skip metastases. Hence from this study we recommend a supraomohyoid neck dissection as a staging procedure for carcinoma of buccal mucosa and Retromolar trigone.

In the case of carcinoma oral tongue we found the neck to have skip metastases. Hence we recommend an extended supraomohyoid neck dissection as a staging procedure for carcinoma oral tongue.

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