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Research Article

A study on distribution of cervical lymph node metastases in oral squamous cell carcinoma (OSCC)

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ABSTRACT

Objectives: The purpose of this study was to determine the distribution of cervical lymph node metastases in the squamous cell carcinoma of the mandibular alveolus and floor of the mouth. **Materials and methods:** This was Prospective observation case series conducted in Department of Oral and Maxillofacial Surgery Allama Iqbal Medical College/ Jinnah Hospital Lahore, Pakistan. The duration of study was eight months starting from 1st March 2017 to 31st October 201. The calculated sample size, with 12% margin of error, 95% confidence level, expecting percentage of level II is 75.3%, is 50 cases.All the patients presenting in the OPD of department of Oral and MaxilloFacial Surgery Allama Iqbal Medical College were included in this study.

Conclusion: In conclusion, the most common region with ipsilateral cervical lymph node metastases in neck is from level I to III with levels I to II being the most prone to metastases (22%) followed by isolated level I (18%), and metastases to level I to III in total was seen in (92%) cases of the mandibular alveolus or floor of the mouth.

Keyword: Oral squamous cell carcinoma; cervical lymph nodes metastases; mandibular alveolus; floor of the mouth.

INTRODUCTION:

Oral squamous cell carcinoma (OSCC) is the eighth most commonly occurring cancer around the globe[1]. It is a major public health problem and cause of morbidity and mortality in developing Southeast Asian countries like Pakistan, concomitant with economic development[2]. OSCC accounts for 4% of malignancies in men, 2% of malignancies in women and is responsible for 3% of all cancer deaths[3].

Metastases of oral cancer is a complex process involving detachment of cells from the tumor tissue, regulation of cells motility, invasion, proliferation, and evasion through the lymphatic or blood system[4]. The aggressive and invasive nature of OSCC is reflected by its metastatic potential, peri-neural growth and significant recurrence rate. It metastasizes largely through lymphatics either in ipsilateral or bilateral cervical lymph nodes[5]. Cervical metastasis has a

tremendous impact on the prognosis of carcinoma of the head and neck and the frequency of such a spread is greater than 20% for most OSCC[6]. Predictive factors of cervical metastasis are primary tumor site, size, degree of differentiation, peri-neural invasion, perivascular invasion, inflammatory response, and tumor DNA content (ploidy)[7].49% of OSCC occult metastasis in the cervical lymph nodes is of buccal mucosa [8]. Level I was the most common site for nodal metastasis (100%), followed by level II (32%), level III (16%) and level IV (8%). Despite the development of multimodal treatment options, the prognosis remains relatively poor [6]. After tongue carcinoma, manifestation of occult metastasis is significantly observed more often in floor of the mouth and mandibular alveolus squamous cell carcinoma, than in any other cancer of oral cavity [9]. An overall 5% survival rate is described in literature. Although the distribution of tumor stages was same as compared to the preceding 10 years. Better survival was related to aggressive treatment of the neck even in early tumor stages and to adjuvant radiotherapy in advanced tumor stages.

A considerable number of patients had to be upstaged after elective neck dissection due to occult lymph node metastasis turned out to be of prognostic value.

Objectives of the study

The aim of this study is to evaluate our data on the distribution of neck nodal metastasis in patients presenting with OSCC of mandibular alveolus and floor of mouth, their topographic distribution in different levels of neck lymph nodes to provide grounds for an appropriate and optimal type of neck dissection required to obtain valid criteria for therapeutic decision-making in clinical routine.

MATERIALS AND METHODS

The study was approved by the local ethics committee at Allama Iqbal Medical College, Jinnah Hospital Lahore. Study patients were enrolled in a clinical protocol reviewed and approved by the institutional cancer board. Before the beginning of study, written informed consent was obtained from each patient.

Data collection

Patients were enrolled from Department of Oral & Maxillofacial Surgery, Allama Iqbal Medical College / Jinnah Hospital, Lahore, Pakistan. Sixty patients with incisional biopsy proven tumor sizes T1-T3, clinically proven N0 or N1 and M0 (According to AJCC / UICC 2007 TNM classification) of Squamous cell carcinoma of mandibular alveolus and floor of mouth were included in the study and evaluated for the presence of metastasis in neck lymph node subsequent levels. The surgical procedures was explained to the patient/s and an informed consent was taken. The demographic variables like name, sex, age, and address were recorded.Investigations include radiographs like Orthopantomogram (OPG) CT-Scan and MRI with contrast from base of skull to thoracic inlet were done to the extent of tumor.

Procedure

The calculated sample size was 60 cases with 95% confidence level, 12% margin of error and taking expected percentage of metastasis in level III, that is 32% in patients of squamous cell carcinoma of mandibular alveolus and floor of the mouth undergoing ipsilateral selective neck dissection level I-V in N0 necks while ipsilateral radical neck dissection in N1 patients. Resection of tumor with a safe margin of 1-1.5cm along with radical / selective neck dissection I-V was done in all patients. Neck dissection was done by one experienced operator in all patients. The resected specimen and levels of neck lymph nodes were marked with silk orientation sutures and sent for histopathological evaluation. Anterior resection margin was marked with 1 silk string, posterior with 2 silk strings, medial with 3 silk strings, lateral with 4 silk strings and deep margin with 5 silk strings. Likewise, level I neck lymph nodes were marked with 6 silk strings, level II with 7

silk strings, level III with 8 silk strings, level IV with 9 silk strings and level V with 10 silk strings. The above information was recorded according to the proforma attached as

Data analysis

After tabulation and graphitization of data, descriptive statistics will be calculated through SPSS (Statistical Package for the social sciences) version 22.1. Demographic variables are presented as simple descriptive statistics. The frequencies and percentages are calculated for qualitative variables and Mean with or without standard deviation is deduced for quantitative variables.

RESULTS

Total sixty (n=60) patients of Squamous cell carcinoma (SCC) were included. There were 70% males (n=40) & 30% females (n=20) patients. The male to female ratio was 2.3:1. The peak incidence 48% (n=29) was in the age group of range 46-60 years, with the mean age of 47.28 years (minimum age 26 and maximum age 66 years) and SD=±10.5, as shown in **Table 1**.

Table 1: Age Group and Gender Cross Tabulation

Age group	Percentage in gender		
	Female	**Male**	
16-30	2	5	**7 (11)**
31-45	8	13	**21 (35)**
46-60	9	19	**28 (47)**
61-75	1	3	**4 (7)**
Total %	20/60 (30)	40/60 (70)	**60/60 (100)**

Mean age: 47.28 ± 10.5

Among the primary tumor sites, total cases of OSCC of the mandibular alveolus were 54% (n=32) and 46% (n=28) were of floor of the mouth. **Table 2**.

Table 2: Primary tumor site frequency

Tumor site	Frequency	Percentage
Mandibular alveolus	32	**54.0**
Floor of Mouth	28	**46.0**
Total	60	**100.0**

According to T-classification most of the cases were of T3 (more than 4cm sized) 48% (n=29), while T2 (2-4cm) lesions were 42% (n=24) on second number and only 10% (n=7) cases were with T1 sized lesions. T4 sized lesions. T4 sized lesions were not included in our study. **Table 3**.

Table 3: Frequency of tumor size

T- classification	Frequency	
$T_{1\ (\text{less than 2cm})}$	7	10.0
$T_{2\ (\text{2cm-4cm})}$	24	42.0
$T_{3\ (\text{more than 4cm})}$	29	48.0
Total	60	

According to T classification and metastatic nodes found, the overall rate of cervical lymph node metastases was 66% (n=53) which included 47% (n=28) metastases in cases of mandibular alveolus while 42% (n=25) cases of floor of the mouth. The highest rate of metastases were found in T3 lesions which was 49% (n=29). Metastases in T2 sized lesions were at second number i.e. 36% (n=21) similarly the lowest metastatic rate was found in cases of T1 sized lesions i.e. 4% (n=2).

Table 4:Frequency of tumor sites for different primary tumor sizes

T-Classification	Frequency and Percentage		
	Mandibular alveolus	**Floor of the mouth**	**Total %**
T_1	5	2	**7/60 (10)**
T_2	14	10	**24/60 (42)**

T_3	14	15	**29/60 (48)**
Total %	33/60 (54)	27/60 (46)	**60/60 (100)**

Between T-classification and metastatic node, cross tabulation showed that the rate of positive cervical lymph node metastases were lowest 43% (n=3) in cases of T1 sized lesions. Out of 10% (n=7) T1 cases, 43% were having metastatic nodes positive. Out of 40% (n=24) T2 cases, 66% (n=16) were having metastatic nodes positive while 34% (n=8) were free of tumor and out of 48% (n=29) T3 sized lesions, 76% (n=22) were having metastatic nodes positive while only 24% (n=7) were having nodes negative for metastases. The number of tumor free nodes decreases and the number of nodes having metastases increases as the size of the tumor increases.

Table 5: Tumor size and metastatic node tabulation

T-Classification	**Metastatic node found**		
	No	**Yes**	**Total %**
T_1	4	3	**7**
T_2	8	16	**24**
T_3	7	22	**29**
Total %	19/60 (31%)	41/60 (68%)	**60/60 (100)**

Table 6: Tumor site and palpable lymph node cross tabulation

Tumor site	**Lymph Node palpable**		
	No	**Yes**	**Total %**
Mandibular alveolus	5	19	**24**
Floor of mouth	9	27	**36**
Total %	14/60 (24)	46/60 (76)	**60/60 (100)**

Among overall 77% (n=46) clinically palpable cervical lymph nodes (cN+), there were 32% (n=19) cases of mandibular alveolus while 59% (n=27) cases were of floor of the mouth. In addition, among 23% (n=14) cases for clinically negative nodes (N0), 8% (n=5) were of mandibular alveolus and 15% (n=9) were of floor of the mouth.

DISCUSSION

Oral Squamous Cell Carcinoma (OSCC) of the mandibular alveolus and floor of the mouth has higher incidence of nodal metastasis and it often goes clinically undetected which is the most common cause of treatment failure, therefore reducing the survival rate to half. Incidence of neck metastasis in OSCC is reported to be 34% - 50%with frequency and distribution to be almost equal for both the mandibular alveolus and floor of the mouth. The presence of cervical metastasis alone is the most powerful indicator of regional recurrence and hence the appropriate management of neck in patients with squamous cell carcinoma (SCC) of head and neck is critically important[7].

Total 50 (n=50) patients of which 70% males (n=35) and 30% females (n=15) presented to the department of Oral and Maxillofacial surgery, were included in this study of one year duration. The male to female ratio was 2.3:1 showing male predominance in agreement with studies by Amador R et al. This is probably due to the fact that the risk of naswar chewing and other tobacco habits are more common in males.However, gender of the patient not significantly influences the survival rate. Patients reported in our study with peak incidence (48%) (n=24) in the age group of range 46-60 years, with their mean age 47 years. Similar results have been found by Manuel et al. that SCC is a disease of middle age from 3rd to 5thdecade[8].

OSCC can affect any of the oral and maxillofacial regions and each primary site of the tumor has its own significance regarding the behavior of the

tumor, its growth pattern as well as metastases to cervical lymph nodes. When comparing with other oral cancers, SCC of the mandibular alveolus and floor of the mouth has great predisposition to produce metastases in lymph nodes (15-75%)[6]. That's why these two primary sites were taken to see the microscopic pattern of metastases. Among the primary tumor sites, total cases of SCC of the mandibular alveolus were 54% (n=27) and 46% (n=23) were of floor of the mouth.

CONCLUSION

It is concluded that the most common region with cervical lymph node metastases is levels I to III in the ipsilateral neck. Neck levels I & II were the most common site of cervical lymph node metastases (22%) followed by isolated level I (18%), and metastases to level I-III in total was seen in (92%)case of mandible alveolus or floor of the mouth.

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PROFORMA (Annex-1)

"DISTRIBUTION OF CERVICAL LYMPH NODE METASTASES IN ORAL SQUAMOUS CELL CARCINOMA"

Case No: _____ Registration No: _____
Name: _____ Age/Sex: _____
Address: _____
Phone No: _____
Date of operation: _____
Date of discharge: _____

Type of neck dissection done:
1-Functional neck dissection _____
2-Radical neck dissection _____

Pre-operative findings:
1. **Tumor size**: (i) <2cm__(ii) 2-4cm__(iii) >4cm__(Without involving adjacent structures)

2. **Tumor site**: (i) Tongue ___ (ii) Floor of mouth ___

Cervical lymph node status:
Lymph nodes palpable: (Yes) (No)
Palpable nodes:

Level I	Submental, Submandibular	Yes/No
Level II	Upper jugular	Yes/No
Level III	Middle jugular	Yes/No
Level IV	Lower jugular	Yes/No
Level V	Posterior cervical	Yes/No

Post-operative findings/Results:
Metastatic nodes found (Yes) (No)
Level of Metastatic nodes (Proven by histopathology)

Level I	Submental, Submandibular	Yes/No
Level II	Upper jugular	Yes/No
Level III	Middle jugular	Yes/No
Level IV	Lower jugular	Yes/No
Level V	Posterior cervical	Yes/No

Among total 10% (n=7) T1 cases of oral SCC, 80% (n=5) cases were of mandibular alveolus, while 20% (n=2) were of floor of the mouth. Out of 42% (n=24) total cases of T2 sized lesions, the mandibular alveolus was 57% (n=14) while the floor of the mouth was 43% (n=10) and out of 48% (n=29) of T3 sized lesions, 46% (n=14) were of mandibular alveolus and 54% (n=15) were of floor of the mouth. So again, the maximum cases 48% in either case of mandibular alveolus or floor of the mouth were of T3 sized. Table 4.

On clinical examination overall clinically palpable lymph nodes were present in 74% (n=44) of patients while only 27% (n=16) had clinically N0 neck. Table 6