Original Research Article

Correlation of clinical, radiological and histopathological cervical lymph node involvement in oral cancer

Mada Lakshmi Narayana[1]*, B. N. Kumarguru[2], Hameed Arafath A.[3], Urvashi Gaur[1], P. Lakshmi[3], Addanki Lakshmi Sravani[1]

[1]Department of ENT, [2]Department of Pathology, [3]Department of Radiology, PESIMSR, Kuppam, Andhra Pradesh, India

*Correspondence:
Dr. Mada Lakshmi Narayana,
E-mail: lakshmi398@gmail.com

ABSTRACT

Background: Lymph node metastasis is the most important factor in the prognosis of oral cancers and survival drops by 50% in the presence of malignant lymph nodes. Most of the lymph node enlargement in oral cancers is due to tumor-associated inflammation rather than metastasis. The aim and objectives of the study was to assess the enlarged reactive and positive cervical lymph nodes clinically and radiologically with the histopathology of neck nodes.
Methods: All the oral cancer patients were examined clinically for enlarged neck nodes and subjected to contrast-enhanced computed tomography (CECT) oral cavity and neck. In CECT, all the characteristics of nodes were recorded, and after neck dissection, all levels of lymph nodes were assessed histopathologically.
Results: In our study, 24 patients were included; among them, 31 enlarged lymph nodes were seen clinically. CECT showed a total of 90 enlarged lymph nodes which includes 21 positive nodes. In histopathology 538 lymph nodes were isolated, and among them, only 32 lymph nodes were found to be positive for malignancy.
Conclusions: The detection rate of enlarged lymph nodes is more with histopathology than radiological and clinical examination. In our study, 94% of lymph node enlargement was proven to be reactive, which shows more tumor-associated inflammation.

Keywords: Lymph nodes, Inflammation, Oral cancer, Metastasis

INTRODUCTION

Head and neck cancer is a very common entity encountered in India.[1] Oral cancer is the most common malignancy of head and neck cancers. Lymph node metastasis is one of the most important factors in the prognosis of oral cancers. The survival rates will drop by nearly 50%, in the presence of malignant lymph nodes in the neck.[2] According to recent literature, there is tumor-associated inflammation around the tumor. Most of the lymph node enlargement in oral cancers is due to tumor-associated inflammation. Clinically neck nodes are palpable only if they reach 1.5 cm, but an ultrasound will detect 5 mm lymph nodes, and the computed tomography (CT) scan can detect lymph nodes up to 2 mm. In oral cancers, most of the lymph nodes which were enlarged are mostly reactive than metastatic. This study is destined to detect enlarged reactive and positive nodes clinically, radiologically, and pathologically. This study also correlates clinically and radiologically enlarged nodes with the positive node pathologically.

METHODS

This study is a prospective observational study. All the patients attending ENT OPD at PESIMSR, Kuppam from

July 2017 to September 2019 with histologically diagnosed oral cancer were included in this study considering inclusion and exclusion criteria.

Inclusion criteria

All histologically diagnosed oral cancer patients with clinically appearing lymph node enlarged subjects who underwent surgery were included.

Exclusion criteria

Post radiotherapy and post neoadjuvant chemotherapy were excluded.

These patients were examined clinically for enlarged neck nodes. All the details about patient, tumor, and nodes (level, size, number, consistency, mobility of the nodes, skin over the nodes) were recorded. The patient was subjected to contrast-enhanced computed tomography (CECT) oral cavity and biopsy from the primary lesion. In CECT, all the characteristics of nodes, i.e., number, levels, size, presence, and absence of fatty hilum, enhancement characteristics, necrotic status, matted/discrete, surrounding soft tissue involvement were recorded. Pre-operative fine needle aspiration cytology (FNAC) of lymph node swelling was done if necessary, to plan surgery like in cases (in the presence of contralateral lymph node to know whether it was reactive or positive for malignancy and in cases of multiple biopsies from the tumor if it was negative). The patient was posted for surgery, and during neck dissection, all the levels of lymph nodes were dissected separately and sent for histopathology. The pathologist divided the reactive and positive nodes according to levels and assessed for extracapsular spread. All the clinical, radiological, and histological findings will be correlated and analyzed. The software used for statistical analysis was STATA 14.1 version.

RESULTS

In the study, 24 patients were included, among which 20 were females, and 4 were males. Among which two patients were 30 to 40 years age group, eight patients were 41 to 50 years age group; eight patients were 51 to 60 years age group, four patients were 61-70 years age group and two patients were 71 to 80 years age group.

Table 1: The correlation of nodal staging between clinical, radiological and histopathological findings.

Nodal staging	Clinical		Radiological		Histopathological	
	N	%	N	%	N	%
N0	1	4.17	1	4.17	16	66.7
N1	12	50	0	0	5	20.8
N2a	1	4.17	0	0	0	0
N2b	6	25	19	79.17	2	8.3
N2c	3	12.5	4	16.7	0	0
N3a/b	1	4.17	0	0	1	4.17

Table 2: The number of lymph nodes according to levels clinically, radiologically and histopathologically.

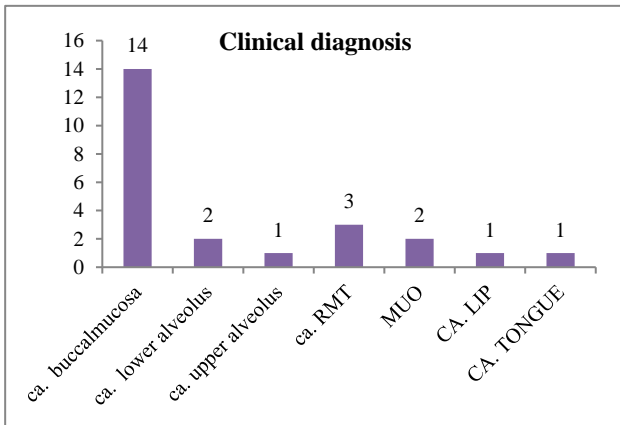| Levels	Clinical		Radiological		Pathological	
	N	%	N	%	N	%
Ia	0	0	10	11.1	4	12.1
Ib	30	96.7	40	44.4	11	33.3
II	0	0	26	28.9	9	27.2
III	0	0	6	6.7	2	6
IV	0	0	3	3.3	0	0
V	1	3.2	5	5.5	7	21.2

Clinically

Clinically 8 patients were diagnosed with malignancy right buccal mucosa, 6 patients with malignancy left buccal mucosa, 1 patient with malignancy left upper alveolus, 2 patients with malignancy left lower alveolus, 1 patient with malignancy right retromolar trigone, 2 patients with malignancy left retromolar trigone, 2 patients with MUO, 1 patient with malignancy lower lip and 1 patient with malignancy lateral border of tongue (Figure 1). As malignancy was confirmed with biopsy in all the cases, FNAC was not performed in any case.

According to the 8th edition of AJCC, T classification includes T4a-12, T3-4 and T2-7 and T1-0. The nodal classification in our study was N0-1, N1-13, N2a-2, N2b-4, N2c-3, and N3b-1. The clinical staging of patients was stage I-0, stage II-1, stage III-7, stage IV-16. The lymph node distribution according to the levels: level Ia-0, level Ib-30, level II-0, level III-0, level IV-0, and level V-1. All 24 patients had a total of 31 palpable lymph nodes.
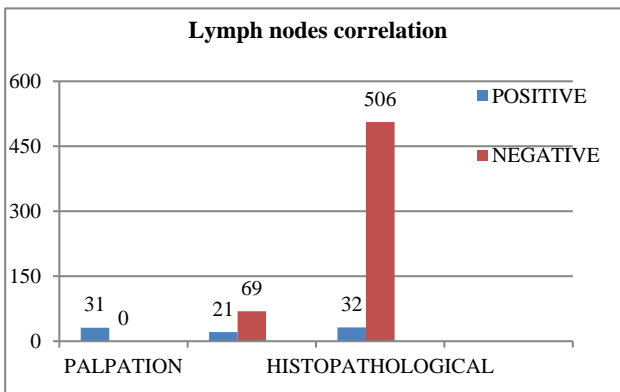
Radiologically

Totally 90 lymph nodes were detected on CECT neck in all 24 patients. Among them ten lymph nodes were found

in level Ia, 40 in level Ib, 25 in level II, 6 in level III, 3 in level IV, 5 in level V. Nodal classification radiologically were N0-1, N1-0, N2a-0, N2b-18, N2c-4, N3-1. 17 lymph nodes had an absence of fatty hilum, 63 had the presence of fatty hilum. 12 lymph nodes were found to be necrotic, and 78 were found to be non-necrotic. All lymph nodes were found to be discrete. Totally out of 90, 21 lymph nodes were positive in 8 patients radiologically considering the presence or absence of fatty hilum and necrosis.

Figure 1: Clinical diagnosis of the subjects included in the study.

**Figure 2: Correlation of clinical, radiological and histopathologically positive and negative lymph nodes.**

Histologically

A total of 538 lymph nodes were detected in the histopathological examination after 25 neck dissections in 24 patients (1 case bilateral neck dissection). Among 25 neck dissections, 24 modified radical neck dissections and one supraomohyoid neck dissection were done. Among them, 33 were found positive for malignancy in only eight patients with rest 16 patients had only reactive nodes. Totally five lymph nodes had extracapsular spread. Positive lymph nodes were found in level 1a-4, level 1b-11, level II-9, level III-2, level IV-0, level V-7. Histologically, nine patients were found to be in pT4a, pT3-3, pT2-6, and pT1-5. The histologically nodal
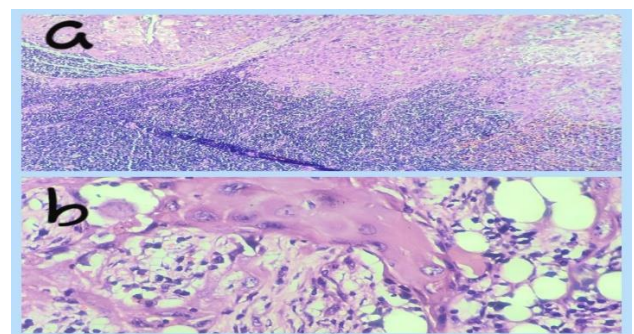
staging was N0-16, N1-5, N2a-0, N2b-2, N2c-0, and N3b-1.

Figure 3: The clinical presentation of neck nodes (a) N0 neck; (b) N1 neck; (c) N2 neck; (d) N3 neck.
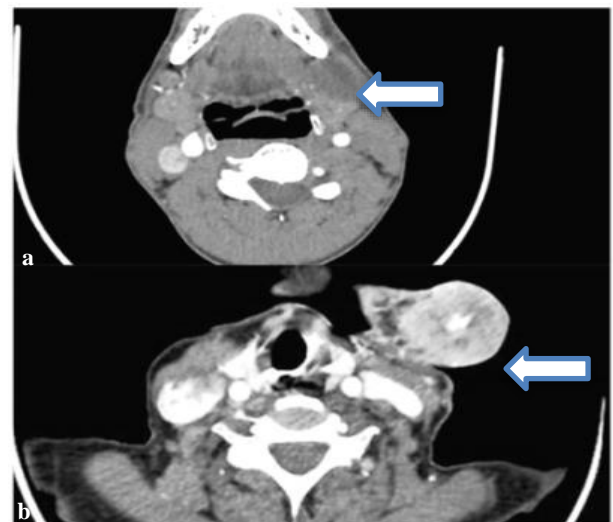
Figure 4: Radiological image showing (a) necrotic lymph node with peripheral rim enhancement arrow indicating the same; (b) necrotic lymph node at level Ib station with corresponding skin involvement.

Figure 5: Histopathological image showing (a) germinal center with atypical cells invasion in the germinal center; (b) lymph node with extracapsular spread.

DISCUSSION

Head and neck cancer is a very common entity encountered in India.[1] More than 90% of these carcinomas are found to be squamous cell carcinoma, where treatment options include mainly surgery, radiotherapy, and/or chemotherapy. Lymphogenic metastasis represents the most important prognostic factor for squamous cell carcinoma of the upper aerodigestive tract. Presence of lymph node metastasis is associated with 50% reduction in survival rate.[2]

In our study, the majority of the patients were females with male: female ratio of 1:5, and most of them belonged to the 4th and 5th decade. In a study by Mehta et al, 70% were males, and most of the patients were in the 3rd and 5th decade.[3] In another study by Essig et al, also had 75% of male patients with a male:female ratio of 3:1 and majority of the patients was found at 5th decade of life.[2]

Clinical palpation is the basic method in evaluating metastatic cervical lymph nodes.[4,5] The high sensitivity of palpation is credited to the physical characteristics such as size and consistency. In our study, the majority of the cases were maximum of T4a and under stage IVa. A similar study had the majority of the cases from T2 group were 45.7%, followed by T4 that is 32.85% and T3 that is 21.4%.[2] In our study majority of the cases were of N1 where a study by Czembireck et al had staged 67% of patient in N2a, N2b, N2c.[6]

Radiologically we have 23.3% of positive lymph nodes out of total 90 lymph nodes detected from CECT. The lymph node characteristics of a positive node radiologically include short-axis diameter >1 cm, the ratio of long axis to short-axis diameter <2 cms, absence of fatty hilum, round appearance, rim enhancement, central necrosis.[7] According to Som, minimum size of lymph nodes at submandibular space considered to be metastatic is 15 mm while for other regional lymph nodes is 10 mm. Presence of conglomerated, more than one lymph node, extranodal involvement, irregular contours, central necrosis, and capsular invasion are criteria for nodal metastasis on CT. Lima bean-shaped node is considered hyperplastic while round indicates neoplastic infiltration.[9] These similar criteria were further explained by Sarvannan et al and found CT sensitivity and specificity of 95.65% and 66.65% with accuracy of 92.30%, while the conglomeration and central necrosis had sensitivity and specificity of 100% thus increasing its accuracy in detection of cervical metastasis.[4] Feinmesser et al stated in there finding that CT, when compared with clinical evaluation, has slightly lower predictive value of 81.6% and sensitivity of 59.6% which is also low, so indicating chances of high false-negative rate. Correct diagnosis on CT is 59.6% with the proved pathologic disease.[8] In our study, we have found the majority of 44.4% lymph nodes at level Ib, which is the primary echelon for oral cancer. In a study done at Bareilly most common cervical metastasis was found at level 1 and only 10% of level IV involvement.[3] A similar study also had most common level 1 involvement that is to be 66.7%.[2] A study by Byers et al showed skip metastasis at level IV in 16% of cases without any disease of level I, II.[10] In our study, we didn't find any case of skip metastasis.

In our study, a total of 32 lymph nodes were found involved with malignancy histologically, and most commonly involved level was level 1b with 31.2% lymph nodes. In our study, the positive lymph nodes at level 1b were found to be 30 nodes clinically, eight radiologically, and ten histologically. Only five lymph nodes showed the extracapsular spread, among them 4 out of 5 lymph nodes were at level 1b. A comparative study stated that level II is the most common involved level in primary tumors of the head and neck, while level V is rarely involved.[7] In our study, 29.1% of patients had positive lymph nodes, and 70.9% of patients had reactive lymph nodes. In a similar study by Mamelle et al stated in his finding, negative lymph nodes were found in 347 patients while positive in 567, among which 397 had extracapsular spread accounting for 53%.[11] In our study done on 24 patients, 506 negative nodes were seen, 32 positive nodes were seen which was detected by clinical examination as 31 nodes and by radiology as 21 nodes. A study on metastatic neck disease on 100 neck specimens 48 were negative, while 52 were positive among which 32 were correctly diagnosed on clinical examination of nodes by palpation and 31 were correctly detected on CT scans.[8] Devaney et. al. has further stated that the most reliable procedure for the lymph nodes status is the histopathological examination.[12] Goertzen et al have explained in their study that neutrophils increase oral squamous cell carcinoma invasion through tumor necrosis factor-alpha dependent mechanism as it promotes a pro-inflammatory and pro-invasion leading to recruitment an activation of inflammatory cells.[13]

Mamelle et al explained the prognosis of the lymph nodes, which is affected by the following factors like the site of the positive node and their number and accuracy depends on combining both factors. The combined approach of surgery and post-op radiotherapy gives great control on the metastatic neck disease with less than 8% failure rate. Distant metastasis also can be predicted with the lymph node prognostic factors.[11] Burusapat et al, in their study on prognostic factor stated that in patients with squamous cell carcinoma of the oral tongue and lip, the sizes of cervical lymph node were statistically significant with the size of the tumor and tumor grading (p<0.05). The extracapsular extension was found to be 69.55% in metastatic lymph nodes.[14] Johnson further explained the prognosis for malignant processes of the head and neck is primarily dependent on the degree of lymph node involvement. Patients with stage N1-N3 lymph node metastasis have half the expected life expectancy of patients with stage N0 disease. The survival rate following partial glossectomy reduced from

92% to 31%, due to the involvement of lymph nodes. Patients with tumors of the head and neck and bilaterally mobile localized lymph node metastasis (stage 2c) have a 1-year survival rate of 44%. Patients with localized, unilateral fixed lymph node metastasis (stage 2b) have a 1-year survival rate of 30%.[15]

CONCLUSION

There was a gross disparity between clinical, radiological, and histological assessment in the number of reactive and positive lymph nodes. This study shows more tumor-associated inflammation leading to reactive lymph nodes than metastatic lymph nodes.

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