# Clinico-Radiological Study Of Cervical Lymph Node Metastasis In Head And Neck Cancer

Laldingngheti[1], Oinam Priyokumar Singh[2], Nicola C Lyngdoh[3], Parichay Bhowmik[4], Nimitha Juhy[5], S Vahneineng Haokip[6], C Lalduhawma[7], Lalsanglura Chhakchhuak[8], Puspakishore Maibam[9]

[1](Senior Resident, Department OF Otorhinolaryngology, Regional Institute OF Medical Sciences, Imphal, Manipur, India)

[2](Consultant, Department OF Otorhinolaryngology, Regional Institute OF Medical Sciences, Imphal, Manipur, India)

[3-9](Department OF Otorhinolaryngology, Regional Institute OF Medical Sciences, Imphal, Manipur, India)

*Abstract:*

*Background: Lymph node involvement is well established as an important prognostic factor for head and neck cancer, with the presence of even one positive lymph node being associated with as much as a 50% reduction in overall survival. Early detection of metastatic lymph nodes is of immense importance. As a method for detecting and evaluating cervical lymph node metastasis, both palpation and imaging examinations are widely used. Therefore, this study is undertaken to evaluate the role of clinical examination as well as imaging modalities, viz – ultrasonography (USG) and computed tomography (CT) scan in the diagnosis of cervical lymph node metastasis.*

*Materials and Methods: In this cross sectional study, a total number of 190 patients with head and neck cancers attending ENT OPD and willing to participate in the study were included in the study. Detailed clinical history, clinical examination, fine needle aspiration cytology (FNAC) and radiological imaging (Ultrasound neck/CECT neck) were done.*

*Results: Males (65.7%) are affected more than females (34.3%). Majority (79%) had history of tobacco consumption. 60% gave history of consuming alcohol. On inspection, 77.4% of the patients had swelling at level II of the neck, followed by level IV (66.8%), level III (58.9%), level 5 (37.9%) and level I (1.6%). On radiological investigation (CT scan), 72.6% of the patients had swelling at level II of the neck, followed by level IV (57.8%), level III (52.6%), level V (37.8%) and level I (1.0%). More than half (59.5%) of the patients had central necrosis of lymph node swelling. Tobacco chewing and smoking were found to be significantly associated with presence of central necrosis, where majority had history of chewing tobacco (85.0%) and smoking (52.2%) (p value <0.05). Spherical shape (60.2%) and globular shape (32.7%) lymph nodes was observed from among the lymph nodes with central necrosis.. Lymph node size more than 2 cm had significantly increased proportions (62.8%) of positive central necrosis. These findings were found to be statistically significant (p value <0.05)*

*Conclusion: The accuracy to detect cervical lymph node metastasis, the specificity, and positive predictive value of CT is more when compared to clinical examination and USG. Therefore, clinical examination must be supplemented with computed tomography for evaluation of cervical lymph node metastasis in head and neck cancer patients.*

*Key Word: Lymph node, Central necrosis, Computed tomography (CT)*

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## I. Introduction

Lymph nodes are found at the convergence of major blood vessels, and their main function is being filtration of incoming lymph, thus playing a role in infection as well as in malignancy. They are considered pathological if there is loss of their oval shape, loss of the hilar fat, asymmetrical thickening of the cortex and if they are persistently enlarged.[7] Lymph node involvement is well established as an important prognostic factor for head and neck cancer, with the presence of even one positive lymph node being associated with as much as a 50% reduction in overall survival.[8]Early detection of metastatic lymph nodes is of immense importance[9.] As a method for detecting and evaluating cervical lymph node metastasis, both clinical examinations and imaging modalities are widely used. Clinically neck nodes are palpable only if they reach 1.5cm, but an ultrasound (USG) can detect 5mm lymph nodes, and computed tomography (CT) scan can detect lymph nodes up to 2mm.

Computed tomography (CT) has improved the accuracy of diagnosis of cervical lymph node metastasis. Ultrasound (USG) scanning has improved the overall accuracy of diagnosis of cervical metastases and it is a cheap and highly reliable method without hazards of radiation exposure.[10]Therefore, this study is undertaken to evaluate the role of clinical examination as well as imaging modalities, viz – ultrasonography (USG) and Computed Tomography Scan (CT Scan) in the diagnosis of cervical lymph node metastasis.

## II.  Material And Method

This cross sectional study was conducted in the department of Otorhinolaryngology in collaboration with department of Radiodiagnosis, Regional Institute of Medical sciences, Imphal, Manipur from January 2021 to October 2022 after obtaining approval from Institutional Ethics Committee. A total of 190 patients with head and neck cancers attending Otolaryngology OPD and willing to participate in the study were included.

**Study Design:** Cross Sectional Study

**Study Location**: Tertiary care teaching hospital in the Department of Otorhinolaryngology, at Regional Institute of Medical Sciences(RIMS), Imphal, Manipur

**Study Duration:** January 2021 to October 2022.

**Sample size:** 190 patients.

**Sample size calculation:** Based on the formula of cross-sectional study, sample size (N) was calculated as: $N = 4PQ/L^2$ where, P = proportion of lymph node central necrosis taken from study conducted by Sharma A et al[5] which is 63%. Absolute error (L) was taken as 7% and sample size was calculated to be 190.

**Subjects & selection method**: The study population was drawn from patients attending Otorhinolaryngology OPD with head and neck cancer patients presenting with cervical lymphadenopathy

**Inclusion criteria:**
1. Patients presenting with neck node more than or equal to 1 cm
2. Patients with palpable neck node swelling

**Exclusion criteria:**
1. Patients with acute/chronic lymph node swelling which is non-neoplastic
2. .Patient in ICU with life support/critically ill patients

**Procedure methodology:**

Informed written consent was obtained from all the participants before including them in the study. A detailed clinical history including age, sex, marrital status, occupation, religion, address, personal history, family history were collected from the patients. The chief presenting complaints with duration were noted. All the cases were subjected to general, systemic and ENT examinations. Enlarged neck nodes were first examined by inspection and palpation methods. Patients with enlarged neck nodes suspecting to have head and neck cancer were adviced to undergo Fine needle aspiration cytology (FNAC), Contrast enhanced computed tomography (CECT neck) and Ultrasound neck. Data was collected in pre-designed proforma.

**Statistical analysis:**

Data collected were checked for completeness and consistency. Data was entered in IBM SPSS Version 21.0 for Windows, Armonk NY: IBM Corp. and summarized using frequencies & proportions for variables like gender, religion, occupation, tobacco use etc. Mean and Standard deviation was used to present continuous data such as age and size of nodes.

## III. Result

In the present study, 190 patients with head and neck cancers fulfilling the inclusion and exclusion criteria were studied. The age group of the patients studied ranged from 30 to 75 years, with majority of patients in the age range of 51 to 60 years (41%). Males (65.7%) are affected more than female (34.3%).

Table no 1 Shows that majority (74.7%) of the patients presented with neck swelling, followed by hoarseness of voice (33.1%), difficulty in swallowing (15.7%), shortness of breath (14.2%), nasal obstruction (13.1%), loss of appetite (10.5) and loss of weight (5.2%).

**Table no 1:** Shows presenting symptoms of patients

| Symptoms | Frequency (n) | Percentage (%) |
|---|---|---|
| Neck swelling | 142 | 74.7% |
| Hoarseness of voice | 63 | 33.1% |

| | | |
|---|---|---|
| Difficulty in swallowing | 30 | 15.7% |
| Shortness of breath | 27 | 14.2% |
| Nasal obstruction | 25 | 13.1% |
| Loss of appetite | 20 | 10.5% |
| Loss of weight | 10 | 5.2% |

Table no 2 shows that on inspection, more than two-third (77.4%) of the patients had swelling at level II of the neck, followed by level 4 (66.8%), level 3 (58.9%), level 5 (37.9%) and level 1 (1.6%)

**Table no 2:** shows distribution of incidence of swelling at various levels of the neck on inspection

| Swelling at neck level | Frequency (n) | Percentage (%) |
|---|---|---|
| Level I | 3 | 1.6% |
| Level II | 147 | 77.4% |
| Level III | 112 | 58.9% |
| Level IV | 127 | 66.8% |
| Level V | 72 | 37.9% |

Table no 3 shows majority of the patients (81.5%) had unilateral swelling and had upto 4 swelling (77.3%) on inspection of the cervical lymph nodes. Majority of the swelling had regular edges (88.4%), with smooth surface (91.5%) and were mobile (89.4%). Majority (50.5%) of the patients had spherical shaped swelling.

**Table no 3:** Inspection of neck nodes

| Inspection of neck nodes | Frequency (n) | Percentage (%) |
|---|---|---|
| Laterality | | |
| Unilateral | 155 | 81.5% |
| Bilateral | 35 | 18.4% |
| Number of Swelling | | |
| 1-4 | 147 | 77.3% |
| >4 | 43 | 22.6% |
| Edge | | |
| Regular | 168 | 88.4% |
| Irregular | 22 | 11.5% |
| Surface | | |
| Smooth | 174 | 91.5% |
| Rough | 16 | 8.4% |
| Shape | | |
| Ovoid | 31 | 16.3% |
| Globular | 63 | 33.1% |

| | | |
|---|---|---|
| Spherical | 96 | 50.5% |
| Movement | | |
| Mobile | 170 | 89.4% |
| Fixed | 20 | 10.5% |

Table no 4 shows majority of the patients (91.1%) had well defined edges, 91.6% had nodes with smooth surface and 92.6% had nodes that were mobile on palpation. Majority (43.7 %) of the cases were globular in shape.

**Table no 4:** shows findings on palpation of neck nodes

| Palpation of Neck Nodes | Frequency (n) | Percentage (%) |
|---|---|---|
| Edge | | |
| Well Defined | 173 | 91.1% |
| Ill defined | 17 | 8.9% |
| Surface | | |
| Smooth | 174 | 91.6% |
| Rough | 16 | 8.4% |
| Shape | | |
| Ovoid | 27 | 14.2% |
| Globular | 83 | 43.7% |
| Spherical | 80 | 42.1% |
| Movement | | |
| Mobile | 176 | 92.6% |
| Fixed | 14 | 7.4% |

Table no 5 shows 72.6% of the patients had swelling at level II of the neck, followed by level IV (57.8%), level III (52.6%), level V (37.8%) and level I (1.0%) on radiological investigation

**Table no 5:** Distribution of incidence of swelling at various levels of the neck on CT scan

| Swelling at neck level | Frequency (n) | Percentage (%) |
|---|---|---|
| Level I | 2 | 1.0% |
| Level II | 138 | 72.6% |
| Level III | 100 | 52.6% |
| Level IV | 110 | 57.8% |
| Level V | 72 | 37.8% |

Figure no 1 shows that more than half (59.5%) of the patients had central necrosis of lymph node swelling.

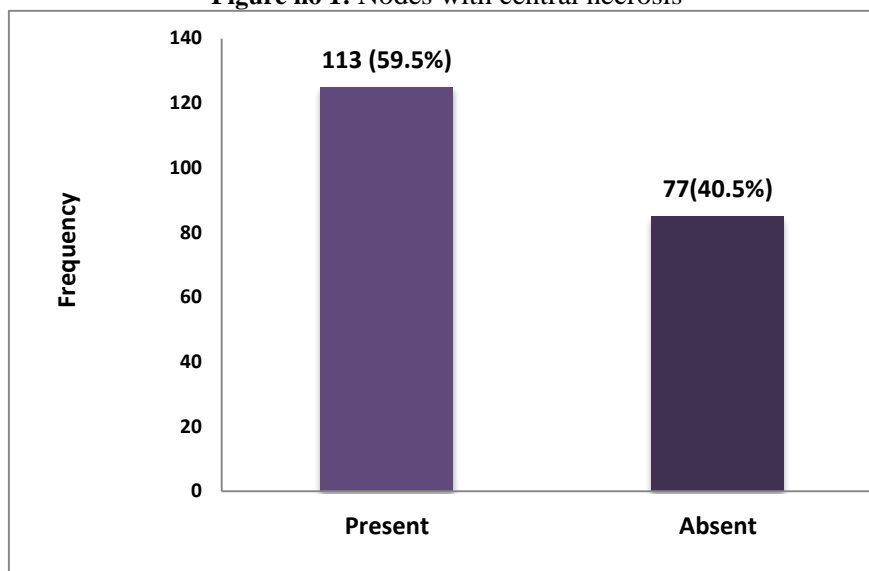**Figure no 1:** Nodes with central necrosis



Figure no 2 shows that on cytopathological examination, majority (61.1%) of the participants had well-differentiated tumour, 18.9% had moderately differentiated tumour, 16.8% had poorly differentiated tumour and 3.1% had undifferentiated tumour.

**Figure no 2:** Shows cytopathological findings of metastatic lymph node
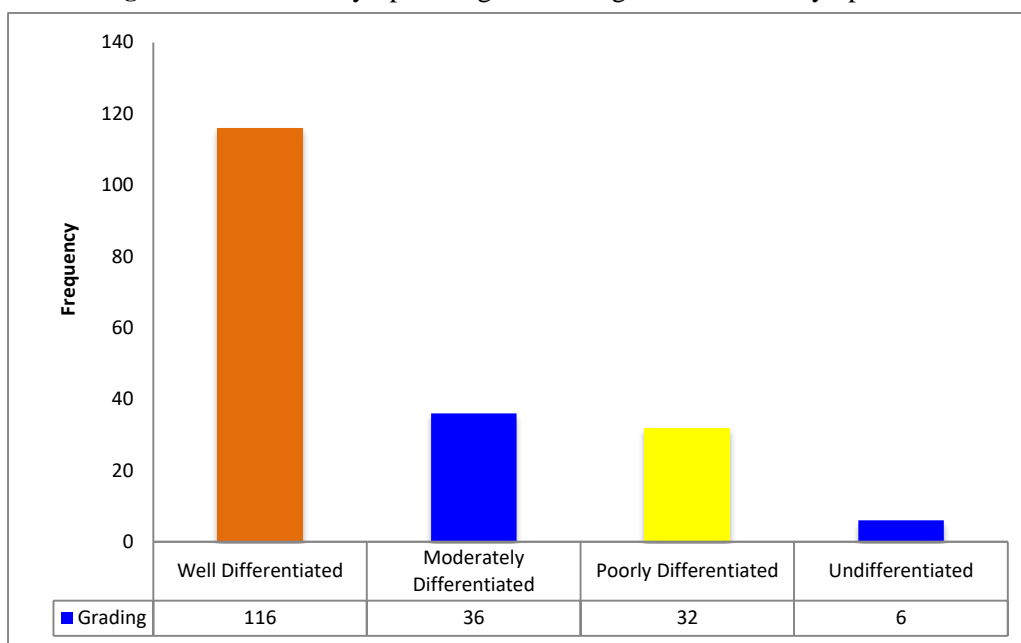


Table 6 shows majority (70.7%) of the patients who had central necrosis were males as compared to females (29.2%). Most of the patients (47.8%) who had central necrosis were in the age group of 51 to 60 as compared to other age groups. These findings were found to be statistically significant (p value <0.05).

**Table 6**: Association of age and gender with presence or absence of central necrosis

| Variables | Central Necrosis | | P value* |
|---|---|---|---|
| | Present | Absent | |
| Gender | | | |
| Male | 80 (70.7%) | 44 (57.1%) | *0.042* |

| Female | 33 (29.2%) | 33 (42.9%) | |
|---|---|---|---|
| Age Group | | | |
| Upto 40 Years | 6 (5.3%) | 11 (14.3%) | |
| 41 – 50 Years | 20 (17.7%) | 21 (27.3%) | |
| 51 – 60 Years | 54 (47.8%) | 24 (31.2%) | *0.032* |
| >60 Years | 33 (29.2%) | 21 (27.3%) | |

* Chi Squared Test

Table 7 shows that tobacco chewing and smoking were found to be significantly associated with presence of central necrosis, where majority of patients who was found to be positive for central necrosis had history of chewing tobacco (85.0%) and smoking (52%) (p value <0.05). No significant association was found between alcohol consumption and central necrosis (p value >0.05).

**Table 7:** Association of personal habits with presence or absence of central necrosis

| Variables | Central Necrosis | | P value* |
|---|---|---|---|
| | Present | Absent | |
| Tobacco Chewing | | | *0.013* |
| Yes | 96 (85.0%) | 54 (70.1%) | |
| No | 17 (15.0%) | 23 (29.9%) | |
| Smoking | | | |
| Yes | 59 (52.2%) | 28 (36.4%) | *0.027* |
| No | 54 (47.8%) | 49(63.6%) | |
| Alcohol Consumption | | | |
| Yes | 47 (37.6%) | 37 (43.5%) | 0.389 |
| No | 78 (62.4%) | 48 (56.5%) | |

* Chi Squared Test

Table 8 shows that more number of spherical shape (60.2%) and globular shape (32.7%) lymph nodes was observed from among the lymph nodes with central necrosis. While those with no central necrosis, majority were ovoid shape (77.9%). Lymph node size more than 2 cm had significantly increased proportions (62.8%) of positive central necrosis. These findings were found to be statistically significant (p value >0.05)

**Table 8:** Association of radiological findings with presence or absence of central necrosis

| wVariables | Central Necrosis | | P value* |
|---|---|---|---|
| | Present | Absent | |
| Shape of Lymph Nodes | | | *<0.001* |
| Ovoid | 8 (7.1%) | 60 (77.9 %) | |
| Spherical | 68 (60.2%) | 8 (10.4 %) | |
| Globular | 37 (32.7%) | 9 (11.7 %) | |
| Size | | | |
| Upto 2 cm | 42 (37.2%) | 54 (70.1%) | *<0.001* |
| > 2cm | 71 (62.8%) | 23 (29.9%) | |

**\* Chi Squared Test**

## IV. Discussion

Head and neck cancer is a very common entity encountered in a country like India where tobacco use in different forms is popular. Head and neck squamous cell carcinoma have a tendency to spread to cervical lymph nodes. Cervical lymphadenopathy due to metastasis carry poor prognosis, thus early detection of metastatic lymph nodes is of immense importance, as the diagnosis is crucial for therapeutic planning in patients

with suspected malignant neoplasms and pretreatment staging in patients with primary malignant tumors.As a method for detecting and evaluating cervical lymph node metastasis, both clinical examination and imaging modalities are widely used.

In this study, a total of 190 patients who fulfilled the inclusion criteria were recruited. The age of the respondents ranged from 30 to 75 years, with mean age of 55.02±9.87 years. Almost two-third (65.7%) of the participants to be male gender, majority were self employed (47.1%) and Hindu by religion (53.8%). Saafan ME et al,[10] in their study also reported male predominance and most their patients were also in their 6th decade. A study done in North-east India,[11] also reported similar observations. The male predominance and occurrence of HNC mainly in the 6th decade maybe due to environmental factors and the fact that males are more exposed to habit of smoking and tobacco chewing.We also observed a significant relationship between gender, age and central node necrosis, which is an important imaging feature used to distinguish between benign and malignant lymph nodes. Majority (70.7%) of the patients who had central necrosis were males as compared to females (29.3%) and almost half (47.8%) were isn the age group of 51 to 60 as compared to other age groups.

The study results found that majority (79%) of the patients gave history of consuming chewing tobacco, almost half (45.7%) gave history of smoking and almost two-third (60%) of the patients gave history of consuming alcohol. Tobacco chewing and smoking were found to be significantly associated with presence of central necrosis, where majority of patients who was found to be positive for central necrosis had history of chewing tobacco (85.0%) and smoking (52.2%).

On inspection, the most common level for cervical lymphadenopathy (77.4%) was at level II of the neck, followed by level IV (66.8%%), level III (58.9%), level V (37.9%) and level I (1.6%). We observed that majority of the patients (81.5%) had unilateral swelling and had upto 4 swelling (77.3%).Similar to inspection of the neck nodes, the radiological investigation (CT scan), also revealed that maximum, almost three-fourth (72.6%) of the patients had swelling at level II of the neck, followed by level IV (57.8%%), level III (52.6%), level V (37.8%) and level I (1.0%).Patil LS et al,[14]and Nithyaa CS et al,[15] in their study also reported level II to be most commonly involved.

On palpation of the cervical lymph nodes, 91.1% of patients had well defined edges, 91.6% had nodes with smooth surface and 92.6% had nodes that were mobile and globular in shape was the common findings .We also observed a significant association between shape of lymph node and presence of central necrosis. Contrary to our study, D'souza O et al,[12] in their study reported that shape of the lymph nodes were not found to be useful in diagnosing whether the lymph node was benign or malignant. In concordance with our study, various literatures had recorded metastatic nodes to be roundish shape, while reactive or benign lymph nodes are elliptical in shape.[17]

On CT, lymph node central necrosis is defined as a central area of the low attenuation surrounded by a rim of the enhancing tissue. In the present study, we observed that more than half (59.5%) of the patients had central necrosis of lymph node. In concordance with our study, Baik SH et al,[13] reported incidence of central necrosis as 55.6%. Dhara V e al,[6] also reported similar finding, where incidence of central necrosis of lymph node was 55.55%.

On cytopathological examination, 61.0% of the participants had well-differentiated tumour, 19.0 % had moderately differentiated tumour, 17.1% had poorly differentiated tumor and 2.9% had undifferentiated tumour, Although no significant difference was seen between cytopathology and presence of central necrosis, Chandak R et al,[16] in their study reported moderately differentated squamous cell carcinoma to be the most common finding among the malignant neoplasm, followed by well-differentiated and poorly differentiated squamous cell carcrnoma

## V.Conclusion

The accuracy to detect metastasis, the specificity, and positive predictive value of CT, according to literature, is more when compared to palpation and USG.[55]Considering the observation of the present study, CT scan can improve the diagnosis of metastatic cervical lymph node Therefore, clinical examination must be supplemented with computed tomography for evaluation of cervical lymph node metastasis in head and neck cancer patients

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