



## A Study of Fine Needle Aspiration Cytology of Metastatic Squamous Cell Carcinoma of Head and Neck Lymph Nodes

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DOI: 10.21276/APALM.3352

### Abstract

**Background:** Lesions of the head and neck region are routinely encountered by clinicians, and squamous cell carcinoma (SCC) of the head and neck is the sixth most common cancer worldwide. FNAC (fine-needle aspiration cytology) is one of the most important diagnostic modalities used universally in the initial assessment of patients presenting with palpable head and neck region masses. In this study, cases of head and neck squamous cell carcinoma metastasizing to lymph nodes are studied to evaluate the role of FNAC as a sole diagnostic method.

**Materials and Methods:** This study was conducted on 100 patients who visited the Cytopathology Department, B.J. Medical College, Civil Hospital, Ahmedabad, during the period from January 2023 to February 2024. FNAC diagnoses were correlated with detailed clinical findings and other relevant investigations.

**Results:** Out of 100 cases, the maximum cases were found in the age group of 51-60 years. Most of the cases were found in the right submandibular region (28%), and a total of 82% of patients had one or more histories of addiction. Cytomorphological analysis revealed that 54% of cases were SCC, 21% of cases were necrotizing SCC, 4% of cases were keratinizing SCC, 4% of cases were non-keratinizing SCC, 3% of cases were SCC with giant cell reaction, and 14% of cases were suspicious of SCC.

**Conclusion:** FNAC is a first-line investigation used for head and neck lymphadenopathy, including deposits of metastatic squamous cell carcinoma. Sometimes there is a diagnostic dilemma due to overlapping features on cytology, which should be kept in mind. Public awareness programs are necessary to obviate known etiological factors like tobacco.

### Keywords:

*FNAC, Head and neck lymph nodes, Metastasis, Squamous cell carcinoma*

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Submitted: 09-Apr-2024

Final Revision: 10-May-2024

Acceptance: 02-Jun-2024

Publication: 11-Jul-2024



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## Introduction

FNAC is a quick, easy, minimally invasive, and cost-effective technique that has been well-accepted as a procedure for diagnosing various swellings [1].

The evaluation of head and neck lymph nodes is a common clinical dilemma and a condition that clinicians routinely encounter. The differential diagnosis in a patient presenting with head and neck lymph nodes is often extensive and will vary with age, sex, and site. Head and neck lymph nodes are evaluated by detailed clinical history and examination with the aid of investigations like

FNAC, USG, CT of the region, and biopsy [2].

Head and neck squamous cell carcinoma is the sixth most common cancer worldwide [4]. Head and neck carcinoma is among the ten leading causes of death in India, with most of the patients having SCC [5]. Neck lymph node metastasis from occult primary constitutes about 5-10% of all patients with carcinoma of unknown primary site. Metastasis in the upper and middle neck (levels I, II, III, IV) is generally attributed to head and neck cancer, whereas lower neck (level V) involvement is often associated with primary sites below the clavicles. The most frequent cytological finding in neoplastic lymph nodes of the neck is SCC, followed by adenocarcinoma, undifferentiated carcinoma, and other malignancies (e.g., lymphoma, melanoma, etc.) [3]. The Sydney system of reporting is used for lymph node metastasis, which includes suspicious for malignancy in the L4 category and malignancies in the L5 category [16].

The FNAC of head and neck masses, especially lymph nodes, is a standard procedure to find out the underlying etiology. In this study, cases of head and neck squamous cell carcinoma with LN metastasis are evaluated for the role of FNAC as a sole diagnostic method. The correlation of addiction as an etiology for metastatic squamous cell carcinoma in the head and neck lymph node is very important and can be included in public awareness programs. Furthermore, we have tried to focus on various cytomorphologic patterns of metastatic SCC leading to potential diagnostic dilemmas.

## Materials and Methods

This study was conducted on 100 patients visiting the Cytopathology Department, B.J. Medical College, Civil Hospital, Ahmedabad, from January 2023 to February 2024. We included a total of 100 cases presenting with head and neck lymphadenopathy and clinical suspicion of metastatic malignancy. We specifically included the factor of addiction in our study with both types of patients - those with a positive and negative history of addiction.

Materials needed for aspiration: Disposable needles of 22-24 gauge, Disposable plastic syringes of 10-20 cc, Glass slides – clean and grease-free, Methanol as fixative, Reagents for H & E stain, May-Grünwald Giemsa stain (MGG), and Papanicolaou stain (PAP), Sterile gloves, gauze pieces, and spirit swabs

**Method:** The patient's history was taken, and investigations were noted. The procedure was explained to the patient, and consent was obtained. Aspiration material was spread on the slide and stained with MGG, PAP, and H & E stains. After staining, the slides were mounted with DPX and then observed under the microscope. The cytomorphology of lymph node aspiration was reported following the Sydney system of reporting lymph node cytopathology.

## Results

The present study was carried out at the Cytopathology section, Department of Pathology, B. J. Medical College, Civil Hospital, Ahmedabad. A total of 100 cases of neoplastic lesions of the head and neck from January 2023 to February 2024 were included in the study. Data was analyzed and tabulated to determine the distribution of lesions by age, gender, and site groups.

Out of the 100 cases of SCC of the head and neck, 88 cases were reported in males and 12 cases were reported in females. The incidence of lesions is shown depending upon their age group. Maximum cases are found between the age group of 51-60 years, followed by 61-70 years. Only one case was found in the 11-20 years group, and no cases were found in the 0-10 years group [see Table 1].

**Table 1: Age wise distribution of Head and neck LN metastatic SCC according to Sydney classification category L4 & L5.**

Age group	Category L4-Suspicious of SCC	Category L5- SCC	Total
0-10	0	0	0
11-20	0	1	1
21-30	0	6	6
31-40	1	8	9
41-50	1	11	12
51-60	4	28	32
61-70	5	19	24
71-80	3	12	15
81-90	0	1	1
>91	0	0	0
<b>Total</b>	<b>14</b>	<b>86</b>	<b>100</b>

A total of 82% of patients have one or more histories of addiction. Out of these, 35% of patients had a history of tobacco chewing, 28% had a history of smoking, and 15% had a history of more than one addiction (e.g., alcohol consumption, smoking, tobacco chewing), whereas 22% of patients were not addicted to any substance [see Table 2].

**Table 2: Head and neck metastatic SCC and association with addiction**

Addiction	Male	Female
<b>Tobacco Chewing</b>	31%	4%
<b>Smoking</b>	28%	0%
<b>Alcohol + Smoking</b>	10%	0%
<b>Smoking + Tobacco chewing</b>	5%	0%
<b>No addiction</b>	14%	8%
<b>Total</b>	88%	12%

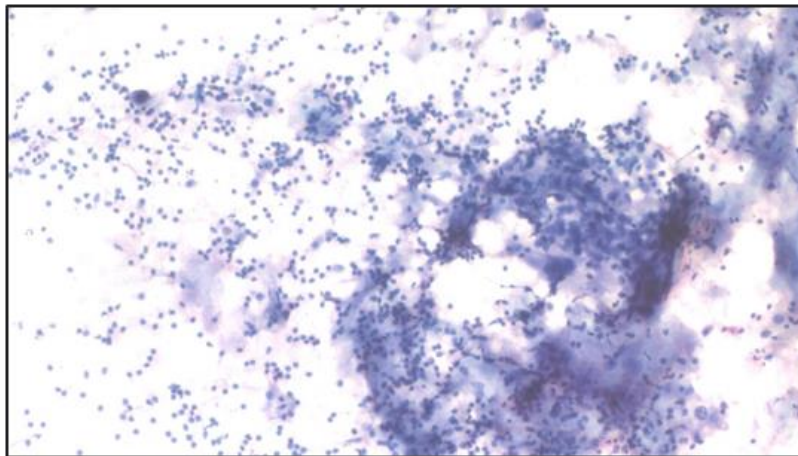
According to the Sydney system of reporting, out of our 100 cases, 14% were of category L4, suspicious of metastatic SCC, while 86% were malignant L5 category – metastatic SCC.

The cytomorphological patterns in metastatic SCC [Fig. 1] to the lymph nodes were further segregated according to the group of lymph nodes involved. Out of our 100 cases, various cytomorphological patterns reported are: 54% cases were of SCC, 21% cases were of necrotizing SCC, 4% cases were of keratinizing SCC, 4% cases were of non-keratinizing SCC, 3% cases were of metastatic SCC with giant cell reaction, and 14% cases were suspicious of squamous cell carcinoma [see Table 3] [Fig. 6].

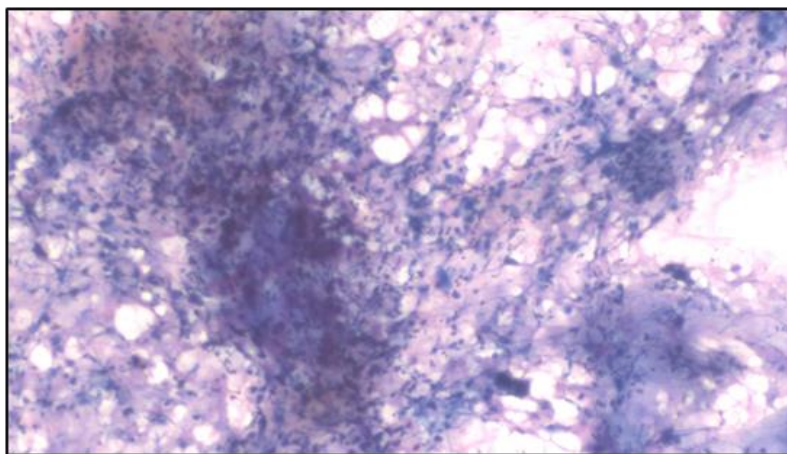
The majority of cases presented with right-side neck swelling rather than left-side swelling. Most of the cases of necrotizing SCC are found in the right and left submandibular regions (38.6%), followed by the right and left anterior triangles (37%). In the present study, metastatic SCC is found in 38.5% of Level II (anterior triangle) and 35% of Level IB (submandibular) lymph nodes. The most common site for keratinizing SCC is the left anterior triangle (50%), and non-keratinizing SCC is found in the parotid region [see Table 4].

**Table 3: Cytomorphological pattern of metastatic head and neck squamous cell carcinoma**

Sydney system category	Lesions	Total case	Incidence rate
<b>L4</b>	Suspicious of squamous cell carcinoma	14	14%
<b>L5</b>	Squamous cell carcinoma	54	54%
	Necrotizing squamous cell carcinoma	21	21%
	Keratinizing squamous cell carcinoma	4	4%
	Non-keratinizing squamous cell carcinoma	4	4%
	SCC with giant cell reaction	3	3%
	<b>Total</b>	<b>100</b>	<b>100%</b>



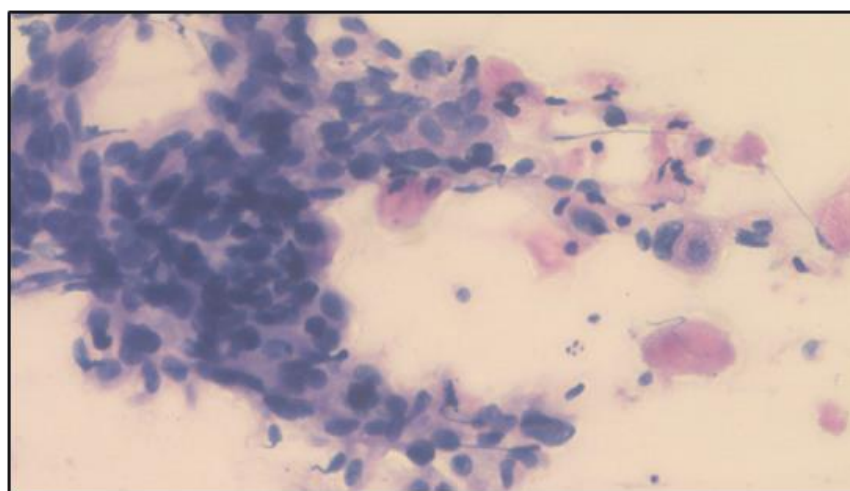
*Figure 1: Smear showing metastatic squamous cell carcinoma with sheets and cohesive groups of severely dysplastic squamous cells over a lymphoreticular background (PAP stain, 20x).*



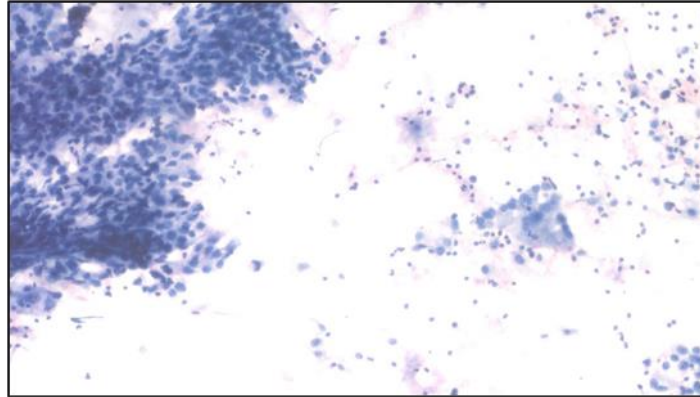
*Figure 2: Smear showing necrotizing squamous cell carcinoma with dysplastic squamous cells. The background shows liquefactive necrosis with the presence of nuclear debris (MGG stain, 20x).*

**Table 4: Site wise distribution of metastatic Squamous cell carcinoma**

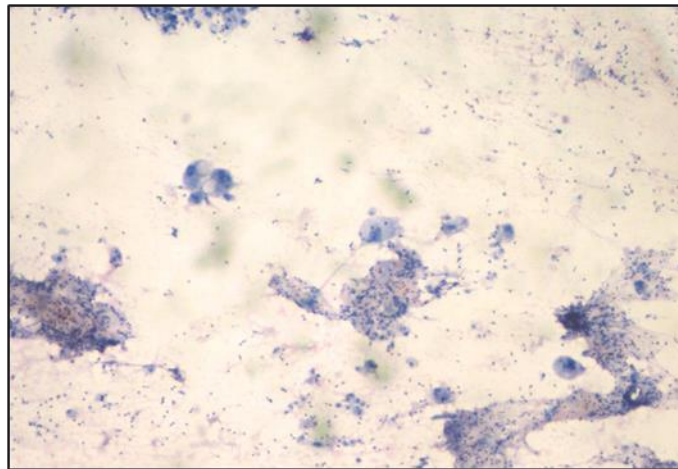
Site	SCC (L5)	Necrotizing SCC (L5)	Keratinizing SCC (L5)	Non-keratinizing SCC (L5)	SCC with giant cell reaction (L5)	Suspicious of SCC (L4)	total
Right submandibular (level IB)	10	5	0	0	2	4	21%
Left submandibular (level IB)	8	3	1	0	0	2	14%
Right anterior triangle (level II, III, IV)	12	4	0	0	1	3	21%
Left anterior triangle (level II, III, IV)	9	3	2	0	0	2	16%
Right posterior triangle (level V)	6	2	0	0	0	1	9%
Left posterior triangle (level V)	4	1	0	0	0	0	5%
Right postauricular (level Va)	3	0	1	0	0	2	6%
Left postauricular (level Va)	2	3	0	0	0	0	5%
Right parotid region (VIII)	0	0	0	3	0	0	3%
Left parotid region (VIII)	0	0	0	1	0	0	1%
<b>Total</b>	<b>54</b>	<b>21</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>14</b>	<b>100%</b>



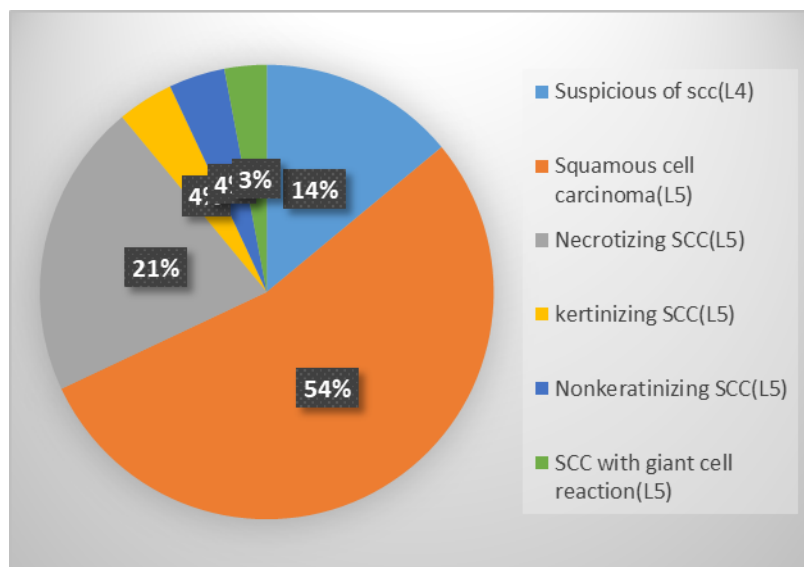
**Figure 3: Smear showing keratinizing squamous cell carcinoma with cohesive groups of dysplastic keratinized squamous cells (PAP stain, 40x).**



**Figure 4:** Smear showing non-keratinizing squamous cell carcinoma with normal salivary gland architecture (H&E stain, 20x).



**Figure 5:** Smear showing metastatic squamous cell carcinoma with the presence of giant cells (PAP stain, 10x).



**Figure 6:** Cytomorphological pattern of metastatic head and neck squamous cell carcinoma.

## Discussion

FNAC is a reliable diagnostic tool for any swelling and lymphadenopathy in the head and neck region in patients who are suspected of malignancy, as it has fewer complications. More than 90% of lymph node metastases are diagnosed by initial aspiration [6].

The diagnosis of HNSCC must be established by biopsy of the primary tumor, whereas the suspicious cervical neck mass should undergo fine needle aspiration (FNA) [5]. The proximity of various tissue types and a wide range of primary and metastatic neoplasms make this site among the most interesting and challenging in FNAC diagnosis [13]. FNAC is the first diagnostic step in identifying the nature of pathogenesis. With these facts in mind, the objective of this study is to determine the incidence of squamous cell carcinoma detected by FNAC in patients with head and neck lymphadenopathy presenting to Civil Hospital, Ahmedabad.

The Sydney system of lymph node cytology reporting and classification was proposed in 2020 by an expert panel, introducing five diagnostic categories—Category L1 to L5. Category L4 includes cases where atypical cells suspicious for metastasis are detected but are too scant to be diagnostic. Category L5 includes malignant cases of metastatic SCC. Out of our 100 cases, 14% were in Category L4 (suspicious of metastatic SCC), while 86% were malignant L5 (metastatic SCC) [16].

In India, squamous cell carcinoma is the most common malignancy of the upper aero-digestive tract [2]. Head and neck squamous cell carcinomas (HNSCCs) develop from the mucosal epithelium in the oral cavity, pharynx, and larynx, and are the most common malignancies that arise in the head and neck. The burden of HNSCC varies across countries/regions and has generally been correlated with exposure to tobacco-derived carcinogens, smoking, excessive alcohol consumption, or both, and prior infection with oncogenic strains of human papillomavirus (HPV), primarily HPV-16, and, to a lesser extent, HPV-18 and other strains. The majority of patients present with advanced-stage HNSCC without a clinical history of premalignancy [4].

In our study, a total of 82% of patients had a history of addiction, which is comparable with Kanwal M. et al. [10], who found 87.6%, and Chauhan R. et al. [12], who reported that 84.4% of all HNSCCs in both genders were associated with tobacco in any form. Tobacco use has been reported to be prevalent among men, the rural population, illiterates, and poor-vulnerable sections of society.

In the present study, the youngest patient was a 17-year-old male and the oldest was an 85-year-old male. The maximum cases were found in the 51-60-year age group, which is in concordance with Patil Amruta et al. [2] and Rathor H. et al. [7], showing maximum cases in the 51-60 years and 61-70 years age groups, respectively.

In the present study, the male-to-female ratio is 7:1, which is comparable to 6:1 and 5.5:1 seen in Dr. C. Bhavani et al. [8] and Shuo Ding et al. [9].

In the present study, the majority of cases presented with right side neck lymphadenopathy than left side. Most cases of necrotizing carcinoma are found in the right and left submandibular region (28%), followed by the right and left anterior triangle. In the present study, metastatic SCCs were found most frequently in Level II (38.5%) and Level IB (35%) lymph nodes, which is comparable with Lei Tao et al. [15], who also found 45% of SCC cases metastasize to Level II lymph nodes.

In the present study, metastatic squamous cell carcinoma was found in 57% of cases, whereas the study by Anne R. Wilkinson et al. [11] showed 46%, and Patil Amruta et al. [2] showed 80.19% of cases of metastatic squamous cell carcinoma.

In necrotizing SCC [Fig. 2], cytology smears show clusters and discrete malignant cells in the background of necrosis and granular

debris. Malignant nuclear features or abnormal keratinized cells with bizarre, globoid shape and dense orangeophilic (pap) cytoplasm are seen in keratinizing SCC [Fig. 3], whereas basophilic cytoplasm and a high N

ratio with prominent nucleoli are found in non-keratinizing SCC [13][Fig. 4]. Keratinizing squamous cell carcinoma, more than other carcinomas, tends to produce a giant cell response process. A variegated population of many different types of inflammatory cells, foamy macrophages, mast cells, and alveolar cells results from bronchial obstruction associated with the carcinoma. Other types of carcinoma, especially adenocarcinoma, do not usually show this reaction [13].

In our study, 4% of cases were reported as non-keratinizing SCC in the parotid group of lymph nodes with differentials of salivary gland tumor, like high-grade mucoepidermoid carcinoma. In these cases, due to the paucity of mucin-secreting cells, it was difficult to distinguish between these entities cytologically. The non-keratinizing SCC arising in the proximity of salivary glands thus creates a diagnostic dilemma for cytopathologists, which at times becomes very difficult to differentiate from high-grade mucoepidermoid carcinoma [14].

## Conclusion

FNAC combined with clinical correlation can be used as a first-line investigation in the workup of head and neck swelling. FNAC can help differentiate between primary and metastatic lesions in the head and neck region, aiding in determining the staging of the disease and detecting occult primary malignancies. There are two major implications of our study: 1) Correlation of metastatic SCC and addiction was found to be significant, necessitating more public awareness programs. 2) Our study also focuses on the cytomorphological features and potential diagnostic dilemmas, especially for budding pathologists. Thus, clinical, radiologic al, and cytomorphological correlation is essential while reporting such cases.

**Funding:** None

**Competing Interests:** The authors declare that they have no conflict of interest.

**Statement of Ethical Approval for the Study:** Ethical approval was taken from the college ethical committee.

**Statement of Informed Consent:** The patients were informed about the FNA procedure, and consent was taken.

**Acknowledgements:** I would like to extend my gratitude to Dr. Hansa Goswami (Professor & Head of the Department of Pathology, BJMC) who gave me this opportunity. I am grateful to my guide Dr. Hemina Desai (Associate Professor) and my colleagues for their thoughtful intervention. I would also like to thank all my teachers and laboratory staff for their support.

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