

Fine Needle Aspiration Cytology and Histopathology of Neck Swellings: A Comparative StudySreelatha Kurapati¹, S Naresh Babu², Keerthi Gourishetty³, B. Swapna Kumari⁴¹Associate Professor, Prathima Institute of Medical Sciences, Karimnagar²Associate Professor, Prathima Relief Institute of Medical Sciences, Warangal³Assistant Professor, Fr. Columbo Institute of Medical Sciences, Warangal⁴Government Medical College, Mulugu

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Conflict of interest: Nil

Abstract

Background: Neck swellings present a diagnostic challenge, often requiring differentiation between benign and malignant lesions. Fine Needle Aspiration Cytology (FNAC) is widely used for its minimally invasive nature and rapid results. This study aims to compare FNAC with histopathology to determine its diagnostic accuracy and reliability.

Aim and Objective: To evaluate the correlation between FNAC and histopathology findings in patients with neck swellings, assess the diagnostic accuracy of FNAC, and identify any discrepancies between these two diagnostic modalities.

Materials and Method: This prospective observational study conducted over a period of one year at Prathima Institute of Medical sciences. The study was approved by the institutional ethical committee, and informed consent was obtained from all participants. 60 Patients presenting with neck swellings from department of pathology were included in the study after following Inclusion and exclusion criteria.

Results: Majority of the patients were from the age group of 31-40years, followed by others and male to female ratio was 3:7. Majority of the patients had location of swelling on right side of neck ant. Nonspecific lymphadenitis were most common neck swellings

Conclusion: FNAC is a minimally invasive, cost-effective, and reliable initial diagnostic tool for neck swellings, with high sensitivity and specificity. However, histopathological examination remains essential for definitive diagnosis, especially in cases where FNAC results are inconclusive or suspicious. Combining FNAC with histopathology enhances diagnostic accuracy, guiding appropriate clinical management and treatment strategies.

Keywords: Fine Needle Aspiration Cytology (FNAC), Histopathology, Neck Swellings, Diagnostic Accuracy, Comparative Study.

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Introduction

Neck swellings are a common clinical presentation with a wide range of potential underlying causes, including infectious, inflammatory, congenital, and neoplastic conditions. Accurate diagnosis of the etiology of neck swellings is essential for effective management and treatment. Fine Needle Aspiration Cytology (FNAC) and histopathology are two pivotal diagnostic techniques employed to evaluate these swellings.

FNAC is a minimally invasive procedure that involves the extraction of cellular material using a fine needle. This technique is favored for its simplicity, cost-effectiveness, rapid results, and minimal discomfort to patients. FNAC serves as an initial diagnostic tool, providing valuable

cytological information that can guide further diagnostic and therapeutic decisions. It is particularly useful in differentiating between benign and malignant lesions and in diagnosing specific infections and inflammatory conditions.

Histopathology, on the other hand, involves the microscopic examination of tissue sections obtained through biopsy or surgical excision. It remains the gold standard for definitive diagnosis, offering detailed insights into the architectural and cellular features of the tissue. Histopathology can confirm the findings of FNAC, provide additional information on the nature and extent of the pathology, and help in determining the appropriate therapeutic strategy.

The combined use of FNAC and histopathology enhances diagnostic accuracy and provides a comprehensive understanding of neck swellings. This study aims to evaluate the correlation between FNAC and histopathology findings in patients with neck swellings, assess the diagnostic accuracy of FNAC, and identify any discrepancies between these two diagnostic modalities. By doing so, the study seeks to highlight the strengths and limitations of each technique and propose an optimal diagnostic approach for neck swellings.

Materials and Method

This is a prospective observational study conducted over a period of one year at Prathima Institute of medical sciences, Karimnagar. The study was approved by the institutional ethical committee, and informed consent was obtained from all participants.

60 Patients presenting with neck swellings from department of pathology were included in the study after following Inclusion and exclusion criteria as given below

Inclusion Criteria:

- Patients aged 18 years and above.
- Presence of palpable neck swelling.
- Patients who consented to undergo both FNAC and histopathological examination.

Exclusion Criteria:

- Patients with bleeding disorders.
- Patients who refused to participate in the study.

- Patients with inadequate or non-diagnostic FNAC samples.
- Patients with advanced staged carcinoma of the neck have previously been diagnosed and treated.

Method

Clinical History and clinical examination of patients were done Cytological and USG tests were performed on those with benign neck edema. FNAC was performed using a 22-gauge needle attached to a 10 ml syringe. The procedure was conducted under aseptic conditions, with multiple passes made to ensure adequate sampling. The aspirated material was smeared onto glass slides, immediately fixed in 95% alcohol, and stained using the Papanicolaou and May-Grünwald-Giemsa (MGG) stains.

Following FNAC, tissue samples were obtained through biopsy or surgical excision, depending on the clinical indication. The excised tissues were fixed in 10% formalin, processed, and embedded in paraffin. Sections of 3-4 micrometers were cut and stained with Hematoxylin and Eosin (H&E) for histopathological examination.

Cytological and histopathological diagnoses were classified into benign, malignant, inflammatory, and non-diagnostic categories. The FNAC results were compared with the histopathological findings to evaluate the accuracy, sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of FNAC.

Statistical Analysis:

Table 1 : Age and Sex distribution among study population

Parameter	Frequency	Percentage
Age		
< 20 Years	4	6.7
21 - 30 Years	12	20
31 - 40 Years	24	40
41 - 50 Years	11	18.3
> 50 Years	9	15
Gender		
Male	18	30
Female	42	70

Majority of the patients were from the age group of 31-40years, followed by others and male to female ratio was 3:7.

Table 2 : Distribution of location of swelling among study population

Location of Swelling	Frequency	Percentage
Rt side of neck Ant. triangle	21	35
Rt side of neck Parotid region	15	25
Lt side of neck Post. triangle	11	18.3
Rt side submandibular region	8	13.3
Midline of Neck	5	8.3
Total	60	100

Majority of the patients had location of swelling on right side of neck ant. Triangle followed by right side of neck parotid region, left side of neck post triangle and other as shown in above table

Table 3: Comparison of neck swelling between FNAC and HPE

Neck Mass	HPE		FNAC		P-value
	Frequency	Percentage	Frequency	Percentage	
Nonspecific lymphadenitis	19	31.7	17	28.3	0.68
Sebaceous cyst	9	15	11	18.3	0.62
Metastatic deposits	11	18.3	11	18.3	1
Dermoid Cyst	8	13.3	9	15.9	0.794
Lipoma	9	15	9	15.0	1
Non Hodgkins Lymphoma	2	3.3	1	1.7	0.561
Colloid goitre	2	3.3	2	3.3	1
Total	60	100	60	100	

Nonspecific lymphadenitis were most common neck swellings consisting of 28.3% of swellings followed by metastatic deposits and sebaceous cyst.

Discussion

A lump is the most common clinical issue encountered in the neck. Lumps can be classified according to the neck triangles: Anterior, Digastric, Carotid, Muscular, and Posterior [1]. Understanding these anatomical triangles is crucial for diagnosing the various pathologies that present as neck swellings. Common pathologies include lymphadenopathies (specific and non-specific, acute and chronic), metastatic carcinoma, lymphoma, thyroid swellings (goitre, nodules, and cysts), and salivary gland swellings (sialadenitis, cysts, adenomas, and carcinomas). Less common pathologies include carotid body tumor, branchial cyst, thyroglossal cyst, cystic hygroma, pharyngeal pouch, and lumps of skin appendages [1, 2].

In this study, 60 cases of neck swellings were analyzed over one year. The majority of patients were aged 21 to 30 years, with the youngest being under 20 years. These findings align with the studies by J Jasani and D Taviad [3, 4]. The male to female ratio was 3:7, consistent with findings by J Jasani and VK Poorey et al., who also reported a higher number of female patients [3, 5].

FNAC involves studying cells obtained by fine needle under vacuum, unlike biopsy where the whole tissue is available for microscopic examination. FNAC offers a simple and early diagnostic method for neoplastic and non-neoplastic neck lesions, can be performed as an outpatient procedure without anesthesia, provides speedy results, and offers accurate diagnosis. It serves as a preliminary complementary procedure to histopathological examination [6].

In this study, metastatic deposits, lipoma, and colloid goitre were accurately diagnosed by both FNAC and histopathology, with 100% sensitivity. FNAC identified nonspecific lymphadenitis in 17 cases, while histopathology observed it in 19

patients. Sebaceous cysts were identified by FNAC in 11 patients but only 9 by histopathology. Dermoid cysts were observed in 9 patients by FNAC but in 8 by HPE. Non-Hodgkin's lymphoma was identified in one patient by FNAC but in two by HPE. Similar results were found in a study of lipoma by Swamy G et al. [7]. All cases of congenital neck masses and lipoma were correctly diagnosed using FNAC in this study, showing 100% diagnostic accuracy, similar to a study by Dejmek A et al. [8].

Missed diagnoses could result from non-representative lymph node selection or crushing of the lymph node during surgery, destroying its morphology [9, 10]. It may also be due to an initial non-specific response to a specific ailment [11]. In two cases where FNAC showed non-Hodgkin's lymphoma, excision biopsy and immunophenotyping were done for further classification. FNAC can be used for preliminary diagnosis of lymphoma, followed by histopathology and cytochemistry for confirmation [12].

Among the two thyroid swellings, both cases of colloid goitre were reported on FNAC and confirmed by HPE after surgery, showing 100% accuracy, similar to a study by Jayaram G et al. [13-15].

Conclusion

Based on our observations and discussions with other studies, we can conclude that the overall sensitivity, specificity, and accuracy of FNAC are very similar to histopathological examination. FNAC is a safe and reliable method for diagnosing various neck swellings. However, it should not be considered a replacement for histopathological diagnosis in all cases. Both modalities should complement each other, along with newer diagnostic techniques, to ensure a precise and accurate diagnosis for further management.

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References

1. Neck Masses [Internet]. Laurence Biro's reflections on Life, Universe and Everything. 2019.
2. Miller D, Ervin T, Weichselbaum R, Fabian RL. The differential diagnosis of the mass in the neck. A fresh look. *The Laryngoscope*. 1981; 91(1):140-5.
3. Jasani JH, Vaishnani HV, Vekaria PN, Patel D, Shah Y, Savjiani N, Patel D, Lakhani D. Retrospective study of fine needle aspiration cytology of head and neck lesions in tertiary care hospital. *IJBAR*. 2013;4(4): 253- 6.
4. Taviad D, Jadav K, Nikhra P, Panchal A, Patel V. Role of fine Needle aspiration cytology in head and neck swelling [Internet]. *Semanticscholar.org*. 2019.
5. Poorey VK, Tyagi A. Accuracy of fine needle aspiration cytology in head and neck masses. *Indian J Otolaryngol Head Neck Surg*. 2014; 66(2):182-6.
6. Gertner R, Podoshin L, Fradis M. Accuracy of fine needle aspiration biopsy in neck masses. *The Laryngoscope*. 1984;94(10):1370-1.
7. Gupta G, Joshi DS, Shah A, Gandhi M, Shah NR. FNAC of head and neck swellings. *GCSMC J Med Sci*. 2014;3(1):38-41.
8. Shariff MA, Raju J. Fine Needle Aspiration Cytology, Neck mass, Histopathology. Accuracy of fine needle aspiration cytology in the diagnosis of neck masses. 2014;(3354).
9. Swamy GG., Chandrashekar B, Parameshwari: Comparison of Fine Needle Aspiration Cytology and Histopathology in the diagnosis of neck masses: *Int J Recent Trends Sci Tech*. 2013; 6(1):13-16.
10. Dejmek A, Lindholm K. Fine needle aspiration biopsy of cystic lesions of the head and neck, excluding the thyroid. *Acta Cytol*. 1990;34(3): 443-8.
11. Johnstone JMS, Msran, AGD, Rintoul RF. Operatksns on malignant glands of the neck, in Fsrquharsons textbook of operative surgery. 7th ed. Edinburgh, Churchill Livingstone, 1986; 252-56
12. Russell, R.C.G. Lymph node biopsy, in atlas of general surgery. Edited by H. Dudley, D.C. Carter and RCG Russel 4th edition Dutterworth. 1986;28-9.
13. Greenfield S, Jordan MC. The clinical investigation of lymphadenopathy in primary care practice. *JAMA*. 1978;240(13):1388-93.
14. Anne R Wilkinson, Sadhana D, Mahore, Sahiba A, Maimoon. FNAC in the diagnosis of lymph node malignancies: A simple and sensitive tool. *Indian J Med Pediat Oncol*. 2012; 58 51.9696433(1): 21-24.
15. Jayaram G, Basu D. Cytology in the diagnosis of thyroid lesions. *J Assoc Physicians India* 19 93;41(3):164-169.