

Diagnostic Utility of Fine Needle Aspiration Cytology in Non-thyroid Neck Masses: Correlation with Histopathology

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ABSTRACT

Background: Neck swellings stem from various origins and require precise identification. FNAC is a quick, easy, and economical technique for assessing non-thyroid neck lumps and demonstrates a strong correlation with histopathology, although there are occasional inconsistencies. This study assesses the diagnostic precision of FNAC and its relationship with histopathology. **Methods & Materials:** This study was a cross-sectional study based in a hospital at Dhaka Medical College Hospital (Jan–Dec 2020) involving 100 individuals with non-thyroid neck masses. FNAC was succeeded by histopathology (gold standard), excluding incomplete cases and those involving the thyroid. Diagnostic precision was assessed through standard validity metrics and statistical analyses ($p < 0.05$ significant). **Results:** A sum of 100 patients with neck masses not related to the thyroid was assessed. Lesions in lymph nodes were the most prevalent (76%), followed by those in salivary glands (13%) and soft tissues (11%). FNAC revealed 68% benign/inflammatory and 32% malignant cases, whereas histopathology indicated 73% benign/inflammatory and 27% malignant cases. FNAC showed a strong correlation with histopathology ($\kappa = 0.69$, $p < 0.001$) and exhibited high diagnostic precision (85.2% sensitivity, 94.1% specificity, 87% accuracy). **Conclusion:** FNAC is a dependable initial test for neck masses unrelated to the thyroid, demonstrating good sensitivity, high specificity, and a robust capacity to rule out cancer. It demonstrates considerable concordance with histopathology, yet positive findings for cancer must be verified. In general, it serves as a helpful, low-impact, and economical diagnostic instrument.

Keywords: Fine Needle Aspiration Cytology, Non-thyroid Neck Masses, Histopathology, Diagnostic Utility

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INTRODUCTION

Neck swellings encompass a variety of conditions and are identified as any irregular growth that appears between the base of the skull and the collarbone [1,2]. Neck masses not related to the thyroid can arise from various origins, such as inflammatory, infectious, congenital, benign, and malignant conditions, necessitating precise preoperative diagnosis for effective treatment [3]. Assessment of neck masses includes clinical evaluation, imaging studies, and tissue analysis. While histopathological examination (HPE) is considered the gold standard, surgical biopsy is both invasive and expensive. As a result, minimally invasive methods are being utilized more frequently to ensure quick and dependable preoperative diagnosis [4,5].

Fine Needle Aspiration Cytology (FNAC) is a straightforward, quick, secure, and affordable minimally invasive method employed to assess lesions in the head and neck. By using a thin needle to aspirate cells for cytological analysis, FNAC aids in distinguishing between inflammatory, benign, and malignant lesions, thus minimizing the necessity for invasive

diagnostic techniques [6,7]. FNAC is essential for assessing non-thyroid neck masses by offering cytological diagnosis when clinical examination and imaging fall short, thus aiding in suitable management and treatment choices [6,8]. Cervical lymphadenopathy is a frequent non-thyroid neck lump, and FNAC aids in differentiating tuberculosis, reactive conditions, and cancers, facilitating prompt diagnosis and intervention [9,10]. Salivary gland abnormalities vary from non-cancerous to cancerous, and FNAC proves useful for early diagnosis, directing treatment, and differentiating between benign and malignant tumors [11]. Research indicates that FNAC is a straightforward, quick, and minimally invasive method with excellent diagnostic precision for head and neck lesions, successfully differentiating between inflammatory, benign, and malignant conditions and decreasing the necessity for excisional biopsy. It also shows strong cytohistopathological correlation, but false-positive and false-negative outcomes emphasize the requirement for histopathological verification to enhance diagnostic precision [12,13].

A study conducted in Bangladesh on neck swellings utilizing clinical, cytological, and histopathological assessments revealed that FNAC demonstrates high diagnostic precision and a robust association with histopathology. The research determined that FNAC is a dependable, minimally invasive technique for assessing neck lumps and significantly aids in directing clinical diagnosis and treatment [14].

In Bangladesh, FNAC is a trusted and commonly utilized diagnostic method, yet there is insufficient specific data regarding its precision in non-thyroid neck masses. Thus, this study seeks to assess the diagnostic value of FNAC and its relationship with histopathology to enhance preoperative diagnosis and inform management.

METHODS & MATERIALS

This was a hospital-based cross-sectional descriptive study conducted in the Department of ENT & Head-Neck Surgery at Dhaka Medical College Hospital, Dhaka, Bangladesh. The study was carried out over a period of six months from January 2020 to December 2020. A total of 100 patients

presenting with non-thyroid neck masses were included in the study.

Patients of all age groups and both sexes with clinically diagnosed non-thyroid neck swellings who subsequently underwent fine needle aspiration cytology (FNAC) followed by histopathological examination were enrolled. Patients with thyroid swellings, those unfit for FNAC or biopsy, and those who did not complete histopathological evaluation were excluded from the study.

After obtaining informed consent, detailed clinical history was taken and a thorough physical examination was performed. FNAC was carried out using a standard technique with a 22–23-gauge needle, and smears were prepared, air-dried or wet-fixed, and stained using Giemsa and Papanicolaou stains. Histopathological examination of biopsy or excised specimens was performed, which served as the gold standard for final diagnosis.

Data were collected using a structured data collection sheet and then analyzed using appropriate statistical methods. Results were expressed in frequencies and percentages. The diagnostic validity of FNAC was assessed by calculating sensitivity, specificity, positive predictive value, negative predictive value, and overall diagnostic accuracy. The agreement between FNAC and histopathology was evaluated using the kappa statistic, and the association between the two methods was analyzed using the chi-square test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 100 patients with non-thyroid neck masses were included in the study. All cases underwent fine needle aspiration cytology (FNAC), followed by histopathological examination, which was

considered the gold standard for diagnostic confirmation.

Distribution of Neck Mass by Site and Cytological Diagnosis

Table I presents the overall distribution of non-thyroid neck masses according to anatomical site as well as the cytological and histopathological diagnostic categories. Lymph node lesions constituted the majority of cases (76%), followed by salivary gland lesions (13%) and soft tissue swellings (11%). Cytological evaluation by FNAC revealed that benign and inflammatory lesions were predominant, accounting for 68% of cases, whereas malignant lesions comprised 32%. Histopathological examination showed benign and inflammatory lesions in 73% of cases and malignant lesions in 27%, indicating a slightly lower proportion of malignancy on final diagnosis.

Table I
Distribution of Neck Mass by Site and Overall Cytological and Histopathological Diagnosis (n=100).

Category	Sub-category	Frequency	Percentage (%)
Site of neck mass	Lymph node	76	76.0
	Salivary gland	13	13.0
	Soft tissue	11	11.0
Total		100	100.0
Cytological diagnosis (FNAC)	Benign & inflammatory lesions	68	68.0
	Malignant lesions	32	32.0
Total		100	100.0
Histopathological diagnosis	Benign & inflammatory lesions	73	73.0
	Malignant lesions	27	27.0
Total		100	100.0

FNAC Findings of Neck Masses

Table II shows among lymph node lesions (n=76), inflammatory lymphoid hyperplasia was the most frequent diagnosis (34%), followed by tuberculous lymphadenitis

(23%), metastatic lymphadenopathy (12%), and lymphoma (7%). Among salivary gland lesions (n=13), pleomorphic adenoma was the most common finding (9%), while mucoepidermoid carcinoma accounted for

4%. In soft tissue lesions (n=11), lipoma was the predominant diagnosis (7%), followed by benign cystic lesions (2%) and abscess (2%).

Table II
Diagnosis of neck mass by Fine needle aspiration cytology (FNAC) findings (n=100).

Category	FNAC	Frequency	Percentage
Lymphadenopathy (n=76)	Inflammatory lymphoid hyperplasia	34	34.0
	Tubercular lymphadenitis	23	23.0
	Metastatic lymphadenopathy	12	12.0
	Lymphoma	7	7.0
Salivary gland (n=13)	Pleomorphic adenoma	9	9.0
	Mucoepidermoid carcinoma	4	4.0
Soft tissue (n=11)	Lipoma	7	7.0
	Benign cystic lesion	2	2.0
	Abscess	2	2.0

Correlation Between FNAC and Histopathology

Table III presents among 73 histologically benign cases, 64 were correctly identified as benign on FNAC, while 9 were misclassified as malignant (false positives). Among 27 histologically malignant cases,

23 were correctly identified as malignant, while 4 were falsely classified as benign (false negatives). The findings demonstrate good diagnostic concordance between FNAC and histopathology. A substantial agreement was observed between FNAC and histopathological diagnosis, with a

kappa value of 0.69. The association between the two diagnostic methods was statistically significant ($\chi^2 = 52.6$, $p < 0.001$).

Table III
Diagnostic Correlation Between FNAC and Histopathology in Non-thyroid Neck Masses (n=100).

Histopathology	FNAC Benign	FNAC Malignant	Total
Benign lesions	64 (True Negative)	9 (False Positive)	73
Malignant lesions	4 (False Negative)	23 (True Positive)	27
Total	68	32	100

Diagnostic Performance of FNAC
Table IV shows FNAC demonstrated good sensitivity (85.2%) and high specificity (94.1%), indicating its strong ability to detect both positive and negative cases of malignancy. The positive predictive value (PPV) was 71.9%, suggesting a moderate

level of accuracy in confirming malignant lesions when FNAC is positive. In contrast, the negative predictive value (NPV) was high at 94.1%, indicating that FNAC is highly reliable in excluding malignancy when the cytological result is benign. The overall diagnostic accuracy of FNAC in

evaluating non-thyroid neck masses was 87.0%, reflecting good overall performance of FNAC as a diagnostic tool when compared with histopathological findings.

Table IV
Diagnostic Performance of FNAC in Non-thyroid Neck Masses.

Parameter	Value (%)
Sensitivity	85.2
Specificity	94.1
Positive Predictive Value	71.9
Negative Predictive Value	94.1
Diagnostic Accuracy	87.0

DISCUSSION

In this study, lymph node lesions occurred most frequently, followed by salivary gland lesions and soft tissue lesions. FNAC revealed 68% benign/inflammatory and 32% malignant lesions, whereas histopathology indicated 73% benign/inflammatory and 27% malignant cases, suggesting a minor overestimation of malignancy in cytology. A comparable study from Bangladesh found that lymph node lesions are the main neck masses and that preoperative diagnostic results might not entirely align with histopathology, highlighting histopathology as the definitive diagnostic gold standard [15]. In our study lymph node lesions were predominant, primarily inflammatory lymphoid hyperplasia, followed by tuberculous lymphadenitis, lymphoma, and metastatic nodes; pleomorphic adenoma and lipoma were the frequent salivary and soft tissue lesions, respectively. These results correspond with evidence that FNAC is trustworthy for classifying head and neck masses, particularly for benign and inflammatory lesions, yet it has drawbacks in lymphoma and certain malignant cases because of overlapping cytological characteristics and sampling mistakes [16]. In the current study, FNAC showed strong agreement with histopathology, accurately identifying the majority of benign and malignant cases, along with a few false positives and negatives. Comparable research indicates high precision and a strong association with biopsy, although inaccuracies can arise from sampling problems and overlapping cytological characteristics [17]. In this study, FNAC demonstrated effective diagnostic capabilities with a high sensitivity of 85.2% and a specificity of 94.1%. The PPV was 71.9% and NPV was

94.1%, leading to an overall accuracy of 87%, suggesting that FNAC is more dependable for excluding malignancy than for confirming it. Comparable research has similarly indicated elevated specificity and overall diagnostic precision of FNAC in neck masses that are not thyroid-related. Results differ based on lesion type, showing improved outcomes in metastatic lesions and lymphoma, while salivary gland cancers exhibit lower sensitivity [18]. Overall, FNAC serves as a dependable preliminary diagnostic method for non-thyroid neck masses, particularly in ruling out malignancy; however, histopathological confirmation is crucial for a definitive diagnosis.

CONCLUSION

Fine needle aspiration cytology (FNAC) is a reliable and effective first-line diagnostic tool for evaluating non-thyroid neck masses. In this study, FNAC demonstrated good sensitivity and high specificity with substantial agreement with histopathological findings. Its high negative predictive value indicates strong reliability in excluding malignancy, making it particularly useful for initial clinical assessment and patient triage. However, the moderate positive predictive value suggests that cytological diagnosis of malignancy should be interpreted with caution and confirmed by histopathological examination whenever possible. Overall, FNAC remains a valuable, minimally invasive, and cost-effective diagnostic modality in the evaluation of non-thyroid neck masses, aiding in timely diagnosis and appropriate management.

REFERENCES

1. Balıkcı HH, Gurdal MM, Ozkul MH, Karakas M, Uvacin O, Kara N, Alp A,

Ozbay I. Neck masses: diagnostic analysis of 630 cases in Turkish population. European Archives of Oto-Rhino-Laryngology. 2013 Nov;270(11):2953-8.
2. Irani S, BIDARI ZF, Sabeti S. Prevalence of pathological entities in neck masses: A study of 1208 consecutive cases.
3. Devkota H, Sibakoti YC, Menyangbo S, Basnet S, Jha MK, Banstola L. Correlation of Fine Needle Aspiration Cytology and Histopathology of the Neck Swellings Presenting at National Academy of Medical Sciences, Kathmandu, Nepal. Birat Journal of Health Sciences. 2017 Nov 2;2(2):206-10.
4. Addams-Williams J, Watkins D, Owen S, Williams N, Fielder C. Non-thyroid neck lumps: appraisal of the role of fine needle aspiration cytology. European archives of oto-rhino-laryngology. 2009 Mar;266(3):411-5.
5. Karthikeyan CR, Venkateswaran SR, Elangovan M. Clinical evaluation of non-thyroidal neck swellings. IAIM. 2019 Jun 1;6(6):57-61.
6. Bayrak BY, Özkara SK. Fine needle aspiration of non-thyroidal head and neck masses: Correlation of the cyto-histopathological diagnoses, causes of inconsistency and traps. Annals of Diagnostic Pathology. 2019 Apr 1;39:15-20.
7. Karimi-Yazdi A, Motiee-Langroudi M, Saedi B, Ensani F, Amali A, Memari F, Dabiri M, Seifmanesh H. Diagnostic value of fine-needle aspiration in head and neck lymphoma: a cross-sectional study. Indian Journal of Otolaryngology and Head & Neck Surgery. 2014 Jan;66(Suppl 1):277-80.
8. Göret CC, Göret NE, Özdemir ZT, Özkan EA, Doğan M, Yanık S, Gümrükçü G, Aker FV. Diagnostic value of fine needle aspiration biopsy in non-thyroidal head and neck lesions: a retrospective study of 866 aspiration materials. International journal of clinical and experimental pathology. 2015 Aug 1;8(8):8709.

9. Khan Q, Shahabi IK. DIAGNOSTIC VALUE OF FINE NEEDLE ASPIRATION CYTOLOGY IN DIAGNOSIS OF NON-THYROIDAL NECK MASSES. JPMI: Journal of Postgraduate Medical Institute. 2010 Oct 1;24(4).
10. i Wahid F, ur Rehman H, Khan Q, Shahabi IK. DIAGNOSTIC VALUE OF FINE NEEDLE ASPIRATION CYTOLOGY IN DIAGNOSIS OF NON-THYROIDAL NECK MASSES. Journal of Postgraduate Medical Institute. 2010;24(4).
11. Adhikari RC, Shrestha HK, Sharma SK. Fine needle aspiration cytology of neck masses in a hospital. Journal of Nepal Health Research Council. 2014 Nov 21;12(02).
12. Peker İO, Kulaçoğlu S, Erüyar T, Ergül G. Fine needle aspiration cytology of head and neck masses: a cytohistopathological correlation study with emphasis on false positives and false negatives. The Turkish Journal of Ear Nose and Throat. 2013 May;23(3):163-72.
13. Patel DN, Patel PB, Patel HV, Gandhi TJ. Fine needle aspiration cytology role in head and neck lesions. International Archives of Integrated Medicine. 2015 Aug 1;2(8).
14. Ali MI, Huq MM, Haque M, Tarafder KH. Comparative Study of Neck Swelling by Clinical, Cytological and Histopathological Examination. Bangladesh Journal of Otorhinolaryngology. 2020 Jul 1;26(1):24-30.
15. Siddiqua UI, Halder BA, Hossain R, Roy SK, Al-Amin A, Sultana S. Evaluation of Neck Mass by Multidetector Computed Tomography and Histopathological Comparison. Bangladesh Medical Research Council Bulletin. 2017;43(3):115-9.
16. Rammeh S, Romdhane E, Sassi A, Belhajkacem L, Blel A, Ksentini M, Lahiani R, Farah F, Salah MB, Ferjaoui M. Accuracy of fine-needle aspiration cytology of head and neck masses. Diagnostic cytopathology. 2019 May;47(5):394-9.
17. Anerudh S. *To Compare Accuracy of FNAC over Open Biopsy in Assessment of Cause of Nonthyroidal Neck Swelling* (Master's thesis, Rajiv Gandhi University of Health Sciences (India)).
18. Alshare AA. The accuracy of fine needle aspiration cytology for the diagnosis of non-thyroid neck masses.