

Usefulness of Fine Needle Aspiration Cytology in Diagnosis of Neck Masses

Dr. Neelkamal Kapoor

Professor and Head, Department of Pathology, Gandhi Medical College, Bhopal India

Abstracts: Background: Fine needle aspiration cytology (FNAC) is a well established, simple, quick, inexpensive and minimally invasive diagnostic technique. Neck region of human body is relatively small area but houses a fairly large number of organs with a variety of lesions and consequently require from conservative to aggressive management protocols. Aims and objectives: To assess sensitivity and specificity or diagnostic value of FNAC of neck masses keeping histopathology as gold standard. Materials and Methods: Surgical biopsies or excisions from neck masses were received in fifty nine cases in which prior FNAC was done. The findings of histopathological study were correlated with the diagnosis given on FNAC. Further the sensitivity and specificity were calculated. Results: Twenty eight aspirates were from lymph nodes, fourteen were from thyroid gland, thirteen were of salivary gland origin and four were others. Out of the Fifty nine cases the diagnosis of forty four (74.57%) was corroborated by histopathology. In fifteen (25.42%) cases the histopathological diagnosis was dissimilar to that of FNAC. The overall sensitivity of FNAC in the diagnosis of neck masses was calculated to be 83.01% and specificity was 78.94%. Sensitivity was highest (82.14%) for neck lymph nodes and lowest for thyroid masses (64.28%). Specificity was the highest for other neck masses (100%) and the lowest for neck nodes (71.2%). Conclusion: FNAC of neck masses is an effective diagnostic tool but its sensitivity and specificity of diagnosis in different organs should be kept in mind while creating a management protocol for the patient. [Kapoor N NJIRM 2011; 2(4) : 26-28]

Key Words: Fine Needle Aspiration Cytology, Neck Mass, sensitivity, specificity

Author for correspondence: Dr Neelkamal Kapoor , E-6/14 Arera Colony, Bhopal-462016, India
E-mail: nkapoorn@rediffmail.com

Introduction: Usually neck masses or swellings occur within lymph nodes, thyroid, parotid and other salivary glands and less commonly in the form of thyroglossal cysts, branchial cleft cysts, carotid body tumors, cystic hygromas, pharyngeal pouch abnormalities and lumps of skin appendages¹. Fine needle aspiration cytology / Fine needle aspiration Biopsy (FNAC/ FNAB) is a simple, quick and cost effective method easily performed in the outpatient clinic, causing minimal trauma and carrying virtually no risk of complication². In the head and neck region, FNAC is of great value because of the multiplicity of accessible organs and heterogeneous pathology encountered. An early differentiation of benign from malignant lesions greatly influences the treatment planning³. This study was done to assess sensitivity and specificity or diagnostic value of FNAC of neck masses.

Material and Methods: This is a hospital based study conducted in a tertiary care hospital. Fifty nine paraffin blocks of consecutive surgical biopsy specimens from neck area were selected from records for study in which prior FNAC were performed, cytological smear prepared, stained

with Papanicolaou method and result documented. Consent of all the patients was taken. The project was not submitted to ethics committee as it was done retrospectively from records. Care was taken to ensure that those surgical biopsies were not included in study where prior FNAC was reported as hemorrhagic or acellular. All the 59 FNAC were palpation guided aspirations and not imaging guided. The surgical biopsies were fixed, processed and sections for microscopy were made, which were stained with Hematoxylin and Eosin. Final diagnosis was made and recorded. A comparison of diagnosis thus made (through FNAC and Surgical biopsy) of all the cases was done and Sensitivity and specificity were calculated taking histopathology report as gold standard.

Result: Out of 59 cases having undergone FNAC followed by surgical biopsy or excision, 39 (66.10%) were females and 20 (33.89%) were males. The youngest patient was a 5 year old and the oldest was 70 year old. In forty four (74.57%) cases subsequent histopathology examination of surgical biopsy confirmed FNAC diagnosis and in 15 (25.42%) cases histopathology diagnosis did not

confirm FNAC diagnosis showing an overall sensitivity of 83.01% and specificity of 78.94%.

Table 1- Site-specific analysis of fine-needle aspiration cytology

Site	No. (%)	Sensitivity (%)	Specificity (%)
Lymph node	28 (47.45)	82.14	71.20
Thyroid	14 (23.72)	64.28	83.30
Salivary gland	13 (22.03)	67.80	80
Others	4(6.77)	75	100
Total	59	83.01	78.94

Discussion: This study was conducted to determine the sensitivity and specificity of FNAC keeping histopathology as the gold standard in the diagnosis of neck masses and the results were then compared with other reports in the literature.

Tilak et al studied 550 patients and found the overall sensitivity of FNAC for neck masses to be 90.91% and specificity to be 93.18% which is greater than that observed in our study⁴. Howlett et al studied a total of 276 patients in similar fashion and found FNAC of neck nodes to have an overall sensitivity of 89% and a specificity of 57%; for thyroid masses the sensitivity was 62% and specificity was 86%; and for salivary glands, the sensitivity was 64% and specificity was 100%⁵. Various observers have tried to interpret and discuss accuracy and efficacy of FNAC of neck masses in various other ways. Schwarz, et al. evaluated 165 patients. In their study, the sensitivity of FNAC for metastatic carcinoma was 92% and for lymphoma was 100%. In their study, the accuracy was highest for the malignant salivary group and lowest for the benign salivary gland group⁶. Schelkun et al assessed over a three year period the diagnostic accuracy and safety of FNAB in comparison to histopathological examination of surgical specimen. Their assessment was not site specific but it only dealt with benign versus malignant diagnoses. Based on cytology alone, 40.3% of the lesions were reported as malignant, 45.1% as benign, and 14.6% as indeterminate. Cytological diagnoses concurred with surgical histopathological diagnoses in 90% of the cases. Fine-needle aspiration biopsy in their study was found to have a false-positive rate of 0.5% and a false-negative rate of 2.3%. The sensitivity and specificity of FNAB in determining a malignant diagnosis were 81.1% and 99%, respectively.

Positive and negative predictive values were calculated at 98.9% and 82.8%, respectively. Schelkun et al made an interesting observation that diagnostic rate, sensitivity, and negative predictive value increased consistently throughout the study period, indicating that the diagnostic accuracy of FNAB improved with experience⁷. Layfield has given some noteworthy suggestions to enhance the accuracy and efficacy of FNAC of neck masses. According to him utilizing electron microscopy and immunohistochemical techniques along with flow cytometry can greatly broaden the diagnostic range and specificity of needle-aspiration cytology. Flow cytometry and immunohistochemistry are particularly useful in the establishment of monoclonality in lymphoproliferative processes and hence can aid in the separation of reactive from lymphomatous lymphadenopathy. Immunohistochemistry can establish the precise nature of lesions as variable as rhabdomyosarcoma, olfactory neuroblastoma, and granular cell tumor. The prudent use of these techniques can be cost-effective and negate the need for more invasive diagnostic procedures⁸.

Tandon et al⁹ did a systematic review and meta-analysis of head and neck cancers and identified 30 studies. 3459 FNAC aspirates from all head and neck sites were included. Overall results were as follows: sensitivity, specificity, accuracy, positive predictive value (PPV), and negative predictive value (NPV) were 89.6%, 96.5%, 93.1%, 96.2%, and 90.3%, respectively. Two thousand seven hundred and two head and neck aspirates were included in their institutional review. Sensitivity, specificity, PPV, NPV, and accuracy were 89.5%, 98.5%, 97.3%, 94.0%, and 95.1%, respectively. They concluded that FNAC is highly effective in the diagnosis of head and neck masses, with some limitations⁹. The clinical state-of-the-art review by Amedee et al showed that Fine-needle aspiration biopsy has a high overall diagnostic accuracy of 95% for all head and neck masses, 95% for benign lesions, and 87% for malignant ones. They concluded that there are virtually no contraindications and complications are minimal with FNAB. Other advantages of FNAB are that it is safe and simple, it can be performed as an outpatient procedure, and it is well tolerated by patients. In the present managed care

environment, it also proves cost-effective. The diagnosis becomes readily known to the clinician and appropriate treatment modalities can be discussed with the patient. It is recommended as a first line of investigation in palpable head and neck masses¹⁰.

Our results showed an overall lesser sensitivity and specificity in comparison with various other studies available in literature.⁴⁹ As far as site specific results of our study were concerned FNAC was most accurate in the diagnosis of neck nodes with sensitivity of 82.14% and specificity of 71.2%. Sensitivity for the thyroid lesions was 64.28% and the specificity was 83.3% which was similar to Howlett et al.⁵ In our study the sensitivity and specificity for the salivary gland group was 67.8% and 80% respectively. Howlett et al found a similar sensitivity (64%) but higher specificity (100%). Difference in the specificity of the neck node and salivary gland group between our study and Howlett et al may be due to the reason that all the FNAC done in our study were unaided by ultrasound whereas Howlett et al performed ultrasound guided FNAC in half of their cases. The differences can also be explained by the fact that in India patients usually present late with large masses where inadvertent sampling discrepancies may occur because different regions of the mass may have areas of degeneration, necrosis, hemorrhage or cyst formation.

Conclusion: Undeniably FNAC is a simple, rapid, inexpensive and well tolerated procedure for the diagnosis of neck masses. It is the most accurate where there is a close cooperation between clinician, cytopathologist and radiologist. The armour can also be increased to make FNAC more effective by using imaging modalities like ultrasonography, computerized tomography etc and specialized diagnostic technical support like immunohistochemistry, flowcytometry etc. The only issue a clinician needs to keep in mind is that sensitivity and specificity of diagnosis on FNAC may be different in neck masses of different origins.

Limitations: The sample size is comparatively small. A larger sample size would have given opportunity of further comparisons between various lesion sites.

Acknowledgements: Dr Reeni Malik Professor, Dr RK Nigam Associate Professor, Dr VK Trichal Associate Professor, all from Department of Pathology, Gandhi Medical College Bhopal for their help in primary reporting of cases.

References:

1. Lumley JSP, Chan S, Harris H, Zangana MOM . Physical signs. 18th ed. Oxford: Butterworth-Heinemann, Oxford, 1997.
2. Wenig BM, Cohen J-M. General principles of head and neck pathology. In Harrison LB, Sessions RB, Hong WK editors. Head and Neck Cancer A multidisciplinary approach. 3rd ed. Philadelphia: Lippincott Williams & Wilkins, a Wolters Kluwer business; 2009.p.11-12.
3. Watkinson JC, Wilson JA, Gaze M, Stell PM, Maran AGD. Stell and Maran's Head and neck surgery, Butterworth-Heinemann, Oxford, 4th edition, chapter 2; 2000. p 20-21.
4. Tilak V, Dhaded AV, Jain R. Fine needle aspiration cytology of head and neck masses. Indian J Pathol Microbiol. 2002 Jan; 45(1):23-9.
5. Howlett DC, Harper B, Quante M, Berresford A, Morley M, Grant J, Ramesar K, Barnes S. Diagnostic adequacy and accuracy of fine needle aspiration cytology in neck lump assessment: results from a regional cancer network over a one year period. J Laryngol Otol. 2007 Jun; 121(6):571-9.
6. Schwarz R, Chan NH, MacFarlane JK. Fine needle aspiration cytology in the evaluation of head and neck masses. Am J Surg. 1990; 159(5): 482-5.
7. Schelkun PM, Grundy WG. Fine-needle aspiration biopsy of head and neck lesions. J Oral Maxillofac Surg. 1991; 49(3): 262-7.
8. Layfield LJ. Fine-needle aspiration of the head and neck. Pathology (Phila).1996; 4(2): 409-38.
9. Tandon S, Shahab R, Benton JI, Ghosh SK, Sheard J, Jones TM. Fine-needle aspiration cytology in a regional head and neck cancer center: comparison with a systematic review and meta-analysis. Head Neck. 2008; 30 (9):1246-52.
10. Amedee RG, Dhurandhar NR. Fine-needle aspiration biopsy. Laryngoscope.2001; 111(9):1551-7