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Original Research Article

Study of diagnostic importance of fine needle aspiration cytology in various body lesions

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Abstract

Fine needle aspiration cytology (FNAC) is a procedure of choice as the first line of investigation in diagnosing non-neoplastic and neoplastic swellings of different areas as it has been found to be highly accurate and very useful, and can reduce patient's hospital stay, cost, offer early diagnosis after presentation and early treatment. In this present study, the data for FNAC study and histology was retrieved at our institute and compared to evaluate the importance of FNAC. Histo-cyto correlation is seen in majority of cases and at various sites including breast, head and neck, salivary glands, thyroid and other body sites but few cases without correlation also occur depict the limitations of aspiration cytology. Inspite of number of limitations, FNAC has high accuracy in diagnosing benign and malignant lesion thus reduces the period between presentation and diagnosis.

Keywords: FNAC, histo-cyto correlation, accuracy, limitations.

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1.0 Introduction

Fine needle aspiration cytology is a procedure by which small amount of tissue is obtained with the help of 21-22 gauge needle and 10 ml syringe attached to it. Martin & Ellis (1930) were the first who used fine needle aspiration (FNA) technique in diagnosis of various organs' lesions. Today, FNAC has become a first line of investigation in various swelling of head and neck area and breast [1]. In visceral organs including liver, kidney and ovaries FNAC is performed with the guidance of ultrasonography. The procedure has several advantages like it is a safe procedure, requires minimal equipments, has good compliance, cost effective, reduces hospital stay, avoids the requirement of open surgical biopsy and local and general anaesthetic complications, can be performed by a well-trained cytopathologist, leaves no scar afterwards and this procedure is quite accurate [2]. Previously FNAC was only a screening process but now it has become a powerful diagnostic technique [3]. In head and neck region, swellings can develop due to lesions in thyroid, parathyroid, lymph node, salivary gland, soft tissue, vessels and nerves. In various studies, the procedure has been found to be highly accurate with sensitivity and specificity being higher than 90% [4]. In lymph node lesions also the procedure is highly reliable as it can differentiate reactive hyperplasia from tuberculosis and metastatic lymph node [5-7]. It can differentiate non-neoplastic and neoplastic conditions and can diagnose tuberculosis accurately by applying AFB stain on aspirated smears which show beaded form of acid fast bacilli. Salivary glands can give rise to various benign, malignant and tumour like conditions which can be very difficult to diagnose clinically or radiologically. For salivary gland neoplasm, this procedure has high sensitivity and specificity around 90%, explaining its importance as first line diagnostic procedure in any suspected salivary gland tumour because various lesions like chronic sialadenitis, Kuttners tumour, can mimic malignancy and the issue can be resolved by aspiration cytology.Also FNAC has been found to be most accurate in diagnosing epithelial cysts [8]. For thyroid lesions, the procedure is first investigation of choice as the thyroid enlargement either diffuse or nodular can occur in any thyroid lesion like colloid goitre or thyroiditis or neoplasm. Moreover, the thyroid lesion has high cosmetic importance and surgery being difficult. Also the malignancy in thyroid is less common as compared to non-neoplastic lesion. Therefore, FNAC plays a crucial role in separating patients in to operative or non-operative groups. The sensitivity and specificity has been found to be 90% by some authors [9,10]. Now Bethesda system for reporting thyroid cytology has been developed that helps to differentiate lesions into 6 categories and possible management guide.

2.0 Material and methods

The study was carried out in cytopathology section of a tertiary care hospital during a period of one year. The study is retrospective and first fine needle aspirations were performed and then if required surgical intervention was done on patient. The data of histopathology was collected retrospectively and

comparison was done to find the accuracy of FNAC in diagnosing various lesions including neoplastic and non-neoplastic at various sites. Fine needle aspiration cytology is performed with the help of 21-22 gauge needle attached with 10 ml syringe by taking all aseptic precautions.

Table-1: Limitations of aspiration cytology

Aspiration cytology	Histopathology
Papillary lesion probably	No residual tumour in breast
Descriptive/inconclusive	Plexiform ameloblastoma
Descriptive/inconclusive	Schwannoma
Chronic reactive hyperplasia	Caseating Tuberculous
Proliferative breast disease with	Fibro fatty tissue only

The needle is introduced in the swelling after proper fixation of swelling with hand and rapid to and fro motion is applied with or without suction. After many passes, the suction pressure is released and needle is withdrawn. The aspirated material is sprayed on glass slides and smears are prepared. Dry smears are stained with giemsa and wet smear are stained with PAP and haematoxylin and eosin. The histopathological data of all patient in whom FNAC diagnosis available were collected. The FNAC and histopathological diagnosis were compared and statistical data was derived.

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3.0 Results and discussion

This study includes 101 cytologically diagnosed cases in which histopathological correlation was available. All the cases presented in cytology section of department of pathology in a tertiary care institute during a period of one year.The results are depicted in the following tables. There are a number of limitations in aspiration cytology as discrepancies in diagnosis with histopathology occur due to a number of factors like small size of tumour, material not corresponding of representative area, and regenerative atypia. False positive aspirations may be due to regenerative changes, metaplasia and various other factors while false negative aspirations may be due to wrong technique, cystic areas, haemorrhage, and necrosis containing no viable diagnostic cells, small foci of neoplastic lesion, nearby large reactive non-neoplastic mass and fibrotic lesions.Table-1 show our aspiration cytology findings of few cases which cannot be correlated with its histopathological findings as a

limitation of aspiration cytology. Table-2 shows our cyto- histo correlation data of different site aspiration cytology.

Table-2: Histopathology and cytology correlation

Histopathology	No of cases	FNAC correlation	Not correlated
Breast			
Fibro adenoma	10	10	0
Carcinomas	29	29	0
Lymphomas	1	1	0
Phylloids tumour	2	2	0
Fibro fatty tissue	2	1	1
No residual tumour	1	0	1
Thyroid			
Colloid goiter	3	3	0
Adenomatous goiter	1	1	0
Papillary carcinoma	1	1	0
Anaplastic carcinoma	1	1	0
Lymph node			
Metastasis	12	12	0
Tuberculosis	3	2	1
Lymphoma	1	1	0
Salivary gland			
Pleomorphic Adenoma	3	3	0
Sialadenitis	2	2	0
Adenoid cystic carcinoma	1	1	0
Other sites			
Lipomas	7	7	0
Epidermal cyst	8	8	0
Liver metastasis	1	1	0
Serous papillary carcinoma of ovary	1	1	0
Fibrous hamartoma of infancy	1	1	0
Other head and neck			
Plexiform Ameloblastoma	1	0	1
Poorly differentiated carcinoma	1	1	0
Squamous cell carcinoma	7	5	2
Carotid body tumour	1	1	0
Schwannoma	1	0	1
Brachial cyst	1	1	0

FNAC has been established as a first line of investigation in various body lesions like head and neck region, breast, visceral organs, or any other superficial site where the lump is easily palpable. FNAC provides the material to be assessed within a short period of time so that the aspirator whether it may be a trained cytotechnologist or cytopathologist understands the adequacy of material and can re-aspirate the lump in a short duration of time, if not adequate, and thus reducing the period between presentation of swelling and diagnosis and therefore management. Furthermore, FNAC has several advantages over open surgical biopsy, which of course is a gold standard for diagnosis, like anxiety of patient is reduced, complications of anaesthesia, scarring due to surgery, requires minimal equipment and further it has high accuracy. The accuracy of the method has been mentioned in various studies for different organs like lymph nodes, head and neck region and others [4-6, 10].

In breast lesions also accuracy has been found to be high [11]. However false negative and false positive cases do occur. The causes for false negativity can be grouped into diagnostic errors and true false negative factors. Diagnostic errors may be due to lack of training, and miscorrelation with the patient's clinical and radiologic findings[12]. In the true false negative factors, the causes are poor sampling technique, mis localization of the tumour, or the presence of a well-defined tumour demonstrating minimal atypia [13,14]. Mammography can detect very small lesions and FNAC of these small lesions has a significant risk of missing these lesions, leading to potentially false-negative results.False-positive diagnosis in aspiration cytology of breast occurs due to ductal hyperplasia or lobular hyperplasia. In our study in breast lesions, Fibro adenomas were correlated very well from histologic findings. Sometimes, the malignant foci are very small and free hand fine needle aspiration cannot reach the lesion thus resulting in false negative reporting. But such lesions are detected by mammography and guided aspiration can minimize such false negative cases. Further one lesion in maxillofacial region was diagnosed as cystic lesion in cytology which was diagnosed as plexiform ameloblastoma on histopathology. The reason could be sampling error. Furthermore, lesions in head and neck region diagnosed as cystic lesion in cytology turned out to be squamous cell carcinoma on histology. As squamous cell carcinoma can form cystic lesion, the cause of false negative may be that the aspiration was performed from that cystic lesion. Such errors can be minimised by performing ultra sound guided or mammography guided aspiration cytology. Furthermore, multiple aspirations should be performed in cases of suspected malignancy to obtain sufficient material so that reactive atypia can be differentiated from malignancy and to avoid false negative and false positive cases. The limitation of our study was the small size of cases of aspiration cytology with histopathological correlation.

4.0 Conclusion

Even though a number of limitations in the form of sampling

error, cytotechnologist error, inter observational error, regenerative atypia, cystic changes, necrosis with no viable cells or other factors, FNAC has high accuracy in diagnosing benign and malignant lesions of various sites and thus reduces the period between presentation of tumours and their diagnosis which results in early management. While limitations of aspiration cytology exist, they can be overcome up to some extent with the use of image guided aspiration techniques, controlling human errors and use of ancillary techniques like immunocytochemistry.

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