

FINE NEEDLE ASPIRATION CYTOLOGY-A POWERFUL TOOL IN THE DIAGNOSIS OF SPACE OCCUPYING AND MASS LESIONS: A REVIEW

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Abstract

Fine needle aspiration (FNA) is accepted as a first line of investigation in any patient with a mass lesion. Superficial lesions can be aspirated by palpation; radiological imaging (ie. ultrasound, fluoroscopy, and computerised tomography) can guide fine needle to deeply located lesions. In common with many cytopathological investigations, the procedure can be quick, inexpensive and reliable. It requires easily available equipment, takes very little time to perform, causes minimal trauma, and can be repeated as often as required. As an investigative technique it is acceptable to most patients and it rapidly provides a diagnosis on which to base further management.⁸

Introduction

In our clinical practice the clinician is frequently presented with a mass for diagnosis, discovered either by clinical examination or by one of the available imaging techniques. To determine the pathological nature of the lesion the clinician must choose from a variety of methods ranging from exfoliative cytology and biopsy to exploratory surgery. The risk and discomfort of any procedure chosen must be balanced against the potential diagnostic yield. In general, simple and safe techniques with high accuracy are the first choice.¹

FNAC is a method of cell investigation that entails using a narrow gauge (22G-25G) needle to collect a sample of a lesion for microscopic examination. The aspirated cell sample is a suspension of various types of cells in a minute amount of blood and tissue fluid. It allows a minimally invasive, rapid diagnosis of tissue but does not preserve its histological architecture. In some cases this limits the ability to make a definitive diagnosis.^{1,2}

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Aspiration cytology of tumours was first introduced by American young surgeon Hayes Martin in 19206.

The European Physicians developed cytologic aspiration biopsy using fine needle in 19501. Countries with the most developed aspiration cytology are Sweden, Slovenia and India⁴. In Bangladesh it is getting wide acceptance among the physicians and surgeons.

Procedure of FNA

The FNAC is usually performed by a cytopathologist or a diagnostic radiologist with assistance of a cytopathologist⁴. Before the procedure is started, vital signs are taken. The skin above the area to be aspirated is swabbed with an antiseptic solution. After the needle is placed in to the mass cells are withdrawn by aspiration with a syringe and spread on a glass slide. After preparation of slides from the aspirated material, these are immediately fixed in 95% ethyl alcohol for at least half an hour and then stained by H & E stain or Paps stain.

Evaluation of smear

Smears are examined on the basis of the following points:-

1. The number of cells present - that is the cellularity of the smear. Generally the aspirates of malignant tumor show high cellularity due to loss of cellular cohesion of malignant cells. Benign tumors usually show hypocellularity in the smears.
2. The cellular composition of the smear- In general aspirates of neoplasm consists of monomorphic population of cells but exceptions are there, for example, aspirate of a malignant melanoma may be composed of small, large and medium cells.
3. The morphology of individual cells - In determining whether a cell is malignant or benign the general nuclear criteria of malignancy such as an increase in nucleo-cytoplasmic ratio, nuclear membrane irregularities, irregular chromatin distribution, hyperchromasia, extreme nuclear pleomorphism, prominent nucleoli and abnormal mitoses, are evaluated.

4. The arrangement of cells (cell pattern)- The characteristic arrangement of cells encountered in aspirate directly point to the diagnosis of some disease, for example, the papillary pattern in papillary thyroid carcinoma, trabecular pattern in hepatocellular carcinoma.

5. Smear background - The background of a smear sometimes provide valuable diagnostic information. Amyloid material may be observed in medullary carcinoma, Psammoma bodies in papillary carcinoma and caseous necrotic material in tuberculosis⁵

Lesions that can be studied by FNAC-

1. Transthoracic fine needle aspiration biopsy of the lung, pleura and mediastinum, preferably under CT guidance.

2. Trans abdominal fine needle aspiration of the pancreas, liver, kidney, adrenal gland, retroperitoneal masses, and intra abdominal and pelvic masses (preferably under ultrasound guidance).

3. FNA of superficial lesions such as. thyroid, breast, lymphnodes, salivary glands and subcutaneous masses¹

Advantages and risk of FNAC

The advantage of FNAC can be summarised as follows - there is

- 1) Minimal subjective discomfort.
- 2) Insignificant complications.
- 3) Negligible risk of tumor spread.
- 4) Helpful in rapid diagnosis and if needed, the procedure may be repeated easily.
- 5) Suitable for debilitated patients.
- 6) The patient is free from scar of operation.
- 7) A great saving of health care resources.
- 8) A high degree of accuracy.

As the size of the needle used in aspiration is smaller than that of surgical suture material the risk of puncture trauma and possibility of tumor spread is quite insignificant^{1,3}

Accuracy of FNA in some organ lesions.

1. Thyroid swelling - The role of FNA here is to aid in the selection for surgery of nodules that have a high possibility of malignancy⁴. The preoperative FNA can reduce the number of unnecessary

thyroidectomy and uncover many clinically unsuspected cancers⁵. Here the sensitivity and specificity is over 90%⁷

2. Lymphadenopathy - Fine needle aspiration of lymph nodes is particularly useful for the diagnosis of metastatic carcinoma, especially in cervical lymph nodes. The cytologic diagnosis of malignant lymphoma can be made in 50% to 75% of the cases, the accuracy being highest in the high grade lesions⁵. By the cytologic criteria a lymph node lesion can be diagnosed as pyogenic lymphadenitis, chronic non-specific lymphadenitis, tuberculous lymphadenitis, metastatic carcinoma, Hodgkin and non-Hodgkin lymphoma.

Rapport between clinician and pathologist

The common target of a pathologist and a clinician is to make proper diagnosis of a lesion and for the achievement of that the rapport between them is a must. Clinicians require clear communication with the cytopathologist to ensure that the procedure is appropriate for the question being addressed and that both understand the answer in the same term. The rapid diagnosis possible with fine needle aspiration can shorten or avoid hospital admissions and speed a patient's route to an appropriate specialist. The cytopathologist should indicate the degree of certainty when offering a diagnosis, making clear when a clinical or radiological correlation is required and when histological confirmation is necessary. The clinician should recognise when fine needle aspiration has narrowed down the possibilities and when the diagnosis has been confirmed. This is particularly important when FNAC is used to make a primary diagnosis of Malignancy².

Conclusion

The FNA procedure is inexpensive, safe and highly accurate in obtaining a pathologic diagnosis and that it impart practical significance to clinical practice. Used appropriately, FNA remains a powerful tool in the diagnosis and management of patients with malignancy. A realistic approach to what is achievable, with clear communication between clinician and cytopathologist, is vital.

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