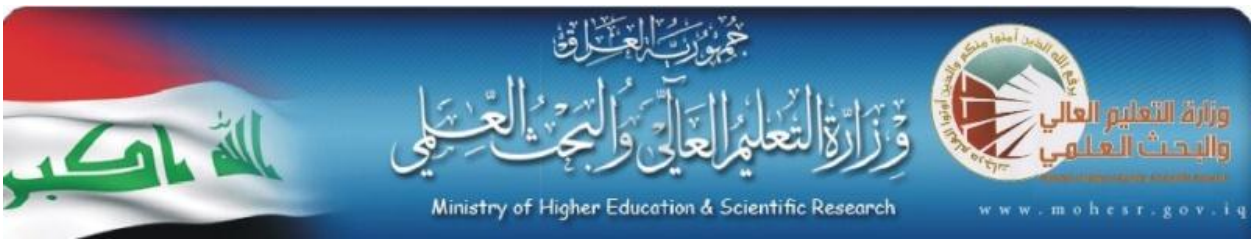

Review of fine needle aspiration versus true cut biopsy in assessment of breast mass

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This review article was submitted
As a part of M.B.CH.B graduation requirement

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2021-2020

Abstract

Breast lumps are one of the most common complaints seen in surgical outpatient departments, making it important to distinguish between benign and malignant conditions before treating them. A detailed understanding of the normal anatomy, physiologic, and pathologic features of the breast is needed for a successful diagnosis. It accounts for 20-30% of all cancers worldwide. (1) Since advanced stage treatment is often unsuccessful, early detection is critical.

In the medical profession, safety is of the utmost importance. Because of a lack of information and screening systems, uneducated people go unnoticed. Due to a lack of knowledge and screening services, uneducated people are unaware of the deadly disease.

Despite the reality that different studies report different success rates, determining relative dominance is often difficult due to the presence of different indicators and assumptions.

CNB, in particular, is often undertaken by the radiologist under radiology supervision, with better collection of material and a low inadequacy rate, while the adequacy and diagnostic sampling of FNAC material depend on the cytopathologist or radiologist working independently or in conjunction with each other performing the FNAC procedure rather than a radiologist alone, and this too varies according to to the radiologist's or cytopathologist's expertise In certain studies, these prejudices are difficult to eliminate. Furthermore, there are few studies comparing alternating sampling of breast lesions, in which one technique is followed by another and both procedures are used to test the same lesion. As a result, we will explain the procedures in accordance with the criteria and will refer to the studies for further details.

Introduction

Breast cancer screening delays are in rise given the worldwide low index of uncertainty. The traditional method of diagnosing a breast mass is excisional biopsy, which provides a specific diagnosis but can produce benign pathological results in most cases. Breast CA affects one-fourth of all women at some point in their lives. According to the American Cancer Society, over 508,000 people died from breast cancer worldwide in 2011. For many years, fine needle aspiration cytology (FNAC) was the most commonly used tool for the pathological detection of breast lumps, especially the distinction of benign from malignant. Since the introduction of core needle or True-Cut biopsy (TCB) in the modern era, many physicians have switched to TCB because it provides oncologists with enough tissue to render a reliable histopathologic diagnosis.

Fine-needle aspiration biopsy (FNAB) is being more commonly used during the Evaluation of the breast lesions since the advent of stereotactic and ultrasonographically (US) guided methods [4-6]. Besides that, the triple-diagnostic approach (clinical assessment, mammography, and FNAB) provides a reliable diagnosis and decreases the likelihood of skipped breast cancer diagnosis to 1%. [7]

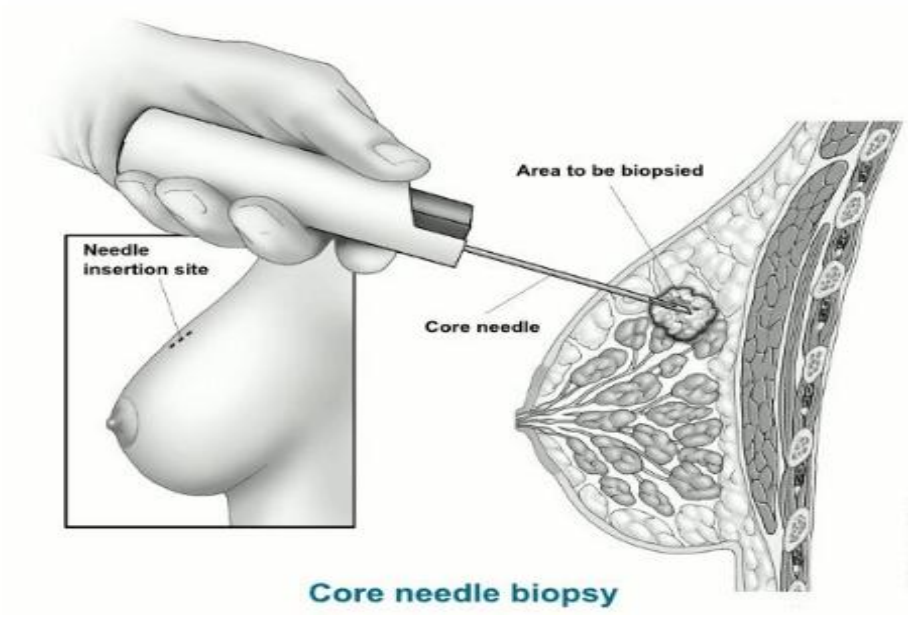
Fine-needle aspiration biopsy (FNAB) of the breast is a non-invasive surgical technique that often eliminates the need for an open biopsy [1]. It is less expensive to run, and the results are available in a shorter period of time. FNAB has some benefits over True-Cut needle biopsy in that it uses a smaller needle and hence has a lower risk of hematoma and other uncommon complications including pneumothorax [2,3].

Even so, the importance of FNAB has recently been called into question due to improved overall results obtained by true cut biopsies. True-Cut needle biopsy is indubitably a strong and effective diagnostic procedure, but it has drawbacks such as a prolonged recovery period due to tissue time consumption and patient discomfort during the operation.

Core Needle Biopsy of the Breast

A hollow-core needle varying in size from 11 to 16 gauges is used in core-needle biopsy to cut one or more parts of breast tissue. The operator either directs the needle to the location of a palpable lesion (freehand biopsy) or employs an imaging technique to pinpoint the target lesion. Stereotactic radiography, ultrasound, and magnetic resonance imaging are examples of imaging techniques (MRI). Computerized guns and vacuum assistance are used to retrieve the biopsy specimen. There is no agreement on which of these techniques is preferred for core-needle breast biopsies with the highest precision and lowest rate of damage (8).

The aim of breast cancer screening programs is to identify cancers when they are small and treatable. Biopsies of suspected anomalies may be needed for early detection. Core-needle procedures can be less successful at targeting the abnormal region of breast tissue than open surgical biopsies. Sensitivity is an estimation of the proportions of all cancer cases detected by a diagnostic test (in this case, core-needle biopsy). To diagnose cancers that were overlooked, research studies designed to test the sensitivity of core-needle biopsy typically use a second biopsy (with the open surgical method) or clinical follow up over time(9). In general, the consistency of studies on the accuracy of core-needle breast biopsies has been poor. The vast majority are retrospective chart analyses as opposed to prospective research. Most have insufficient information about the patient populations. A lesion's size, location, or imaging characteristics can influence the choice of one breast biopsy technique over another. However, insufficient knowledge about these characteristics has been included in research studies to assess their effect on biopsy accuracy.



Core needle biopsy

Despite the poor quality of the evidence base, studies have shown that the clinical method used to conduct a core-needle breast biopsy influences the procedure's sensitivity. The hand - drawn technique has significantly lower sensitivity than biopsies driven by stereotactic radiography or ultrasound (10).

Special types of core needle biopsies:

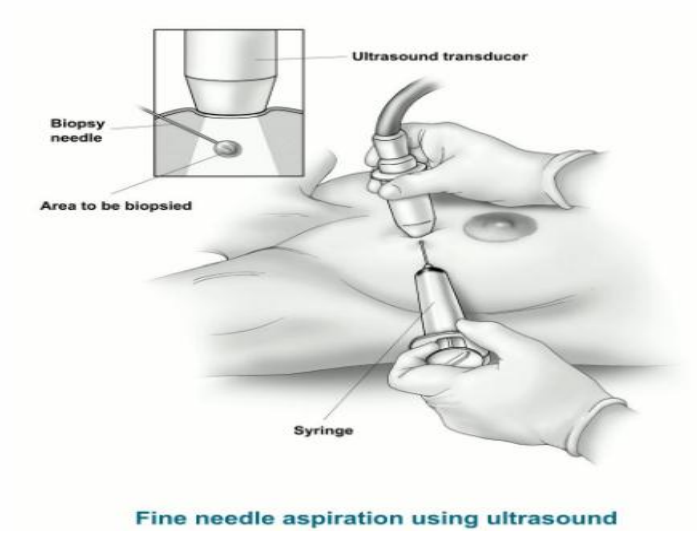
1)Stereotactic core needle biopsy: A physician will use mammogram images taken from various angles to locate the biopsy site during this procedure. A machine analyzes

the breast x-rays and indicates precisely where the needle tip should be placed in the irregular region.

2) **Vacuum-assisted core biopsy:** A hollow probe is inserted through a small cut into the irregular region of breast tissue for a vacuum-assisted biopsy (VAB). Using an imaging examination, the doctor directs the probe into position. The probe is then suctioned with a cylinder (core) of tissue, and a rotating knife inside the probe separates the tissue sample from the rest of the breast. Several samples from the same cut can be obtained. This method usually removes more tissue than a standard core needle biopsy (11).

Fine Needle Aspiration (FNA)

The specialist performs a FNA biopsy by withdrawing (aspiration) a small amount of tissue or fluid from a suspicious region using a very thin, hollow needle attached to a syringe. The biopsy sample is then examined to see if it contains cancer cells. If the biopsied region can be detected, the needle can be directed into it when the doctor feels it.



Fine needle aspiration using ultrasound

If the lump is difficult to feel, the doctor can use an ultrasound screen to track the needle's movement toward and into the region. This is referred to as an ultrasound-guided biopsy. FNA is done percutaneous with a short needle (usually a 21 to 25 gauge). After preparing the skin with alcohol, chlorhexidine, or betadine, it is numbed with a local anesthetic. Palpation or ultrasound guidance is used to locate the mass. The mass is punctured while negative pressure is produced and sustained in the syringe (increasing diagnostic yield). The needle is passed through strong lesions several times (14).

Indications:

Diagnosis: FNA is recommended for women who have a mammogram abnormality or palpable breast lesions. Owing to the limited volume of breast tissue sampled and the high rate of non-diagnostic or insufficient tests, FNA remains problematic for the diagnosis of suspected malignant lesions. In this situation, the "triple examination" is used to render this diagnosis, combining the physical exam, imaging tests, and cytology to improve diagnostic precision. Despite the fact that the Z0011 research is changing the treatment of axillary disease, axillary ultrasound with FNA sampling of suspiciously appearing nodes is still recommended. Formalized paraphrase [15](16) Formalized paraphrase

Therapeutic: FNA is recommended for large, symptomatic breast cysts with vegetations or imaging abnormalities. [10] Formalized paraphrase

Accuracy:

According to some research, the sensitivity of aspiration cytology for malignancy is 64% for one aspiration sample and 91% for three samples. The specificity rate was 56% (inadequate or unsatisfactory cytological preparations)(10).

Pathologist will look at the biopsy tissue or fluid to find out if there are cancer cells in it:

- If the fluid is brown, green, or tan, the lump is most likely a cyst and not cancer.
- Bloody or clear fluid can mean either a cyst that’s not cancer or, very rarely, cancer.
- If the lump is solid, the doctor will look at small groups of cells from the biopsy to determine what it is.

Methods

The review article Compare and contrast the tow diagnostic modalities: Core needle biopsy and fine-needle aspiration cytology, and their sensitivity and specificity in the detection of breast lumps.

Results

Features	*CNB*	*FNAC*
Sensitivity	High	Lower/equivalent to CNB
Specificity	High	Lower/equivalent to CNB
Positive predictive value	High	Equivalent to CNB
Negative predictive value	Higher especially in gray zone lesions	High but variable
False positivity	Low	Low
False negativity	Variable; at times higher than FNAC	Variable
Inadequacy	Variable	Variable (difficult to obtain a good sample in fibrocollagenous lesion)
Necessity for anesthesia	Required	Not required
Necessity for radiology guidance	Required always	May be required in nonpalpable lesions
Turn-around time	Relatively more	Relatively less
Cost	Higher	Low
Complications	Low	Very low
Therapeutic aspiration	Not possible	Can be possible
Immunochemistry for steroid receptors, growth factor receptor and proliferative index	Reliable	Possible but some people question its reliability
Tumor grading	Performed and reliable	Performed and less reliable
Detection of *in-situ* component	Possible	Not possible
Lymphovascular emboli	Possible	Not possible
Perineural invasion	Possible	Not possible
Diagnostic difficulty in papillary lesions including subtyping	Low to moderate	High
Diagnostic difficulty in preneoplastic lesions	Low	High
Diagnostic difficulty in radial scar/complex sclerosing lesions	Moderate	High
Diagnostic difficulty in fibroadenoma and benign phyllodes tumor	Low to moderate	Low to moderate

FNAC: Fine-needle aspiration cytology, CNB: Core needle biopsy

Compare and contrast the diagnostic modalities: Core needle biopsy and fine-needle aspiration cytology (Table 1)

Studies	*Modality*	*Sensitivity (%)*	*Specificity (%)*	*Positive predictive value (%)*	*Negative predictive value (%)*	*False-positive (%)*	*False-negative (%)*	*Inadequacy (%)*
Lieske *et al.* (n=763)[3]	FNAC	82	-	-	-	-	-	8
	CNB	93	-	-	-	-	-	5
Berner *et al.* (n=1275)[4]	FNAC	92.9*	63.7*	-	-	1.7	7.1	19.1
	CNB	88.3*	94.5*	-	-	0	5.7	1.1
Bukhari and Akhtar (n=175)[5]	FNAC	80	99	99	87	0.5	8	-
	CNB	94	100	100	89	0	0.5	-
Westenend *et al.* (n=286)[6]	FNAC	92	82	100[$]	-	0	6	7
	CNB	88	90	99[$]	-	1	9	7

Compare different parameters in fine-needle aspiration cytology and core needle biopsy in studies that have compared both these diagnostic modalities (Table2)

Discussion

A breast FNAC or CNB is implied in a range of diagnostic conditions, with the exception of certain therapeutic effects of FNAC, such as the evacuation of a benign lesion during FNAC. These techniques are used for diagnostic purposes, which involve morphological diagnosis as well as the application of appropriate ancillary techniques such as immunochemistry for estrogen and progesterone receptors (ERs and PRs) in the malignant epithelial neoplasms. Both approaches may be used to treat palpable and nonpalpable breast lumps, with or without the guidance of radiology. **FNAC's advantages** includes (1) rapid diagnosis, (2) high acceptance, (3) cost-effectiveness, (4) high sensitivity and accuracy, (5) ability to sample several areas at once, (6) preoperative preparation, and (7) collecting samples from the metastatic and main sites, (8) performing ancillary procedures, and (9) providing immediate psychological relief to the patient following a negative diagnosis [Table 1]. Furthermore, as previously discussed, therapeutic aspiration is an option in the case of a cyst. FNAC can be used to treat both palpable and nonpalpable breast lesions, and it is a reasonably safe procedure with a discounted value of procedure-related complications. However, FNAC may result in hematoma formation, infection, or, in rare cases, pneumothorax (especially after axillary lymph node FNAC).

The **main disadvantage** of FNAC is its inability to differentiate benign or borderline tumours from malignancy. Preneoplastic lesions such as atypical ductal hyperplasia or in-situ changes, for example, cannot be reliably detected by FNAC, and distinguishing it from an invasive malignancy is therefore challenging. Likewise, benign lesions that cause enormous sclerosis, such as sclerosing adenosis, have long been established to be the cytopathologist's graveyard. Another significant drawback is the extremely variable range of sensitivity and diagnostic accuracy of FNA smears depending on the cytopathologist's practice. Beside that, unpredictable and often high incidence of false negativity related to sample errors or interpretation error has also led many practitioners to question FNAC's efficacy.

On the other hand, CNB has the clear **benefit** of having a high sensitivity and specificity, a high negative and positive predictive value, a lower inadequacy rate, and benefits in diagnosing gray zone lesions of the breast, such as atypical ductal hyperplasia and in-situ carcinomas [Table 1].

Conclusion

Various diagnostic methods for evaluating breast lumps have been developed with the aim of identifying a responsive, specific, reliable, and cost-effective approach to diagnosing breast cancer. Physical examination, mammography, Trucut biopsy (Core needle biopsy), ultrasonography, thermography, FNAC, and open excision biopsy are all used in the diagnostic workup of a palpable breast mass to varying degrees. FNAC, along with clinical evaluation and mammography, has been used for this purpose for a long time. It has been shown to be of great benefit in the diagnosis of breast lumps because, in addition to being cost effective, it is also easy and fast in delivering the cytological diagnosis. 3 In patients with breast lumps, FNAC is often used as a first priority procedure. Nevertheless, it has some drawbacks, such as the inability to distinguish between invasive and in situ carcinomas, inadequate tests, and false negative findings. Trucut biopsy, also known as core needle biopsy, is now one of the most effective methods for obtaining histopathological diagnosis. It is a simple procedure that can be done as an outpatient. It also eliminates the need for needless excisional biopsy.

Lower inadequacy rates, the availability of ancillary procedures, cancer grading and typing are all features that aid in the planning of a definitive surgery. The role of FNAC and Core needle biopsy in the management of breast lesions is debatable in the evidence. Some studies prefer FNAC over CNB, although others oppose its use. Some scholars advocated merging the two methods.

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13.AHRQ created the John M. Eisenberg Center at Oregon Health & Science University to make research useful for decisionmakers. This guide was written by David Hickman, M.D., Erin Davis, B.A., Seth Meyer, M.A., and Martha Schechtel, R.N., of the Eisenberg Center.

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