Fine Needle Aspiration

Goals

- Adequately sample the lesion (or cyst).
- Minimize bleeding, maximize number of cells from target.
- Make well-prepared, well-fixed smears.
- Rinse needle in cytology fixative.

Introduction

Fine needle aspiration (FNA) is a reliable, safe and relatively painless diagnostic procedure. To be successful, FNA sometimes requires practice in the collection of a “mini tissue” biopsy and immediate specimen preparation. Poor biopsy collection and poor slide preparations are common causes for failure to provide definite diagnosis. The following information may facilitate better control of biopsy variables and provide greater success in obtaining and preparing FNA specimens.

Important Considerations and Variables

Number of Samples

Multiple samples from different areas of the target reduce sampling error, increase cellular yield, and allow for multiple types of preparations. A general rule is that the patient should be informed that he or she will be punctured at least three times (cyst evacuation is an exception). We recommend 3-6 needle sticks in sampling of a non-cystic lesion.

Needle Size

Fine needle aspiration requires a small needle (22-gauge or smaller). A 23 gauge needle (1-1.5") is successful for most palpable masses. Slightly larger gauge needles work better in breast, dense fibrous tissue, and fatty lesions (benign breast nodules, lipomas, etc.). Larger needles (18-20 gauge) for FNA cause significant bleeding and blood dilutes the specimen and obscures cytologic evaluation. Although larger tissue fragments can be useful for histologic purposes (“core biopsy”), the intent of fine needle aspiration is to obtain a *cytologic* sample, and small needles are required. A general rule: start small (e.g., 23-25 g) and use incrementally larger needles in subsequent passes if no material is being obtained.

Syringe Size

Syringe size affects two aspects of the collection:

- the amount of negative pressure generated
- degree of needle control.

In general, a 10-mL syringe is adequate. The degree of negative pressure required in FNA sampling generally varies form light to none, depending on the tissue sampled. Since the “mini biopsy” is obtained by the rapid in-and-out (“sewing machine”) motion of the needle during the procedure, aspiration serves only as an aid to move the biopsy material up into the needle.

A common misconception in FNA is that more forceful aspiration results in a better sample. Because of bleeding, the opposite is often true.

Before use, the syringe plunger should be moved to break any seal that might have occurred during manufacture or storage.

Many aspirators draw a small amount of air (approximately 1 mL) into the syringe before aspiration to later facilitate the expression of cells onto a slide. This avoids a problem with needle recapping and reattachment.

There is no need to have saline or other fluid in the syringe during FNAB. This practice distorts cellular morphology and makes the cells extremely difficult, or impossible, to recover.

To prevent clotting, it is very helpful to use a light heparin rinse in the needle before FNAB.

In thyroid and other vascular lesions, low, intermittent --or no-- vacuum can prevent undesirable blood dilution.

Comfort of grip, control of direction, motion, and aspiration during sampling are partially determined by the syringe size and configuration. Large syringes with an aspiration pistol may seem to offer the most convenient way of applying negative pressure during the biopsy procedure, but a smaller, less bulky aspiration apparatus (like the needle alone) allows for operator perception of subtle tissue density differences, needle control during initial insertion, easier changes in “angle of attack” of the needle, and ease during the sampling motion.

Summary

- High levels of vacuum are often more detrimental than helpful.
- Aspiration should stop when blood is visible in the needle hub.
- Release vacuum before withdrawing needle to avoid aspirating material into the syringe.
- 10 or 20 mL syringes are commonly used for FNAB. There is no significant increase in the aspirating power of a larger syringe. The syringe that is chosen for this procedure should be chosen according to individual preference.

Aspiration Technique

Preparation

Verify patient identification using at least two patient identifiers, the procedure site, and the procedure to be performed."

FNA Error Prevention Phase II: If the pathologist performs FNA procedures, there is a written procedure to verify patient identification using at least two patient identifiers, the procedure site, and the procedure to be performed.

Before the procedure begins, label frosted end slides with the patient's name and "AIR".

Prep overlying skin with disinfectant before inserting needle.

If local anesthesia is used, numb the area between skin and the edge of the lesion ("intradermal anesthesia"). Avoid injecting the lesion itself, if possible.

Immobilize target lesion by pinching between thumb and index finger or by pressing down on the lesion, trapping it between index finger and middle fingers while separating fingers to stretch the overlying skin (*Figure 1*).

A small amount of air (0.5-1mL) can be drawn into the syringe before inserting needle. This facilitates expression of the needle contents following sampling.

Sampling the Lesion

Using a smooth motion, pierce the skin and advance the needle carefully into the lesion/mass, without applying suction. Note that many lesions/masses are actually deeper than one would estimate by palpation; therefore, the aspirator has to be prepared with a needle of suitable length to be able to progress a bit deeper.

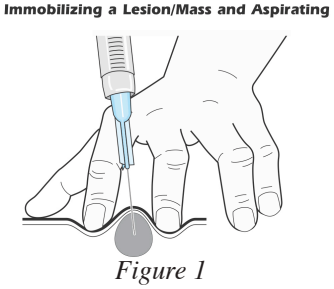

Figure 1

Puncture of the lesion is often detected by a change in resistance or a "popping" sensation to the inserted needle. Once the needle is inserted into the target lesion, 2-5 mL of negative pressure is applied as the needle is moved into the lesion and back-and-forth motions begin. A single pass is defined as one entrance into the skin using one new needle. If a cyst is encountered, it should be completely drained and the area re-examined for a residual mass.

A back-and-forth motion within the lesion in short (5-mm), reciprocating, sewing machine-like motions with minimal redirection of the needle is essential to collect a good biopsy. Rapid change in direction in the needle is painful for the patient and frequently yields poor results. Negative pressure should be discontinued immediately if blood becomes visible in the needle hub. If blood does not enter the hub, the aspiration is discontinued after 15-20 strokes of the needle. To avoid accidental aspiration of the sample into the syringe, it is important that negative pressure be released before removing the needle. On subsequent samplings, different regions of larger lesions should be systematically sampled (*Figure 2*).

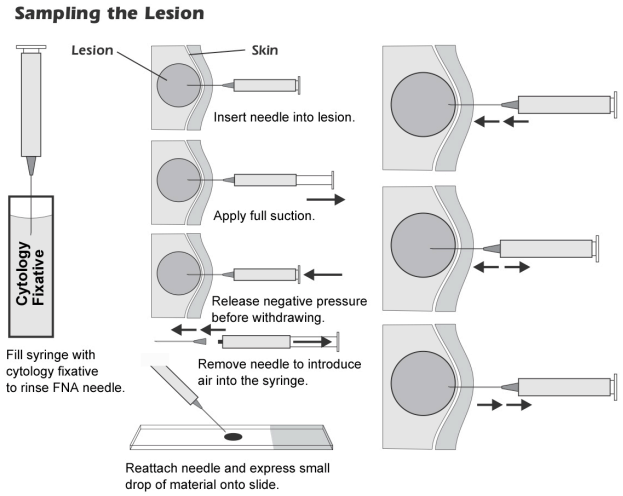

Figure 2

Use of Needles Alone (No Syringe)

For thyroid and vascular lesions, use of needle alone (no syringe) is recommended to minimize bleeding. In this technique, the needle is grasped and directed by holding the hub between thumb and forefinger. The needle will fill by capillary action alone. An excellent concentrate of 1-3 drops of material is usually easily obtained (*Figure 3*).

Needle Biopsy With and Without Syringe

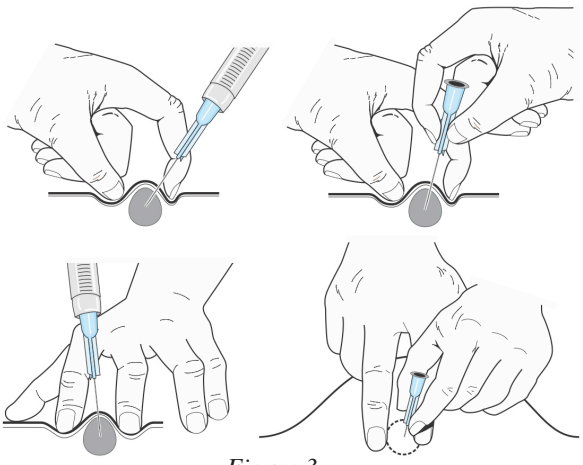

Figure 3

The non-aspiration technique employs either a needle alone or a needle attached to the barrel of a small syringe without a plunger. This method can decrease the amount of blood admixed with the sample, and it affords greater tactile sensation of the texture of the lesion/mass directly through the needle. Holding the hub in a "pencil" grip (*Figure 4*), the aspirator inserts the needle into the lesion/mass in an up-and-down, in-and-out motion in 3-5 mm strokes.

Holding the Hub in a Pencil Grip

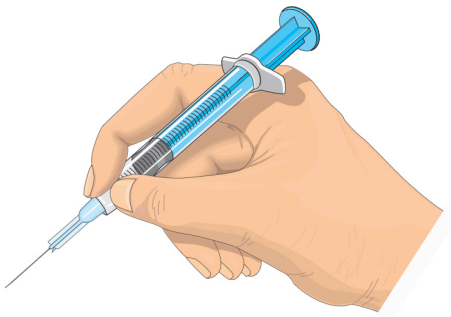

Figure 4

FNA of Breast Lumps

General aspirate, smear preparation, and rinsing recommendations apply (see "Aspiration Technique" section).

Special Considerations

- In patients with small breasts, penetration of the chest wall during FNA is possible if a sample is collected perpendicular to the chest wall. An oblique angle of attack is encouraged for deep lesions (*Figure 5*).
- The fatty stroma of breast aspirates with ease, often diluting the specimen with fat.
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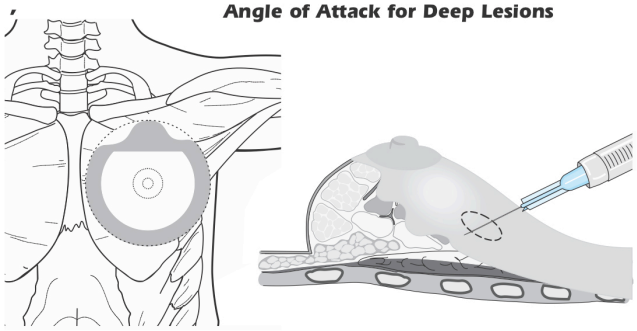
Angle of Attack for Deep Lesions



Shaded area indicates where penetration through chest wall is most likely.

Figure 5

- Breast lumps are often due to fibrous tissues in a lesion. We recommend that first passes of breast lesions be made with a slightly larger than usual (20-gauge) needle. Even larger needles can be used in subsequent passes if densely fibrous lesions result in poor cellular yield. In contrast to vascular organs, syringe aspiration can often help obtaining a good sample from the breast tissue.
- When cyst fluid is aspirated, only bloody fluid need by submitted to the laboratory. Add equal amounts of cytology fixative.
- Aspiration through the areola should be avoided. A target lesion under the nipple or areola can be aspirated by pushing the nodule away from the nipple and aspirating through adjacent skin (*Figure 6*).
- A clinically suspicious mass with negative FNA results should be followed carefully with consideration for open biopsy.

Needle Aspiration Near Nipple

The moveable target should be pushed away from the nipple and aspirated from the side. The areola must be avoided.

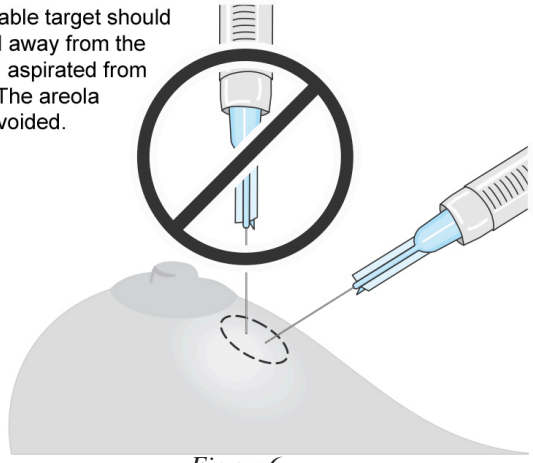


Figure 6

Cystic Aspirations

Cystic lesions of breast are almost always benign. Clear fluid evacuations can be discarded. Blood-tinged cystic contents should be fixed with equal parts of cytology fixative (make no smears).
After evacuation of a cyst, always palpate to see that the lesion has completely disappeared. Malignant cystic lesions of breast and thyroid often have residual mass at the edge of the cyst. Subsequent sticks should try to sample remaining solid regions of the target.

Clinical Interpretation of Negative Findings in Aspiration Cytology of a Solid Tissue Lesion

A fundamental understanding of solid tissue aspiration cytology is the indeterminate value of a negative result. Positive cytologic findings of malignancy or other specific disease conditions, when based on appropriate criteria, are accurate and highly useful clinically. Fine Needle Aspiration has occasional false-negative results. Causes of false-negative sampling include failure of the needle to penetrate the lesion, extensive central areas of necrosis or sclerosis within large tumors, and laboratory locator error in failure to detect a rare malignant cell. As a result, any negative result should be interpreted with caution. If a sufficient degree of clinical suspicion exists after a negative result, tissue or open biopsy is recommended.

Helpful Hints

The aspirator should stabilize the nodule against deeper tissue using the index and middle fingers or thumb and forefinger of the aspirator's non-dominant hand. The aspirator stretches the patient's skin between the fingers before piercing the skin (*Figure 7*). This helps to reduce the patient's pain during insertion of the needle. Minimal or no suction may be applied to reduce bleeding.

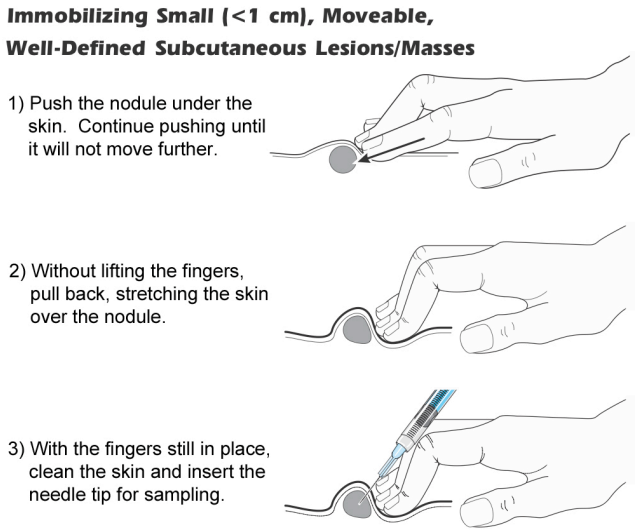


Figure 7

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