

Interventional Breast Imaging

Student Researcher: Agripina Torres

Faculty Advisor: Dr. Elaine Halesey, Ed.D., R.T. (R)(QM)

Background

Interventional breast imaging is a breast biopsy or localization procedure that is guided through an imaging modality.

- ❖ A breast biopsy is a minimal invasive procedure that consists of obtaining a sample and/or fluid of the breast under investigation.
- ❖ A localization is a nonpalpable breast lesion amenable to surgery.

Breast Biopsy

- ❖ Core needle biopsy (CNB) takes strands of mammary gland tissue for histologic diagnosis (Fischer, Baum, & Luftner-Nagel, 2017).
- ❖ Vacuum -assisted biopsy (VAB) is a high velocity core needle biopsy in the diagnostic work-up of clustered micro calcifications. (Fischer et al., 2017).
- ❖ Fine needle aspiration (FNA) is to extract fluid or to recover individual cells from a tissue complex for cytological diagnosis (Fischer et al., 2017).
- ❖ Axillary lymph node needle biopsy is to evaluate possible nodal metastatic using CNB or FNA.

Non Palpable Breast Biopsy

- ❖ Carbon marking method consisting of injection of sterile charcoal powder diluted with saline solution near to a nonpalpable breast lesion (Bick et al., 2020).
- ❖ Wire localization is a wire with a terminal hook or pigtail inserted through the skin (Bick et al., 2020).
- ❖ Radio-guided occult lesion localization (ROLL) is an injection of human serum albumin labeled with radioactive technetium inside the tumor (Bick et al., 2020).

- ❖ Radio-active seeds localization is radioactive seeds are positioned inside the tumor (Bick et al., 2020).
- ❖ Magnetic seed localization is paramagnetic steel and iron oxide cylindrical seed (Bick et al., 2020).

Introduction

- ❖ Interventional breast imaging has several methods to biopsy/localize the breast.
- ❖ Image guided biopsy has changed the initial way to investigate a lesion. Initially all suspicious breast finding was done by an open excisional breast biopsy.
- ❖ Now with image guided breast intervention this has avoided unnecessary open biopsy that resulted in reduced scars, hospital stay, and surgical risk.
- ❖ Once the route of biopsy is known it is important to know the appropriate modality to use to guide the biopsy.
- ❖ Some factors to take into account is the size, location, appearance/characteristics of the suspicious breast lesion.

Stereotactic Guidance

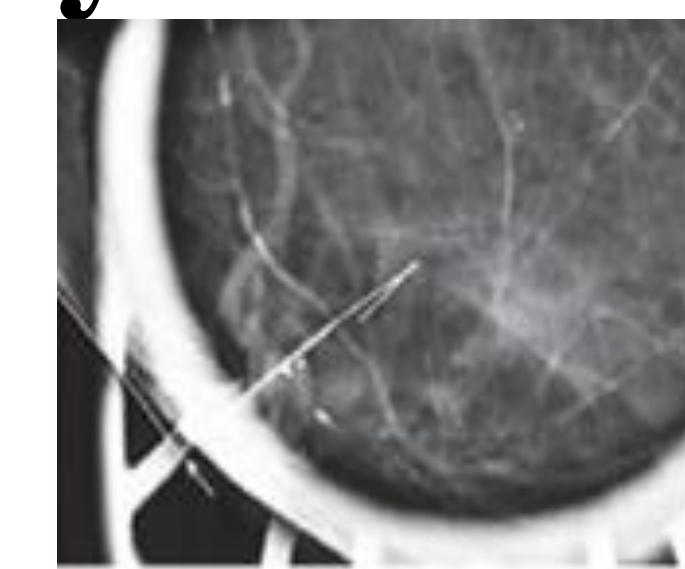


(Cardenosa, 2017)

The image is a CNB/VAB with the needle advanced into the desired location. A breast biopsy/localization under stereotactic guidance uses low dose radiation to obtain a 2 dimensional image to locate the breast abnormality. Patient is positioned in prone, upright, or lateral decubitus with the breast compressed (Bick et al., 2020).

- ❖ Types of biopsy under stereotactic guidance are CNB/VAB, carbon marking, wire localization, ROLL, radio-active seeds and magnetic seed localization (Bick et al., 2020).
- ❖ 32% of all image guided breast biopsy used stereotactic guidance (Teberian et al., 2020).

Tomosynthesis Guidance



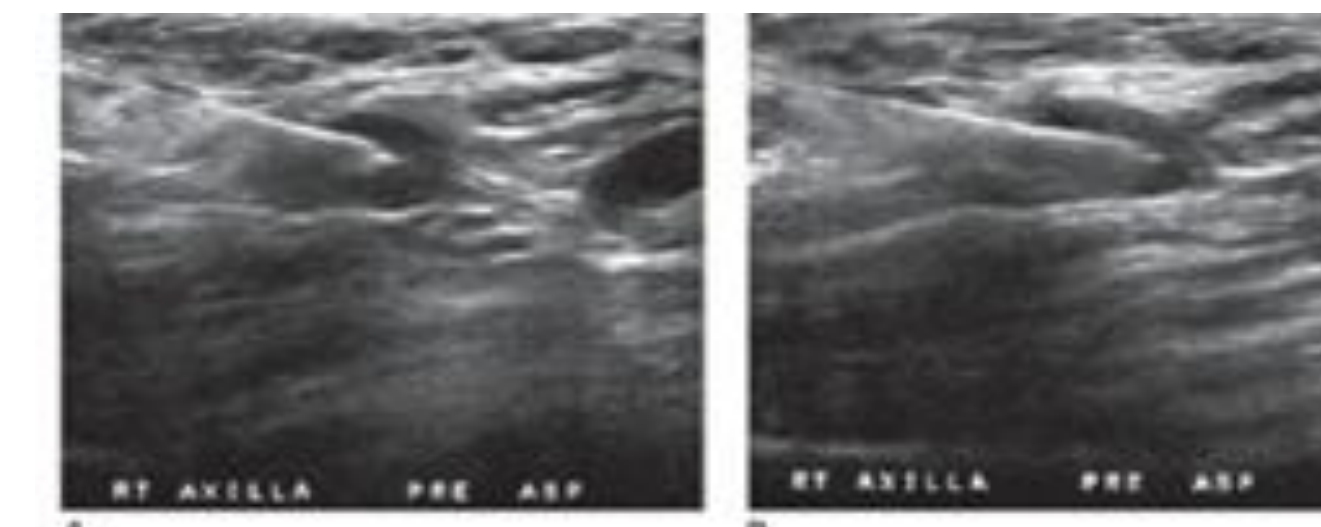
(Cardenosa, 2017)

The image is a wire localization with compression.

A breast biopsy/localization under tomosynthesis guidance takes slices of the breast using a low dose of radiation to obtain a 3 dimensional image to locate the breast abnormality.

- ❖ Patient is positioned based on mammographic view in which the lesion is best seen in upright or prone with the breast compressed (Choudhery, Johnson, & Fazzio, 2020).
- ❖ Types of biopsy under tomosynthesis guidance are CNB/VAB, wire localization, and radio-active seeds and magnetic seed localization (Bick et al., 2020).

Ultrasound Guidance



(Cardenosa, 2017)

The images are a fine needle aspiration of axillary lymph node. The left is the needle guided in and the right is with suction

A breast biopsy/localization under ultrasound guidance uses high frequency sound waves to make an image in real time to locate the breast abnormality

- ❖ Patient is positioned in supine or oblique with arms flexed behind the head to flatten the breast (Evans et al., 2018)
- ❖ Types of biopsy under ultrasound are FNA, CNB/VAB, axillary, carbon marking, wire localization, ROLL, and radio-active seeds and magnetic seed localization (Bick et al., 2020).
- ❖ 65% of all image guided breast biopsy used ultrasound guidance (Teberian et al., 2020).

Magnetic Resonance Imaging (MRI) Guidance

A breast biopsy/localization under MRI guidance uses both magnets and radio waves to create an image to locate the breast abnormality

- ❖ Patient positioned in a prone position with the breast compressed
- ❖ Types of biopsy CNB/VAB, wire localization, and radio-active seeds localization (Bick et al., 2020).
- ❖ 3% of all image guided breast biopsy used MRI guidance (Teberian et al., 2020).

Conclusion

Breast interventions is essential in the management of suspicious breast lesions detected by screening or during the assessment of clinical abnormalities (Fischer et al., 2017). Image guided breast interventions has raised 51% where as open surgical breast biopsies has declined 64% (Teberian et al., 2020). With the rise of image guided breast intervention each modality and has taken a step forward in ways to improve how the biopsy can be done. Some modalities are adding robotic assistance to enhance diagnostic skills (Mahmound, Aslam, Alsaadi, Fagiri, & Alonazi, 2017)