Interventional Mammography

- Used to:
  - Locate an area of interest
  - Place a radiopaque maker for an open surgical biopsy (wire localization)
  - Sample tissue or cells
Interventional Procedures

- Sterile Technique
- Standard lesion localization
- Stereotactic lesion localization
- Ultrasound
- Cyst aspirations and fine-needle aspiration biopsies
- Pneumocystography
- Galactography
- Core biopsy
Sterile Technique

Spread of infection:

• **Exogenous**: infection introduced to the patient from outside the body.

• **Endogenous**: infection introduced to the patient from within the body.

• **Iatrogenic**: the condition of the patient is influenced by the physician’s actions.

• **Nosocomial**: an infection obtained by a patient within the hospital setting.
Sterile Technique

• Preparation of local anesthetics, contrast media, etc. is very important.
• Sterile technique must be used when drawing up these agents.
• The expiration date must be checked, along with the integrity of the contents being used.
Sterile Technique

- Proper glove usage is also very important.
- Sterile gloves must be used when preparing a sterile tray, for the procedure.
- Sterile gloves must also be used during the procedure, if an injection, or puncture into the skin is performed.
- Utility gloves may be used when disposing of the tray and the instruments.
Sterile Technique

Skin preparation:
• Any invasive procedure requires proper skin preparation.
• This involves using a betadine/providine prep on the patient’s skin.
• Make sure to use proper sterile technique, cleaning from the injection site first to the periphery, in a spiral fashion.
Sterile tray preparation may include:

- Gauze
- Betadine
- Local anesthetic agent
- Syringe(s)
- Needle(s)
- Scalpel
- Suture
- Formalin
- Tweezers
- Contrast medium
- Sterile towels
Sterile Technique

Disposal of items:

• Utility gloves may be used to dispose of items from the procedure tray.
• Be sure to place anything that comes in contact with the patient’s bodily fluids into a biohazard receptacle.
• Sharps are to be placed in a sharps container.
• Any instruments used that can be sterilized, must first be rinsed off first, before sending for sterilization.
• When handling tissue specimens, care must be used when placing them into formalin. Do not use dirty forceps when placing tissue specimens into formalin.
• It is important to place tissue specimens immediately into formalin, so that they stay wet.
Standard Lesion Localization

- **Definition**: Placement of a wire inside of the patient’s breast to help the surgeon locate and remove the lesion.
- Sterile technique is used to insert a needle in the patient’s breast, with the guidance of a specialized mammography paddle, with numbers and letters to designate the location of where the wire should be placed.
- The radiologist or surgeon will typically perform this procedure, with the assistance of a mammographer.
Standard Lesion Localization

- Localization paddle
Biopsies

- **Mammotome**: Tissue sample obtained with a needle using gentle vacuum, which draws, cuts and removes tissue.

- **Core Needle**: Tissue sample obtained with a needle using a spring loaded device which cuts and removes tissue.

- **Open Surgical**: Incision made in the breast and a large sample is cut and removed. In some cases, a wire is inserted into the breast to locate the lesion.
Mammotome Biopsy

- In a breast biopsy performed with the minimally invasive Mammotome® Breast Biopsy System, a small probe is inserted into the breast through an incision about the size of a match head.
- Vacuum is used to gently draw, cut and collect tissue into the probe's hollow chamber.
- This biopsy technique enables several samples to be acquired resulting in a highly accurate breast cancer diagnosis.
- Since multiple tissue samples are obtained without removing and reinserting the probe, there is less internal scarring, which minimizes interference with future monitoring and diagnosis of breast abnormalities.
Core Needle Biopsy

- In a core needle biopsy, the physician makes a small skin incision through which a needle is inserted into the lesion to obtain sample tissue.
- The hollow spring-loaded device is "fired" repeatedly into the abnormality to collect a sufficient amount of breast tissue for analysis. Usually, 4 to 6 samples are taken (4 to 6 insertions).
- This biopsy procedure is performed in an outpatient setting without general anesthesia or stitches.
Open Surgical Biopsy

- Open surgical procedures often involve a two-step process. First, a radiologist identifies the area to be biopsied.
- Through a process known as wire localization, a wire is positioned in the abnormal breast tissue to identify the area to be cut out and removed during the breast biopsy surgery.
- Next, the patient is taken to the operating room where she is placed under general anesthesia or a local anesthesia with sedation.
- A surgeon makes a 1 to 2-inch incision in the breast and removes the localization wire and a large section of tissue, typically about the size of a golf ball.
- The incision in the breast is then closed with stitches and covered with a protective bandage.
Stereotactic Biopsy

- Stereotactic localization is followed by a biopsy procedure, typically either a fine-needle aspiration or core needle biopsy.
- Needle biopsies of palpable breast lesions do not require stereotactic localization.
- Stereotactic breast biopsy is a radiological technique for localizing breast lesions for biopsy by either fine-needle aspiration or core needle biopsy.
- The technique requires that the breast be compressed between a compression paddle and an image receptor.
Stereotactic Lesion Localization

- Sterile technique is used to perform this procedure.
- Both, the radiologist and mammographer are present, and sometimes a third person is available to take specimen radiographs.
- Stereotactic breast biopsies are very accurate procedures. They are less invasive than open surgery, but they are still considered invasive.
- A computer is used to calculate the depth of the lesion stereotactically (15 degrees (+) and 15 degrees (-)), and a small core biopsy is performed, while the breast is in compression, with its guidance.
**Stereotactic Lesion Localization**

- The depth dimension \((z)\) is determined by the thickness of the breast under compression.
- A lesion within the imaged volume has a unique location that can be described in terms of specific \(x\), \(y\), and \(z\) coordinates relative to the point of reference, or origin \((0,0,0)\).
- This reference point is a hole in the compression plate centered above the main biopsy window. The radiograph is a two-dimensional (2D) representation of a three-dimensional (3D) object (the breast), which in the setting of a stereotactic procedure contains a target lesion.
- The location of the lesion is defined on the 2D image by coordinates on axes designated \(u\) and \(v\) to help distinguish these coordinates from the \(x\) and \(y\) coordinates of the 3D object.
- The images are viewed on a computer monitor, and the physician can identify the lesion in three dimensions.
Prone Stereotactic Biopsy
Stereotactic Table
Stereotactic Table
Biopsy Mechanism
Biopsy Mechanism
Biopsy Mechanism
Digitizer Tablet
Ultrasound

- Ultrasonography can be used to perform breast biopsies, or fine-needle aspirations.
- Sound waves are used to see a mass or lesion in breast tissue. The radiologist will use a transducer to guide him to where the lesion is, and then he will place a needle into the breast to biopsy the tissue.
- In this procedure, the patient’s breast does not need to be compressed, as in a stereotactic biopsy.
Cyst Aspirations and Fine-needle Aspiration Biopsies

- These procedures are performed on patients who have been diagnosed with cysts.
- Painful cysts will be drained using a fine-needle technique either by palpation, or with ultrasound guidance.
- Sterile technique is observed in these procedures.
- After the fluid has been withdrawn, the fluid is sent off to pathology for diagnosis.
- Cells can be malignant, if the patient is diagnosed with having a complex cyst (not completely fluid filled).
- Simple cysts could reoccur after their drainage.
Pneumocystography

- This procedure is performed after a cyst has been drained. The same amount of air is injected, after the fluid is withdrawn and a radiograph is taken.
- This procedure is performed to see if a tumor is present, where the fluid was found.
Galactography

• This procedure is performed on patients who have a discolored or bloody discharge, coming from the nipple.

• A very small catheter is placed inside the duct where the discharge is evacuating. Contrast medium is injected, and a radiograph is taken to see if there is a tumor present.
Core Biopsy

- This procedure is different from stereotactic breast biopsies.
- In this procedure, much larger samples of tissue are obtained, using a large diameter instrument. It is very similar to having a surgical biopsy done, although the patient is not put under general anesthesia.
- The benefit of having this procedure, is that it leaves little room for error, and the patient does not have to be given general anesthesia.
Sources

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