SNS COLLEGE OF ALLIED HEALTH SCIENCE

Affiliated to The Tamil Nadu Dr MGR Medical University, Chennai

DEPARTMENT OF RADIOGRAPHY AND IMAGING

TECHNOLOGY

COURSE NAME : MODERN IMAGING TECHNIQUES AND RECENT TRENDS IN IMAGING

UNIT : MAMMOGRAPHY

TOPIC : MAMMO TOMOGRAM & SONOMAMMOGRAPHY

PROCEDURES - RECAP

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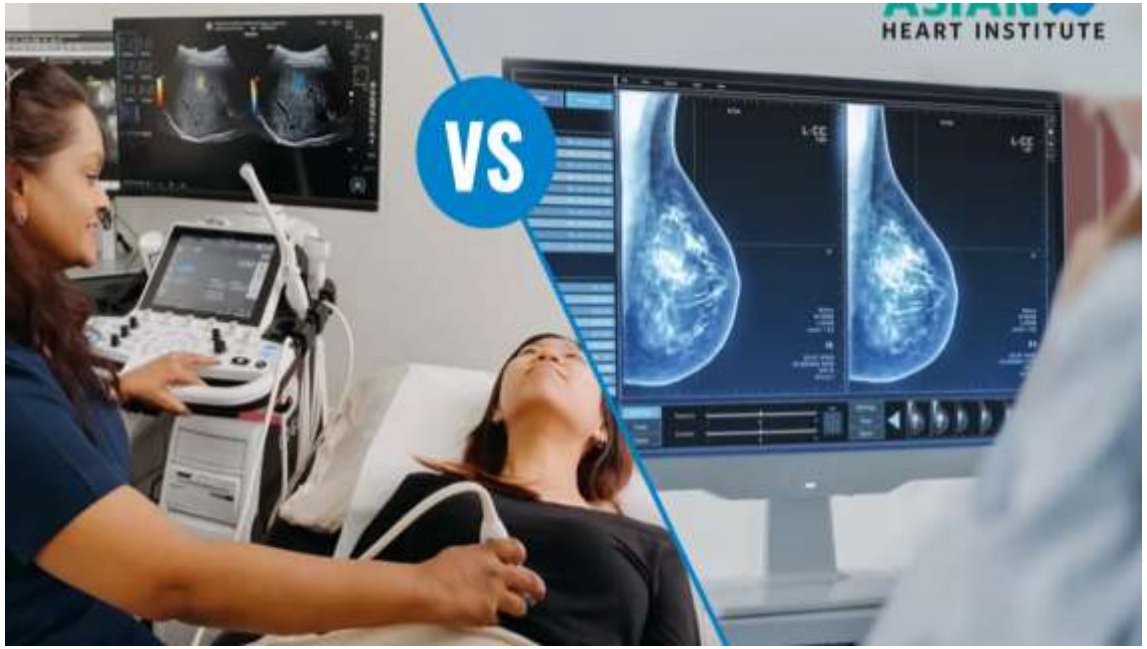
INTRODUCTION - DEFINE

- Mammotomography: 3D mammography for detailed breast tissue imaging
- Sonomammography: Ultrasound-based imaging for breast evaluation



MAMMOTOMOGRAPHY (DIGITAL BREAST TOMOSYNTHESIS) - PROCEDURE

Definition: Advanced 3D mammography capturing multiple low-dose X-ray images

Procedure:

- Breast compressed between plates
- X-ray tube moves in an arc, taking images from multiple angles
- Images reconstructed into 3D slices for detailed view
- Duration: ~10-15 minutes

Uses: Screening and diagnostic imaging for breast abnormalities

MAMMOTOMOGRAPHY - ADVANTAGES

Enhanced Detection:

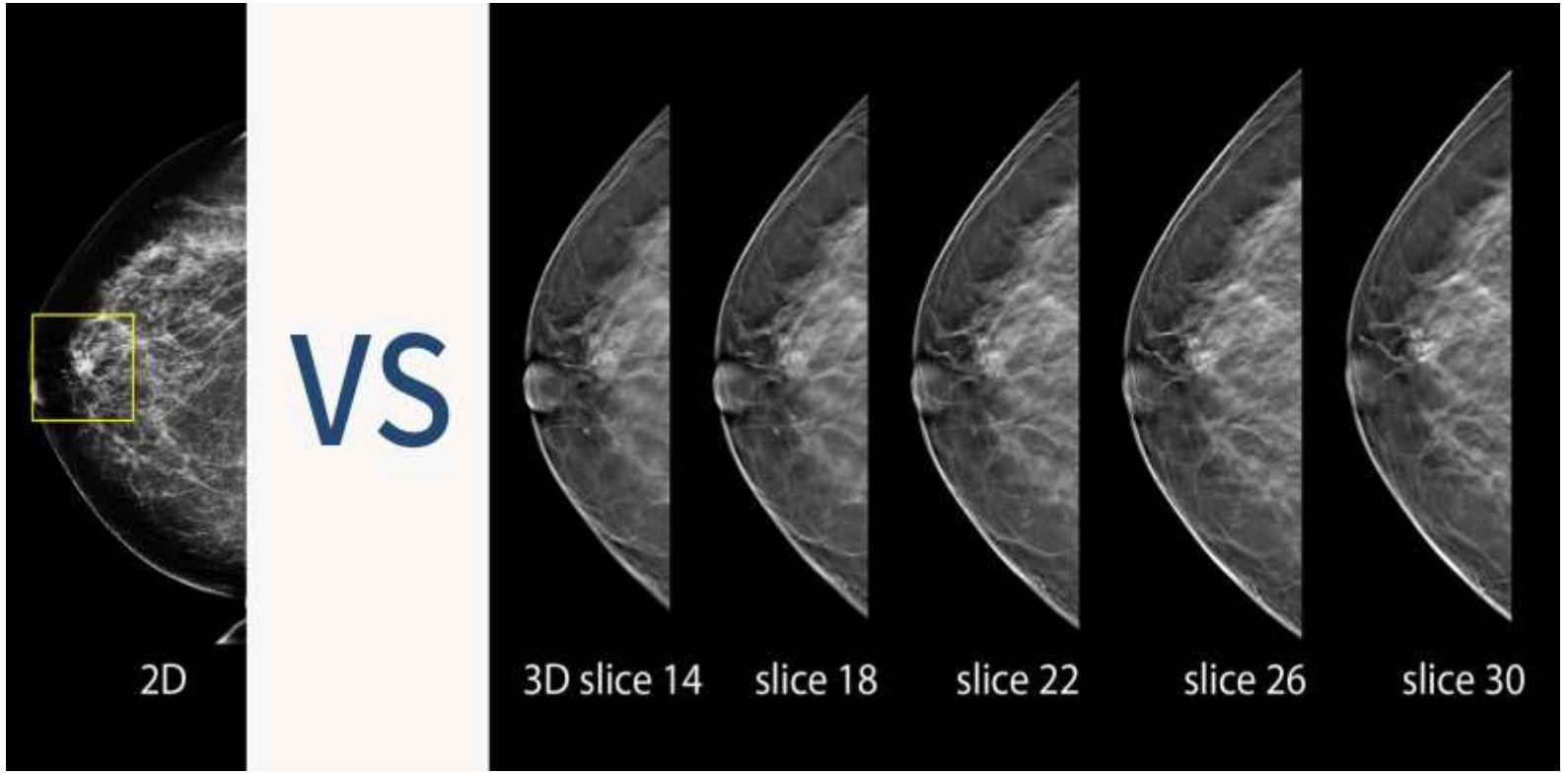
- Improves cancer detection rates by ~20-30% compared to 2D mammography (Source: Studies like JAMA, 2014)
- Better visualization in dense breasts

Reduced Overlap: Minimizes tissue overlap, improving clarity

Fewer Callbacks: Decreases false positives and need for additional imaging

Detailed Imaging: 1-mm slices allow precise lesion localization

MAMMOTOMOGRAPHY - ADVANTAGES



MAMMOTOMOGRAPHY - LIMITATIONS

- **Radiation Exposure**: Low-dose radiation, though higher than 2D mammography
- **Cost**: More expensive than traditional mammography
- **Availability**: Not all facilities offer DBT due to equipment costs
- **Interpretation Time**: Longer reading time for radiologists due to multiple slices
- **False Negatives**: May miss some lesions, especially in very dense breasts

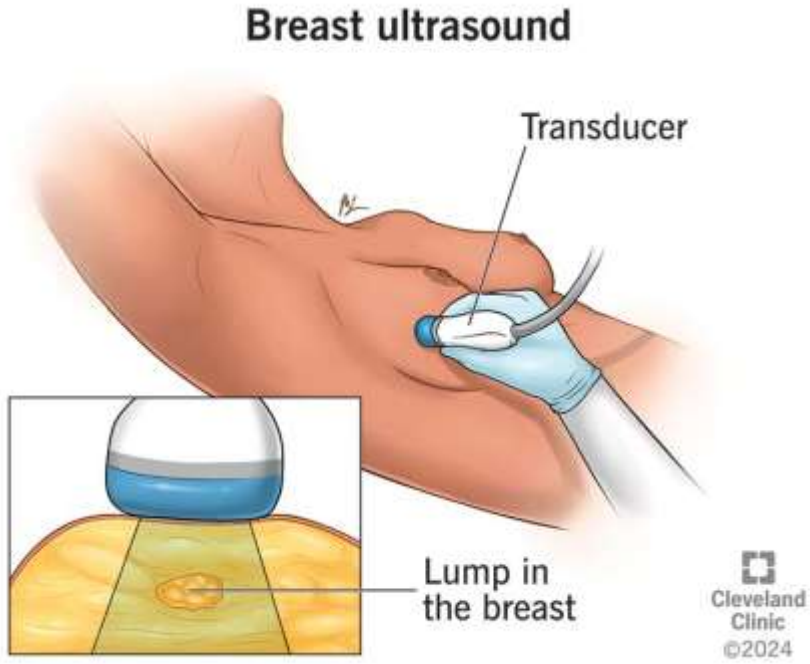
SONOMAMMOGRAPHY (BREAST ULTRASOUND) - PROCEDURE

Definition: Non-invasive imaging using high-frequency sound waves

Procedure:

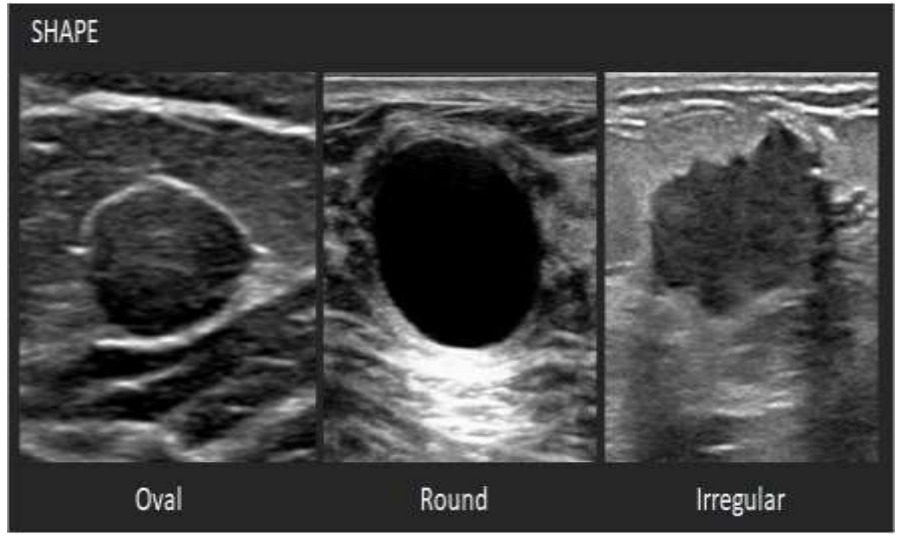
- Patient lies on a table
- Gel applied to breast; handheld probe moved over skin
- Sound waves reflect off tissues, creating images
- Duration: ~15-30 minutes

Uses: Evaluate breast lumps, guide biopsies, supplement mammography



SONOMAMMOGRAPHY - ADVANTAGES

- **No Radiation**: Safe for pregnant women and younger patients
- **Dense Breasts**: Effective in evaluating dense breast tissue
- **Real-Time Imaging**: Allows dynamic assessment and biopsy guidance
- **Cost-Effective**: Generally less expensive than DBT
- **Accessibility**: Widely available in most medical facilities



Ultrasound image of breast cyst vs. solid mass

SONOMAMMOGRAPHY - LIMITATIONS

- **Operator Dependency**: Image quality relies on technician skill
- **Limited Scope**: Not a primary screening tool; supplements mammography
- **False Positives**: May misinterpret benign lesions as suspicious
- **Poor Microcalcification Detection**: Less effective for detecting calcifications compared to DBT
- **Time-Consuming**: Detailed exams can take longer

COMPARISON TABLE

Aspect	Mammotomography (DBT)	Sonomammography
Imaging Type	X-ray (3D)	Ultrasound (Sound waves)
Primary Use	Screening & diagnostics	Diagnostics, biopsy guidance
Radiation	Low-dose radiation	None
Dense Breasts	Good performance	Excellent performance
Cost	Higher	Lower
Availability	Limited in some regions	Widely available
Limitations	Radiation, cost, reading time	Operator-dependent, misses microcalcifications

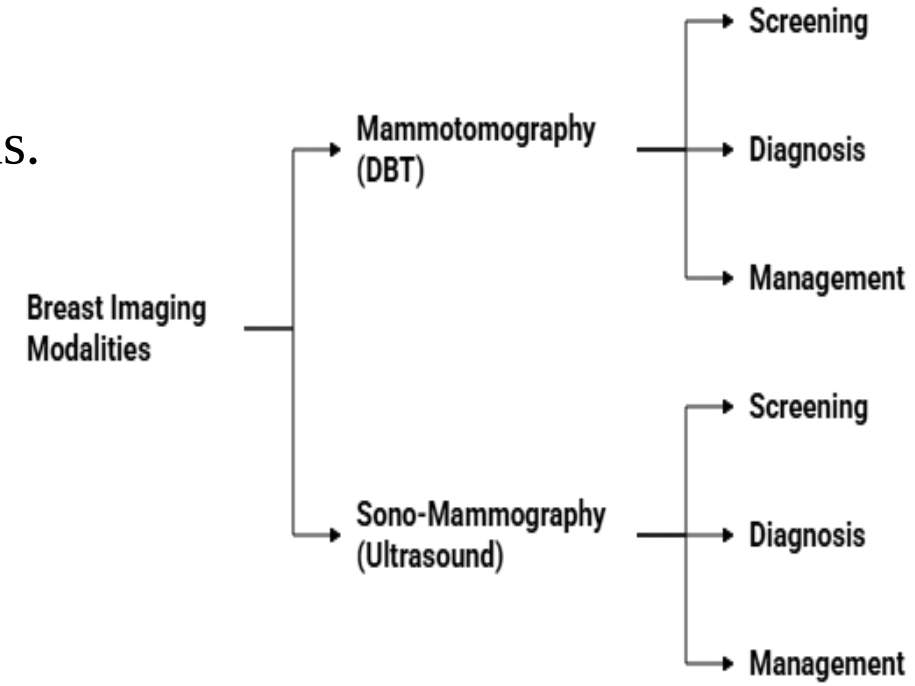
CLINICAL APPLICATIONS

Mammotomography:

- Preferred for routine screening in women over 40
- Detects microcalcifications and architectural distortions.

Sonomammography:

- Ideal for evaluating palpable lumps, cysts vs. solid masses
- Used in younger women or as follow-up to mammography.



PATIENT CONSIDERATIONS

Comfort:

- DBT: Breast compression can be uncomfortable
- Ultrasound: Non-invasive, generally comfortable

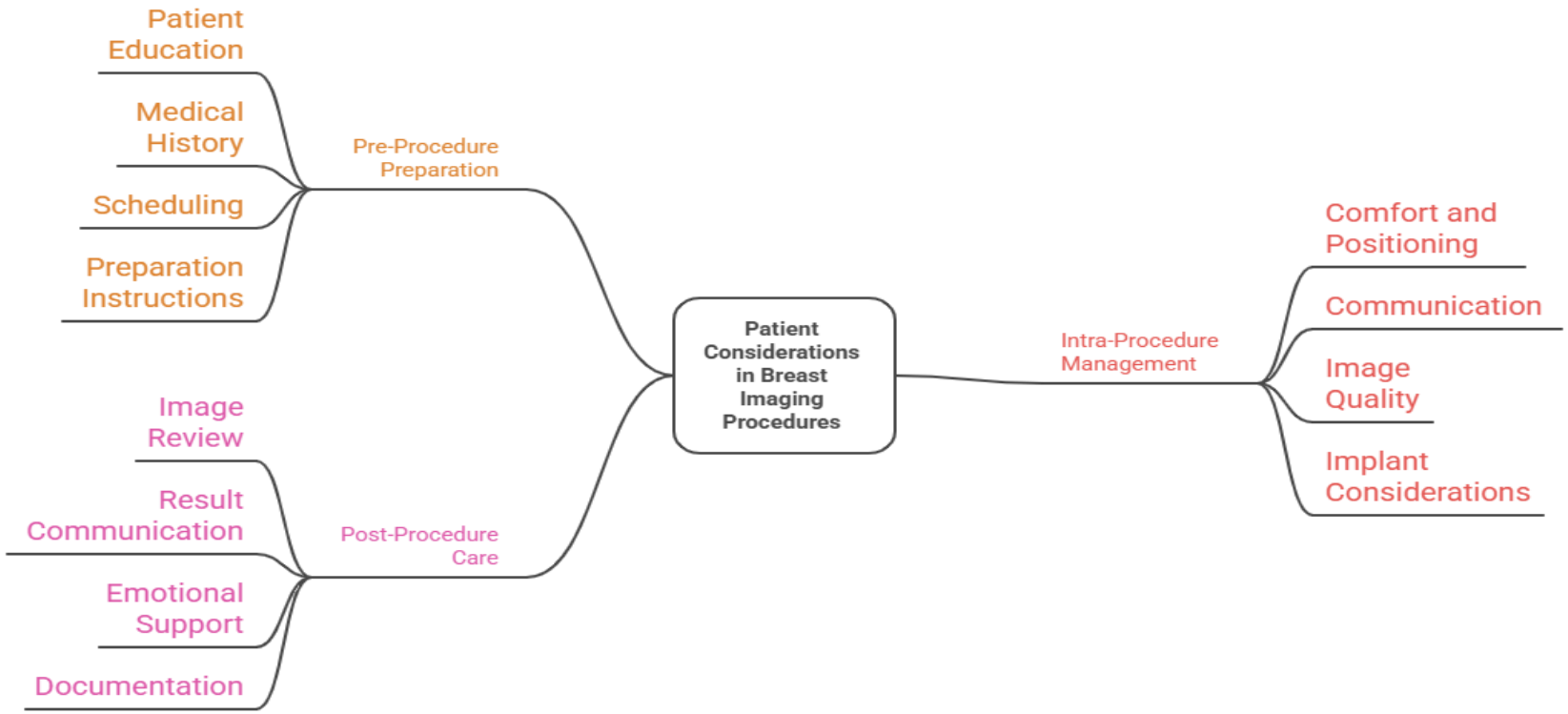
Safety:

- DBT: Minimal radiation risk
- Ultrasound: No radiation, safe for all ages

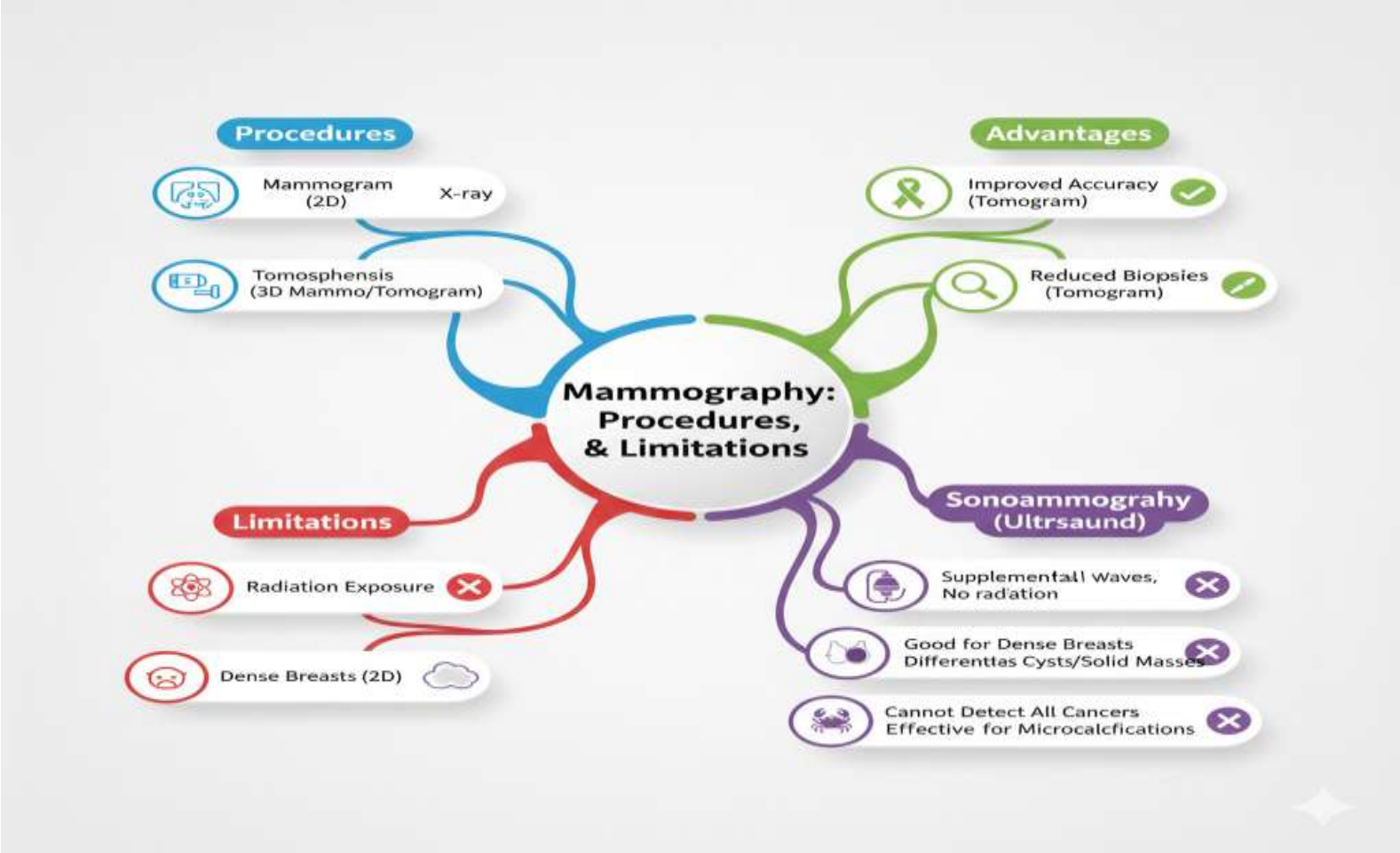
Accessibility: Ultrasound more available in resource-limited settings

Patient Education: Explain benefits vs. risks for informed decisions

PATIENT CONSIDERATIONS



SUMMARY


Mammography: Procedures, & Limitations
Procedures
Mammogram (2D)
X-ray
Tomosphensis (3D Mammo/Tomogram)
Advantages
Improved Accuracy (Tomogram)
Reduced Biopsies (Tomogram)
Limitations
Radiation Exposure
Dense Breasts (2D)
Sonoammograhy (Ultrsaund)
Supplementall Waves, No radiation
Good for Dense Breasts Differentias Cysts/Solid Masses
Cannot Detect All Cancers Effective for Microcalcfications

References:

- **Mammography Quality Standards Act (MQSA) Regulations.**
- **Bushberg, J. T., et al. (2020). *The Essential Physics of Medical Imaging*.**
- **https://my.clevelandclinic.org/health/diagnostics/15939-digital-breast-tomosynthesis-and-breast-cancer-screening**
- **https://www.apollohospitals.com/diagnostics-investigations/sonomammography**