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Architectural Distortion with the Use of Tomosynthesis

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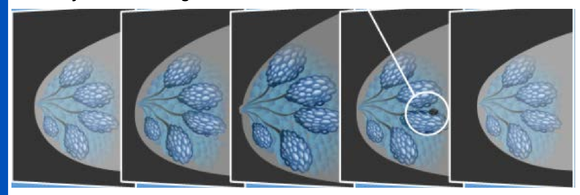
Introduction

Digital breast tomosynthesis (DBT) is an advanced mammographic technique incorporating multiple angular projections of the breast to enable three-dimensional (3D) reconstruction while requiring only a single breast compression event.

Pacifici, S. (n.d.). *Digital breast tomosynthesis: Radiology Reference Article*. Radiopaedia. https://radiopaedia.org/articles/digital-breast-tomosynthesis?lang=us.



Koktysh, L. (2020, October 21). *3D mammography evolves with computer-assisted diagnosis*. ScienceSoft footer icon. https://www.scnsoft.com/blog/3d-mammography-evolution.

Diagnostic mammography is administered to detect breast cancer in women who have an obvious symptom or symptoms indicating an area of concern. The physician or the patient can notify the technologist of a problem. Diagnostic mammography often utilizes specialized projections and should be performed in the presence of the radiologist.

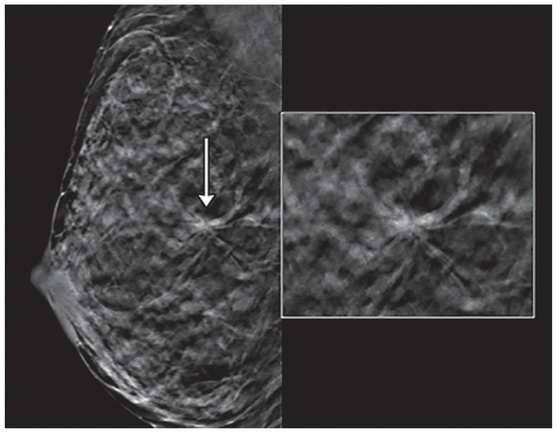
Peart, O. (2008). *Lange Q&A: Mammography examination* (4th ed.). McGraw Hill Publisher Professional.

https://www.hologic.com.hologic-products/breast-health-solutions/selenia-dimensions-mammography-system

DBT exams are positioned and compressed the same way for a mammogram however, for the DBT exam, the x-ray tube moves in an arc over the breast while taking multiple images. When the x-ray tube stops moving the images will be put together to create one image.

Peart, O. (2008). *Lange Q&A: Mammography examination* (4th ed.). McGraw Hill Publisher Professional.

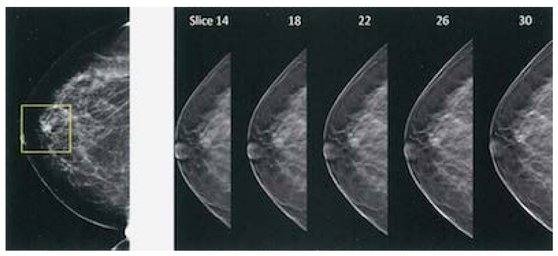
Architectural Distortion



https://pubmed.ncbi.nlm.nih.gov/30240306/

- Asymmetrical breast tissue, also called focal architectural distortion (FAD), is usually identified when comparing one breast with the other. The breasts usually present a mirror image, although 3%-5% of normal breast can show asymmetrical densities in the outer quadrant or axillary tail.
- Areas of architectural distortion can represent a malignancy or a benign process, such as surgical scar, sclerosing lesions or posttraumatic fat necrosis.
- Often due to desmoplastic reaction in which there is a focal disruption of the normal breast tissue pattern.
  - What can be considered as architectural distortion:
    - Contour abnormality
    - Trabecular thickening
    - Trabecular disorganization

Peart, O. (2008). *Lange Q&A: Mammography examination* (4th ed.). McGraw Hill Publisher Professional.



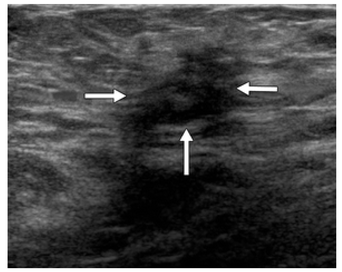
Women's Imaging: 3D Mammography. University Radiology. (n.d.).https://www.universityradiology.com/womens_imaging/3d_mammography.

Radial scars and complex sclerosing lesions result from idiopathic processes unrelated to trauma or postsurgical change.

https://www.ajronline.org/doi/10.2214/AJR.12.10153

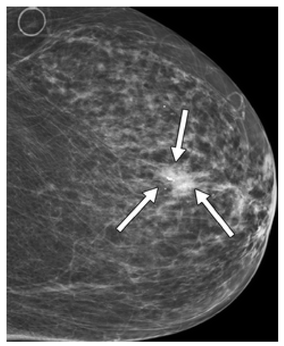
Ultrasound:

On ultrasound, radial scars commonly present as a hypoechoic mass or parenchymal distortion that mimics malignancy.



https://www.ajronline.org/doi/10.2214/AJR.12.10153

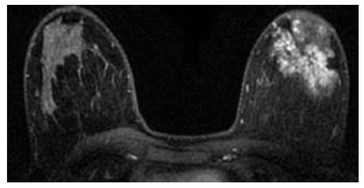
Tomosynthesis: Craniocaudal view:



https://www.ajronline.org/doi/10.2214/AJR.12.10153

MRI: Contrast-enhanced MRI:

On MRI, the morphologic features and contrast enhancement patterns cannot reliably differentiate a benign from malignant mass.



https://www.ajronline.org/doi/10.2214/AJR.12.10153

Advantages

- Better results and screening for dense breasts
- Less discomfort
- Earlier detection of breast cancer with symptoms
- Detection of breast cancer in women with no symptoms
- Fewer calls backs for additional imaging
- Improved imaging for large, dense breast tissue
- Simple detection that shows inner breast structure

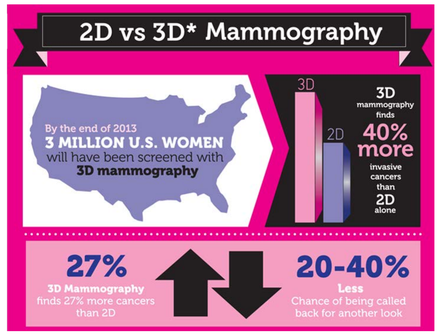
Disadvantages

- More exposure to radiation
- More images taken
- Variation in the images
- Relatively new procedure

Statistics

- There are about 2,300 new cases of breast cancer in men each year, and about 230,000 new cases in women each year.
- Architectural Distortion accounts for 12-45% of breast cancer cases.
- Malignant cases are noted in 6.8%-50.7% of cases presented yearly.

Costa, M. P., & Barreiro, G. C. (2016). Importance of concepts in abdominoplasty and liposuction in breast reconstructions. In A. B. Fioravanti (Ed.), *New concepts on abdominoplasty and further applications* (pp. 147–148). essay, Springer International



3D Mammograms. Effingham Health System. (2020, October 1). https://www.effinghamhealth.org/our-services/mammograms/.

Conclusion

DBT is a fairly new technology that can assist in diagnosing of breast cancer. DBT uses a series of 2D images to build a 3D mage of the breast. DBT is the most helpful screening technique used for detection of breast cancer with women of dense breasts. Architectural distortion (AD) is detected more frequently on a tomosynthesis and if questionable on diagnostic imaging, MRI may be performed. AD is the most missed abnormality in false-negative cases.

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