

IMAGING OF THE POST-SURGICAL BREAST

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- No disclosures to report

Objectives

- Describe imaging findings after oncologic, reconstructive and cosmetic breast surgery
- Understand benign post-surgical changes and differentiate them from recurrent breast carcinoma
- Review novel oncologic and reconstructive techniques
- Recognize imaging findings of BIA-ALCL

Breast Conservation Therapy (BCT)

- Treatment of choice for early stages of breast cancer
- Lumpectomy + Radiation Therapy
- Multiple trials have shown equivalent survival with BCT and MRM
- Local recurrence slightly higher with BCT
- +/- SLB and ALND.

Veronesi U, Cascinelli N, Mariani L, Greco M, Saccozzi R, Luntz A, Aguller M, Marubini E. Twenty-year follow-up of a randomized study comparing breast-conserving surgery with radical mastectomy for early breast cancer. N Engl J Med. 2002;347:1227-1332.

Breast Conservation Therapy Indications

- *Size/location of tumor relative to breast size allows safe oncologic procedure and acceptable cosmetic result*
- Locally advanced breast cancer with good result after neoadjuvant chemotherapy may become candidates for BCT

Breast Conservation Therapy Contraindications

- Extensive multicentric disease
- Inability to obtain negative histologic margins despite reasonable attempts for re-excision.
- Unfavorable tumor-to-breast size ratio
- Inflammatory breast cancer.
- Contraindications to XRT: Previous RT, early pregnancy, Collagen vascular disease
- Risk reduction: patients with known BRCA genetic mutations



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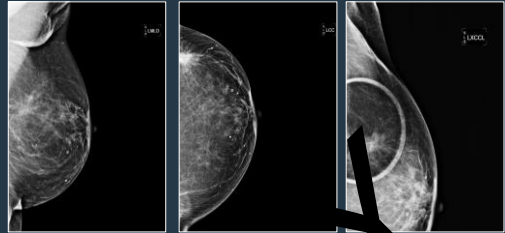
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BCT- Imaging findings

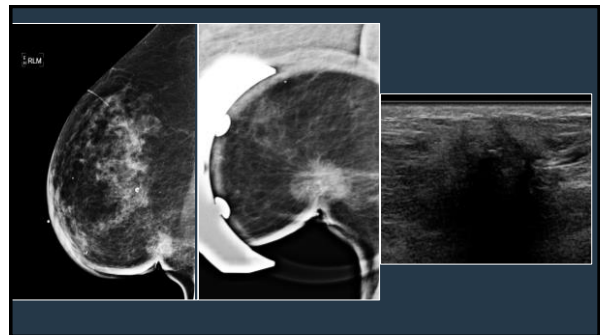
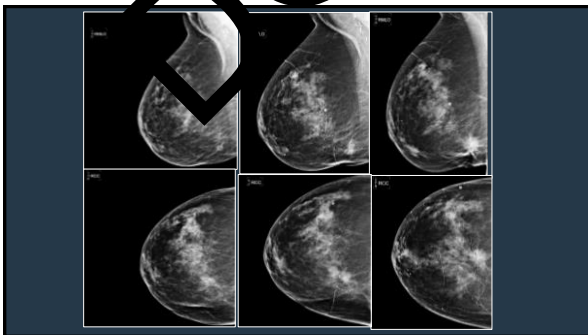
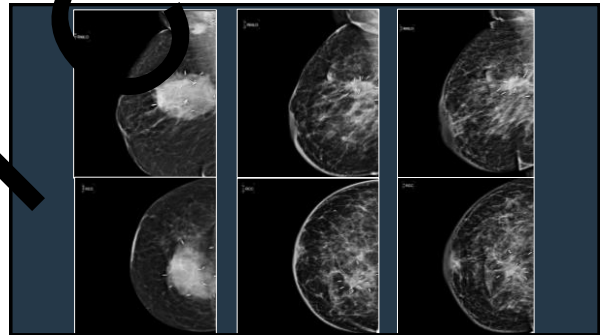
- Skin thickening (>2mm) and trabecular thickening (>90% of patients)
- Overall increased breast density due to parenchymal edema/decreased compressibility
- Fluid collection/seroma: Seen in 50% of patients 1 month after surgery and 25% at 6 months
- Post-surgical AD: change in configuration in different projections, thick/curvilinear spiculations, central lucencies
- Post-surgical changes peak at 6-12 months and should progressively decrease until "new baseline" at years 2-3
- Any change such as increased density, skin thickening, new masses/calculifications should raise suspicion for recurrence

Mendelson EB. Evaluation of the postoperative breast. Radiol Clin North Am 1992; 30:107-138

Palpable mass. History of BCT and BR



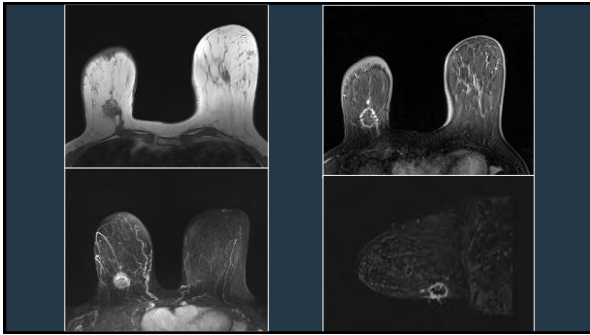
BCT and BR- Palpable mass





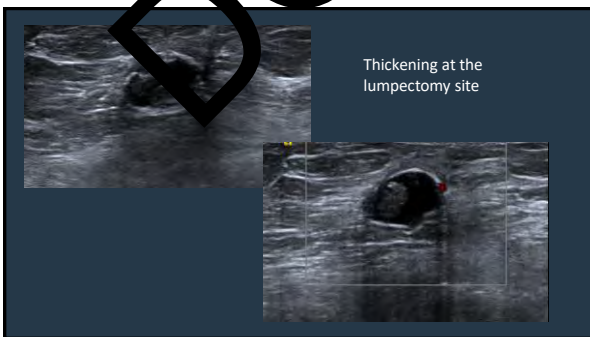
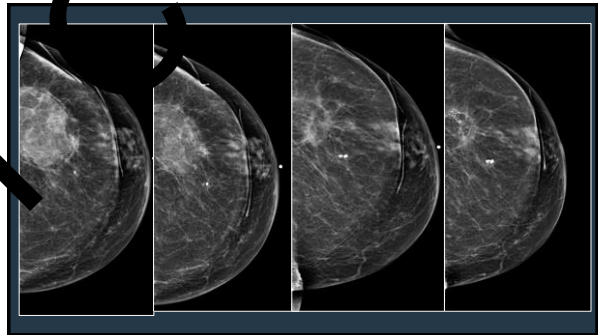
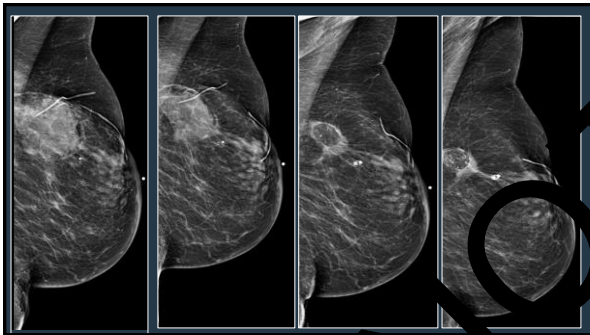
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BCT- Calcifications

- **Dystrophic calcifications:** >5mm, irregular shape, central lucencies, no associated soft tissue mass or density, always at the site of surgery
- **Fat necrosis:** oval or round lucency with curvilinear, peripheral calcifications. Common complication after reconstructive surgery (breast reduction, myocutaneous flaps). May present as a palpable mass
- **Suture calcifications:** Suture material can also calcify with distinctive shapes



Mastectomy-Indications

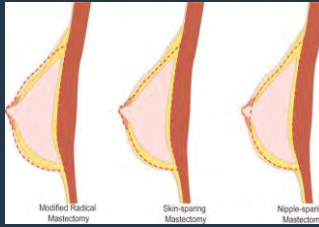
- Contraindications for BCT
- Genetic susceptibility
- Patient preference

Mastectomy- Types

Modified Radical Mastectomy (MRM): removal of breast, skin, NAC and level I and II axillary lymph nodes. Treatment of choice if no immediate reconstruction planned

Skin-Sparing Mastectomy: complete removal of breast tissue and NAC, preserving the skin envelope and inframammary fold

Nipple-Sparing Mastectomy, Total skin-sparing mastectomy or Subcutaneous mastectomy: preserves skin and NAC. Optimal cosmetic outcome

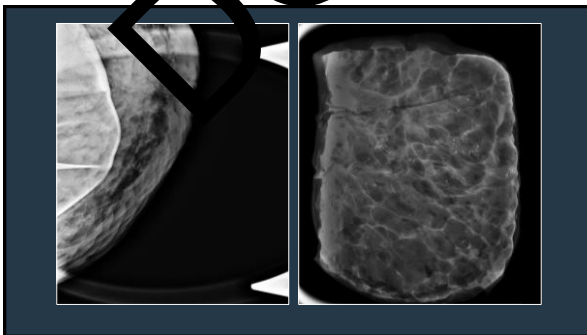
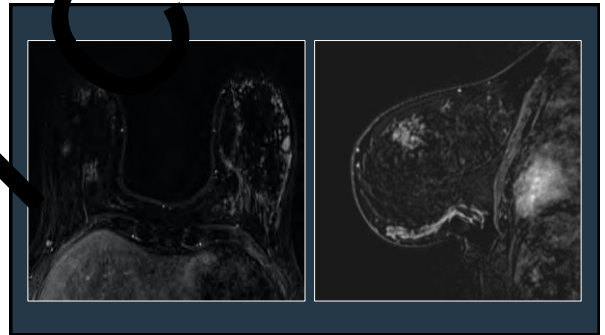
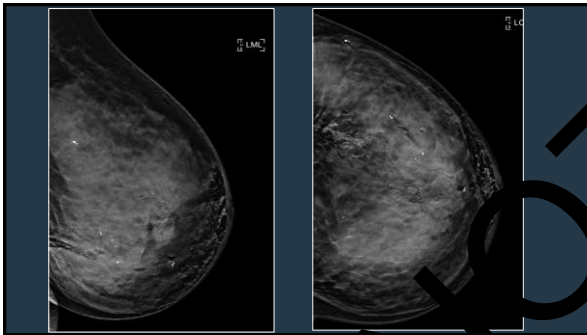


Margolis, NE et al. Updates on Imaging of the Post-Surgical Breast. RadioGraphics 2014; 34:642-660

Novel Surgical Mastectomy Techniques: SSM and TSSM

- Oncologic safety versus improved cosmetic outcome
- Histologic review of skin flap in skin-sparing mastectomy: 59.5% residual breast tissue (TDLU's) and 9.5% residual carcinoma if flap > 5mm.
- *An imaging finding of residual breast parenchyma should be reported by the radiologist as long-term imaging surveillance may be indicated*
- *Pre-operative MRI necessary to determine eligibility: tumors less than 2 cm from the nipple or tumor size larger than 2 cm are the two parameters that have been associated with NAC involvement*

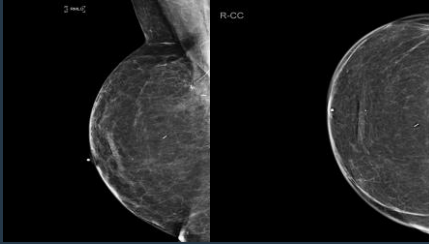
Torresan RZ, dos Santos CC, Okamura H, Alvarenga M. Evaluation of residual breast tissue after skin-sparing mastectomies. Ann Surg Oncol 2005;12(12):1037-1044



Reconstructive Surgery

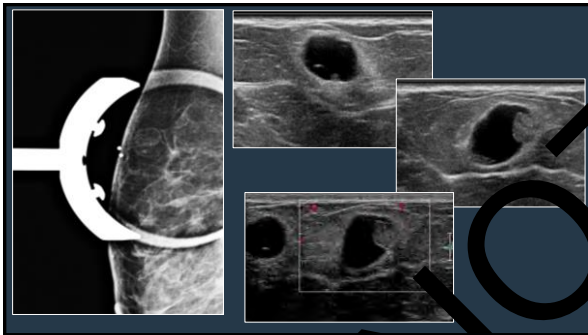
- Post-mastectomy reconstruction options:
 - Synthetic implants.
 - Autologous tissue transfer (flaps): pedicle and free.
 - Autologous fat grafting.

TRAM Flap: Imaging Appearance



Autologous Fat Grafting

- Lipoaspirate material injected to fill defects at lumpectomy sites or depressions along margins of reconstructed breast (UIQ) or for primary augmentation
- Imaging features: fat necrosis and oil cysts, in 75% patients
- Mammography: lucencies and calcifications
- Ultrasound: Cystic, echogenic or mixed echogenicity *avascular* masses
- MRI: hyperintensity on T1 non-fat-sat sequences, hypointensity on fat-sat sequences and T2 WI. Thin rim of enhancement on oil cysts



Complications

- Increase risk of infection
- Secondary malignancies: lung, secondary breast cancer, leukemias and radiation induced sarcoma
- *Recurrent breast carcinoma*
- *Fat Necrosis*

Recurrent Breast Carcinoma
 Who is at increased risk?

- Incidence 1-2% per year, peaks at 2.5% between years 2-6
- Patients that did not receive XRT.
- Young patients: < 40 y/o.
- ER negative tumors.
- Lymphovascular invasion.
- Multifocal tumors.
- Close or positive margins.
- Extensive Intraductal Component: IDC +DCIS where the latter represents greater than 25% of tumor

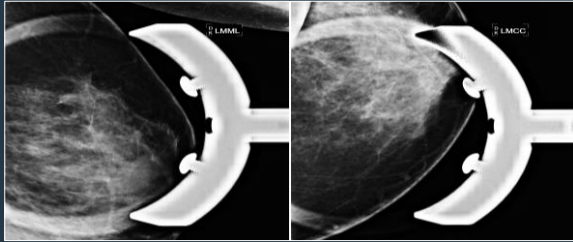
Recht A, Silen W, Schnitt SJ, et al. Time-course of local recurrence following conservative surgery and radiation therapy for early stage breast cancer. *Int J Radiat Oncol Biol Phys* 1988; 15:255-261

Recurrent Breast Carcinoma

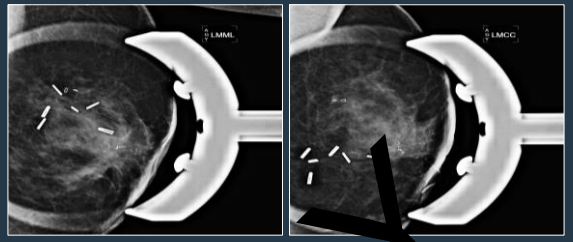
- New mass and/or calcifications
- Increasing architectural distortion/asymmetry/focal asymmetry
- Increase density of lumpectomy site
- Recurrent disease can take the form of invasive or in situ malignancy regardless of the original presentation and may not appear in a similar fashion than the primary cancer

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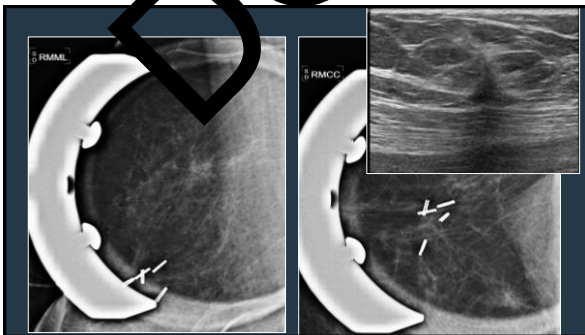
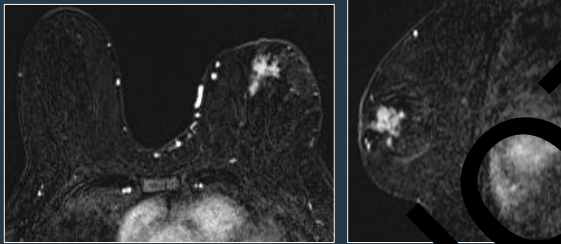
Screen detected DCIS-2009



Recurrence lumpectomy site-2011



MRI



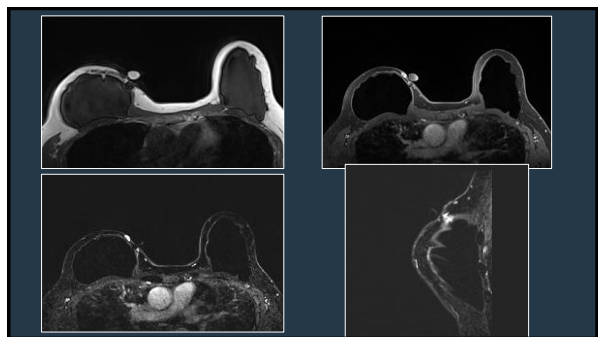
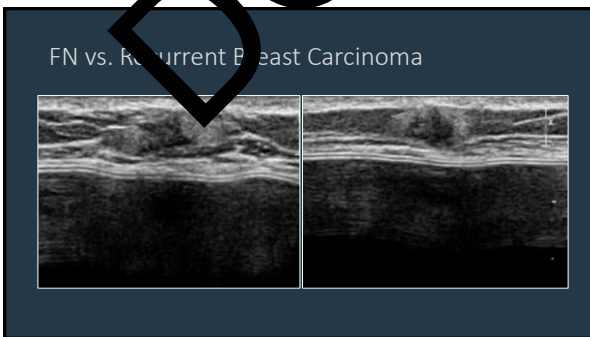
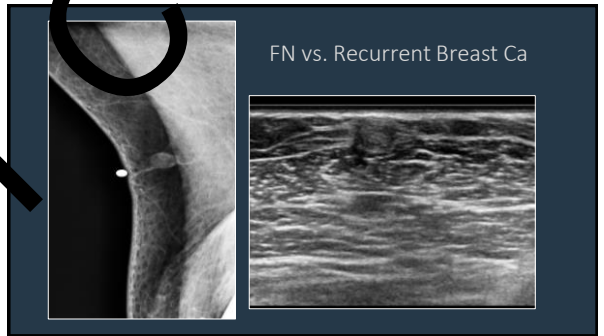
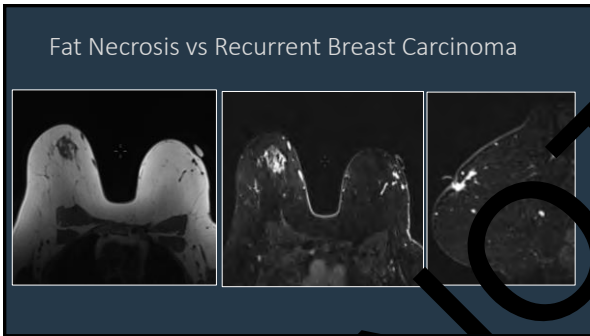
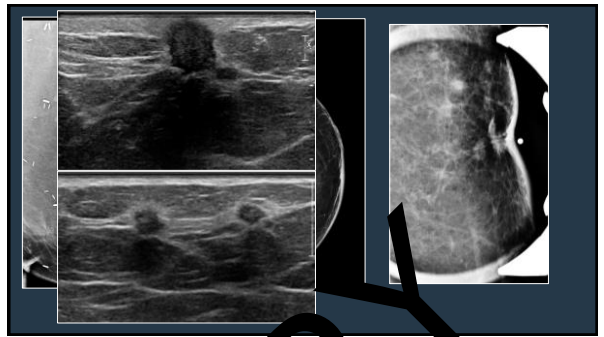
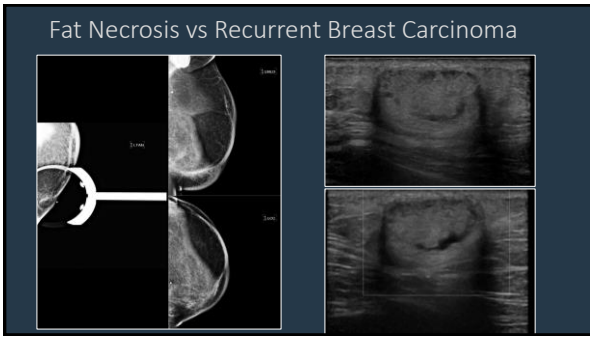
Fat Necrosis vs Tumor Recurrence

- Risk of cancer recurrence low, therefore no imaging surveillance is necessary
- Fat necrosis most common complication due to insufficient blood supply
- TRAM flap: 58.5% of patients at average of 1.7 months after surgery.
- Cancer recurrence occurs in the skin envelope superficial to the autologous flap reconstruction and it is usually palpable
- Posterior margin of the mastectomy bed not amenable to palpation. Pain & discomfort



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Breast Implant Associated-Anaplastic Large Cell Lymphoma (BIA-ALCL)

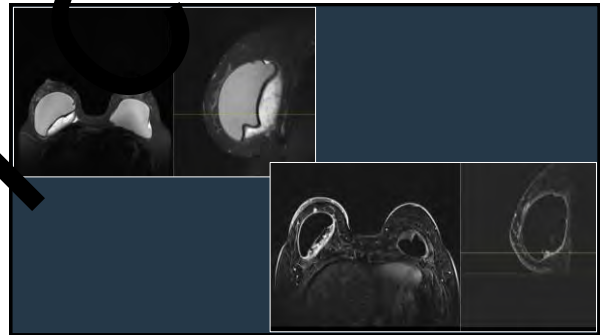
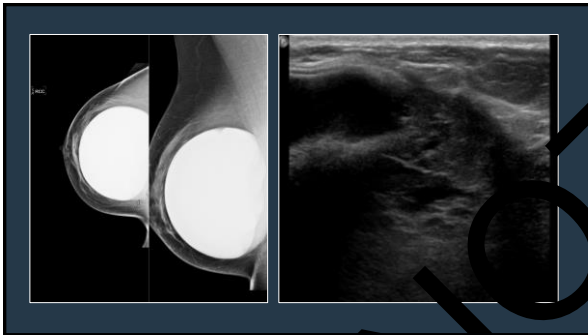
- Non-Hodgkin lymphoma: abnormal T cell, CD30 +, ALK -
- Large, spontaneous periprosthetic fluid collection with unilateral breast enlargement (DDx: Infection, trauma)
- Palpable mass, lymphadenopathy, systemic symptoms
- Average 7-10 years after surgery (cosmetic or reconstructive)
- **Only seen with textured surface implants** (no confirmed cases on smooth surface implants)

2019 NCCN Consensus Guidelines on the Diagnosis and Treatment of Breast Implant-Associated Anaplastic Large Cell Lymphoma (BIA-ALCL)
 Mark W Clemens, MD, FACS, Eric D Jacobsen, MD, Steven M Horwitz, MD Author Notes
 Aesthetic Surgery Journal, Volume 39, Issue Supplement_1, March 2019, Pages S3-S13.

2019 NCCN Consensus Guidelines in Diagnosis and Treatment of BIA-ALCL

- Ultrasound: High S&S for detection of fluid and masses. Guidance for FNA
- MRI/PET
- FNA: at least 50cc
- Fluid analysis: Cytology, Immunohistochemistry and Flow Cytometry
- Core needle biopsy of masses and lymphadenopathy
- Confirmed cases should be reported to the PROFILE registry of the American Society of Plastic Surgery (www.theapsf.org/PROFILE)
- Excellent prognosis with early diagnosis and complete surgical excision

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THANK YOU

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