Imaging after Oncoplastic Surgery: Autologous Reconstruction and Fat Infiltration During Breast Reconstruction

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Oncoplastic surgery and fat injections

• Do these procedures interfere with cancer detection on screening mammography?
• What about screening US?
• How should palpable abnormalities be worked up?
• What about nonautologous injections?
What are the potential concerns for imaging following oncoplastic surgery?

• Experience with reduction surgery and TRAM flap reconstruction

• Sequelae
  – fat necrosis
  – calcifications
  – cyst formation
Evolving Fat Necrosis on Mammography
Fat necrosis on MRI – characteristic appearance “black hole” sign

Prior reduction surgery
Fat necrosis on US – variable appearance – can look suspicious
Symptomatic TRAM Flaps
MRI is test of choice
TRAM Fat Necrosis
• Retrospective of 66 lesions in 37 patients presenting as palpable abnormality following fat injection
• Initially lesions characterized under ultrasound as BIRADS 1-4
• Subsequent characterization based on: echotexture, size, vascularity, and margins
• Results: qualitative ultrasound analysis of masses
  – 66 total lesions, initially classified as
    • 32 BIRADS 2
    • 12 BIRADS 3
    • 22 BIRADS 4
  – Further classified as:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
<th>No. of Cases (%)</th>
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<tbody>
<tr>
<td>A</td>
<td>Solid mass, hypoechoic</td>
<td>15 (22.7)</td>
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<tr>
<td>B</td>
<td>Solid mass, isoechoic</td>
<td>1 (1.5)</td>
</tr>
<tr>
<td>C</td>
<td>Solid mass, hyperechoic</td>
<td>2 (3.0)</td>
</tr>
<tr>
<td>D</td>
<td>Solid mass, complex</td>
<td>7 (10.6)</td>
</tr>
<tr>
<td>E</td>
<td>Typical cystic appearance/anechoic mass with posterior</td>
<td>27 (40.9)</td>
</tr>
<tr>
<td></td>
<td>acoustic enhancement</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Cystic mass with internal echoes</td>
<td>10 (15.2)</td>
</tr>
<tr>
<td>G</td>
<td>Negative ultrasound findings</td>
<td>4 (6.1)</td>
</tr>
</tbody>
</table>
• 19 of 37 patients underwent biopsies of 31 masses
  – 22 BIRADS 4
  – 2 BIRADS 3
  – 7 BIRADS 2
• 100% of lesions that were classified as A, B, C, E, F, or G were benign fat necrosis or oil cysts
Masses with both uncircumscribed margins and vascularity had PPV of 100% in this study.

Followup for indeterminate findings

Solid masses with circumscribed margins and vascularity were confirmed benign, with followup ultrasound demonstrating stability, more cystic appearance, or decrease in size.
If there is any concern about a palpable abnormality and US is not clearly cystic get MRI (if you can)

• Decrease in US follow ups
• Decrease in biopsies
• Decrease in anxiety for the patient
49 year old woman with history of prior right lumpectomy

Underwent lipofilling

Presents with palpable masses
Multiple palpable areas
Fat injections

Radiological findings in mammary autologous fat injections: A multi-technique evaluation

M. Costantini, A. Cipriani, P. Belli, E. Bufo, R. Rubelli, G. Visconti, M. Salgarello, L. Bonomo

Department of Imaging and Radiological Sciences, Università Cattolica del Sacro Cuore, Policlinico Universitario A. Gemelli, Rome, Italy
Department of Plastic and Reconstructive Surgery, Università Cattolica del Sacro Cuore, Policlinico Universitario A. Gemelli, Rome, Italy

Oil cysts common finding
• Fat necrosis most frequently observed complication

• Mean amount of fat injected was $114.8 \pm 55$ ml
  - average amount of fat grafted in patients who developed fat necrosis was $158.4 \pm 42.7$ versus $104.6 \pm 52.3$ ml ($p = 0.0043$, t-test).

• Fat necrosis most frequently occurs when large amounts of fat are injected

Costantini M et al Clin Radiol 2012
Fat injections do not interfere with breast cancer early diagnosis

Costantini M et al Clin Radiol 2012
Mammographic Changes after Fat Transfer to the Breast Compared with Changes after Breast Reduction: A Blinded Study.

Rubin, J; Coon, Devin; Zuley, Margarita; Toy, Jonathan; Asano, Yuko; Kurita, Masakazu; Aoi, Noriyuki; Harii, Kiyonori; Yoshimura, Kotaro

<table>
<thead>
<tr>
<th></th>
<th>Breast reduction (n=194)</th>
<th>Lipoaaugmentation (n=216)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil cysts</td>
<td>58 (31.5%)</td>
<td>55 (25.5%)</td>
<td>0.18</td>
</tr>
<tr>
<td>Scarring</td>
<td>158 (85.6%)</td>
<td>38 (17.6%)</td>
<td>&lt;0.001</td>
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<tr>
<td>Ca++, benign fat necrosis</td>
<td>50 (27.2%)</td>
<td>37 (17.1%)</td>
<td>0.02</td>
</tr>
<tr>
<td>Ca++ warranting biopsy</td>
<td>3 (1.6%)</td>
<td>10 (4.6%)</td>
<td>0.16</td>
</tr>
<tr>
<td>Mass/distortion warranting biopsy</td>
<td>25 (13.6%)</td>
<td>6 (2.9%)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Lipoaaugmentation
lower rates of mammographic abnormalities
more favorable BIRADS score (follow ups and biopsies)
Radiographic Findings after Breast Augmentation by Autologous Fat Transfer

Veber, Michaël M.D.; Tourasse, Christophe M.D.; Toussoun, Gilles M.D.; Moutran, Michel M.D.; Mojallal, Ali M.D.; Delay, Emmanuel M.D.

Plastic and Reconstructive Surgery Issue: Volume 127(3), March 2011

Lipomodeling does not affect the mammographic follow-up. 50% mammograms had new findings postoperative evaluation effective → skilled breast radiologist

Mammography of breasts with fat grafting is not problematic
Caveat about MRI and Fat Necrosis
New mass adjacent to Lumpectomy site
US biopsy

No recurrence
Path: fat necrosis
Questionable new mass at the lumpectomy site
MRI looks suspicious

Biopsy: Fat necrosis
Free Silicone injections
Cancer in free silicone and silicone augmentation
Summary

• Oncoplastic surgery and fat injections do not interfere with cancer detection on screening mammography
• US for palpable abnormalities may be problematic
  – Screening US should not be used in patients with large areas of fat necrosis
• MRI can be helpful in working up palpable abnormalities
• Screening MRI for nonautologous injections
Thank you!