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Case Report

Breast cancer recurrences in myocutaneous flap reconstruction ☆

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ARTICLE INFO

Article history:
Received 31 August 2020
Revised 14 October 2020
Accepted 17 October 2020

Keywords:
Recurrence
Deep inferior epigastric perforator (DIEP) flap
Autologous breast reconstruction
Mastectomy
Breast cancer

ABSTRACT

Autologous flap reconstruction is widely used after skin sparing mastectomy to reconstruct the appearance of the breast. We present 2 cases of breast cancer recurrence in a deep inferior epigastric perforator reconstruction, including a 65-year-old female with history of papillary carcinoma and a 35-year-old female with history of a high grade invasive ductal carcinoma with extensive ductal carcinoma in situ. Differential imaging considerations of the post mastectomy patient are reviewed. Typical appearance of a deep inferior epigastric perforator flap reconstruction as well as location and timing of presentation may help differentiate a recurrence from the more commonly encountered postsurgical etiologies.

Introduction

Some women may preferentially choose mastectomy over breast conserving surgery with the hope of minimizing recurrence. In theory, there should be minimal risk of recurrence after a total mastectomy with clear surgical margins. Recurrences are still observed and may be due to residual breast tissue and native skin. While most recurrences are palpable, clinically occult recurrences may be detected at imaging. When a recurrence occurs, it often resembles the original primary malignancy at imaging and at histopathology.

Case reports

History

Case 1: A 65-year-old woman with history of multifocal invasive papillary carcinoma (estrogen receptor + (positive) (ER+), progesterone receptor + (positive) (PR+), human epidermal growth factor receptor 2+(positive) (HER2+)) at left 3:00. At the time of her initial breast cancer diagnosis, breast conserving surgery was attempted but due to multiple positive margins, mastectomy followed by immediate autologous deep

☆ Competing Interests: The authors have declared that no competing interests exist.

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https://doi.org/10.1016/j.radcr.2020.10.034

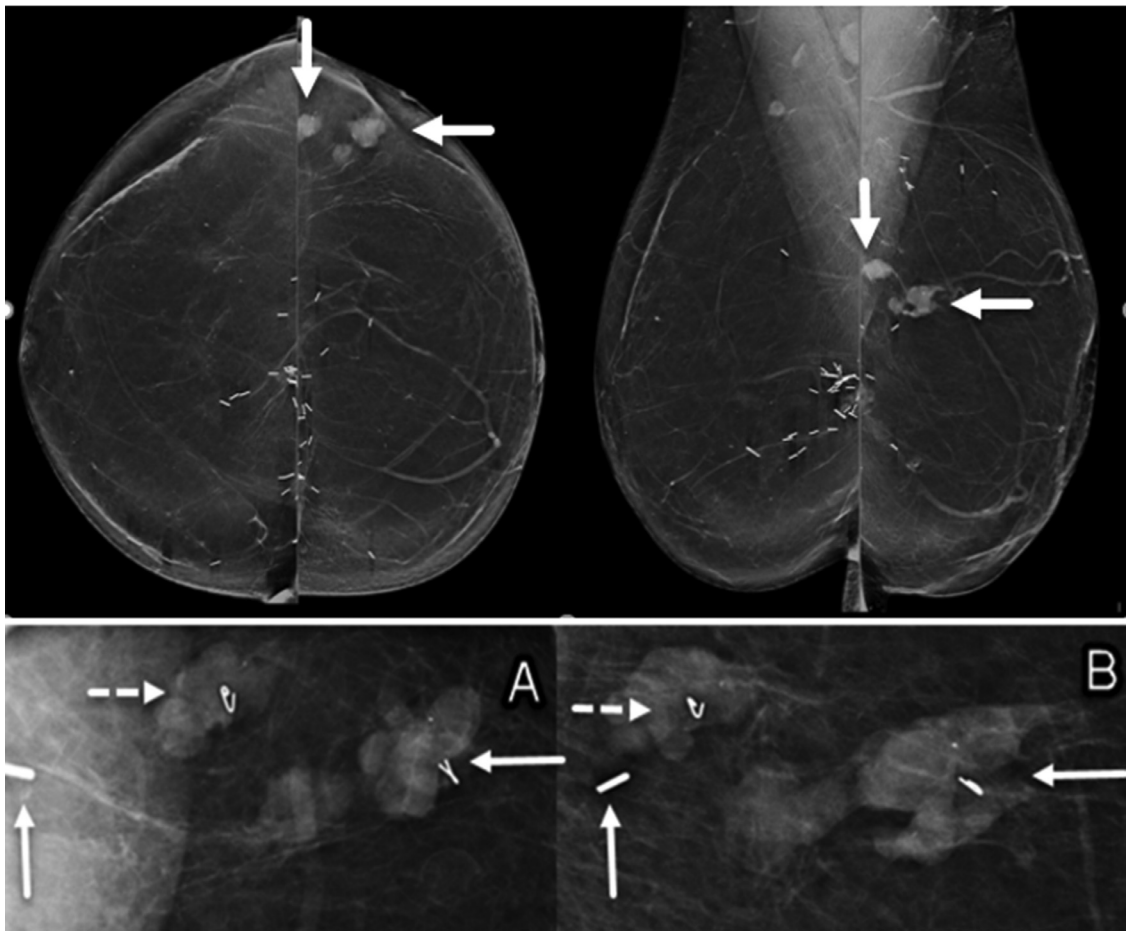

Fig. 1 – Case 1 - A 65-year-old female with past history of left mastectomy with DIEP reconstruction who later developed a recurrence 7 years later. Bilateral craniocaudal and mediolateral oblique synthesized mammograms demonstrate the DIEP reconstructed breasts with complete fat composition due to abdominal fat, multiple surgical clips, and lack of fibroglandular tissue. At the site of palpable abnormality in the left breast at 3:00, there are 3 high density, microlobulated margined masses (arrows indicating the most anterior and posterior masses) in a linear distribution that span 4.9 cm. DIEP, deep inferior epigastric perforator.

inferior epigastric perforator (DIEP) flap reconstruction was performed.

Initial surgical pathology (mT1aN0) at mastectomy was mucin producing, multifocal invasive papillary carcinoma with high grade ductal carcinoma in situ, with lymphovascular invasion. Letrozole was started but after 15 months, this was discontinued due to symptoms of arthralgia. The patient declined recommendation for alternative endocrine therapy. As the cancer was small and the mastectomy specimen had negative margins with no evidence of nodal metastases, radiation therapy was not administered. Seven years later, she developed a similar palpable lump in the left lateral 3:00 position of the reconstructed breast. Mammography, ultrasound with biopsy, and MRI were performed (Figs. 1-3), followed by wide surgical excision with local tissue rearrangement and sentinel node biopsy. Final surgical pathology showed invasive papillary carcinoma (ER+/PR+/HER2+) with focal mucin production, contiguous across adjacent sections for 4.9 cm, consistent with extent of disease predicted on mammography, ultrasound, and MRI. The patient received adjuvant chemotherapy with Taxotere, Carboplatin, Herceptin, and Perjeta with plans for adjuvant radiation and endocrine therapy.

Case 2: A 38-year-woman with history of right invasive ductal carcinoma (ER+, PR+, HER2−) with extensive ductal carcincoma in situ at right 6:00 had mastectomy with immediate DIEP flap reconstruction after workup of mammographic calcifications revealed cribiform and solid pattern ductal carcinoma in situ with necrosis and microinvasion. Initial surgical pathology (pT1bN0) revealed grade 2, 0.8 cm invasive ductal carcinoma with comedonecrosis. Oncotype DX score was 21. Patient received partial adjuvant chemotherapy with Taxotere and Cyclophosphamide but due to hyponatremia requiring hospitalization, additional chemotherapy treatment was aborted and was on tamoxifen. Three years later, the patient presented with a palpable lump in the 6:00 position of the right reconstructed breast. Ultrasound with biopsy and post procedure mammograms were performed. MRI was also

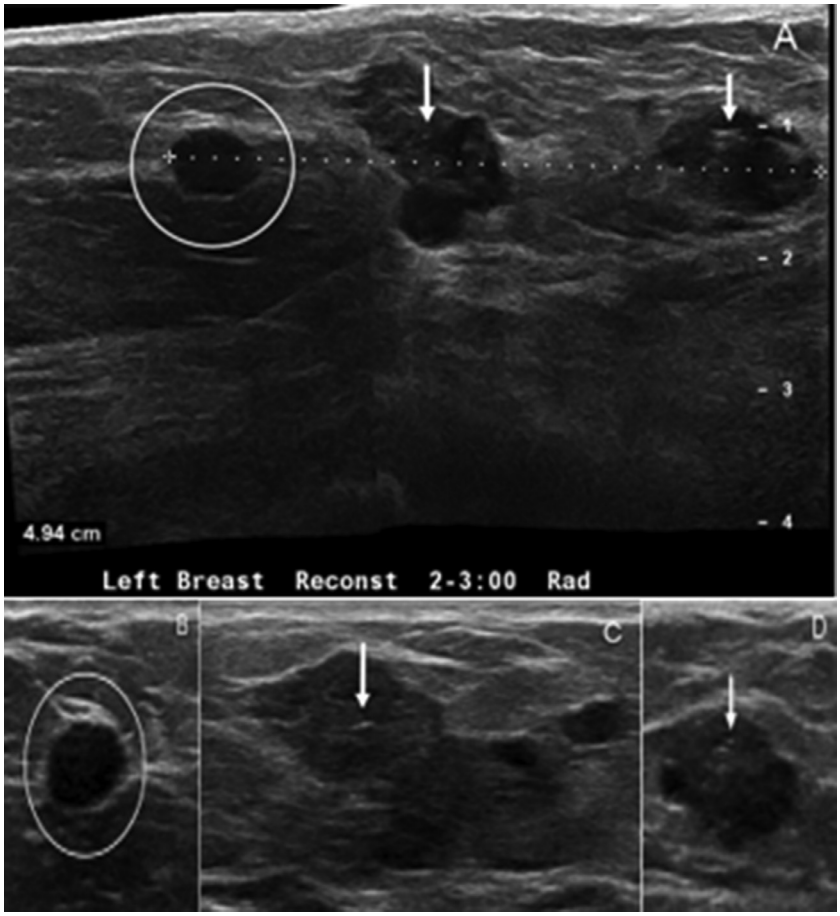

Fig. 2 – Case 1 - Panoramic ultrasound view (A) of the 3 multifocal hypoechoic recurrent cancers span over a 4.9 cm. The smallest round mass (B) without calcifications represents the mass interposed between the larger anterior and posterior masses. In contrast, the larger anterior (C) mass and posterior (D) masses contain internal calcifications (arrows).

performed to exclude chest wall involvement (Fig. 4). Pathology from needle core biopsy was grade 3, invasive ductal carcinoma with high grade DCIS, solid and cribriform types with comedo necrosis (ER+/PR+/HER2−). Dose dense adriamycin was administered followed by segmentectomy with local tissue rearrangement.

Imaging

Case 1: Figs. 1-3 demonstrate the multifocal recurrence across all breast imaging modalities. Mammography with magnification views (Fig. 1) showed 3 high density irregular masses spanning 4.9 cm from anterior to posterior with adjacent surgical clips from flap reconstruction. Ultrasound with biopsy (Fig. 2) was performed next of the most anterior and posterior mass. Ultrasound images showed corresponding 3 hypoechoic solid masses delineating the extent of multifocal recurrent malignancy. MRI images performed after biopsy demonstrate corresponding 3 enhancing masses (Figs. 3A and B) with signal voids corresponding to biopsy clips. All masses were T2 hyperintense (Fig. 3C) due to the presence of mucin. Axial T1 weighted (T1W) image without fat saturation (Fig. 3D) shows the anastomotic junction of the skin and flap and the surgical clip from vascular anastomosis to the internal mammary artery.

Case 2: Figs. 4-5 illustrates the workup of the unifocal recurrence and the pre-mastectomy mammogram. The appearance of a DIEP flap is unique from a transverse rectus abdominis musculocutaneous (TRAM) flap or from a non-reconstructed breast. At the time of recurrence, workup began with ultrasound (Fig. 4A) of the palpable abnormality. Mammograms were only performed to document clip placement (Fig. 4B) and shows the multiple surgical clips and fat composition of the DIEP flap. MRI was performed to exclude chest wall involvement and shows the enhancing recurrent malignancy (Fig. 4C) and the skin and/or flap anastomosis (Fig. 4D). In contrast, initial mammograms before mastectomy (Fig. 5) shows the glandular composition of a normal breast.

Figure 6 shows 2 companion cases to illustrate other differential considerations of a mass encountered in a postsurgical breast. A woman with history of breast cancer treated with mastectomy with reconstruction presented with a pal-

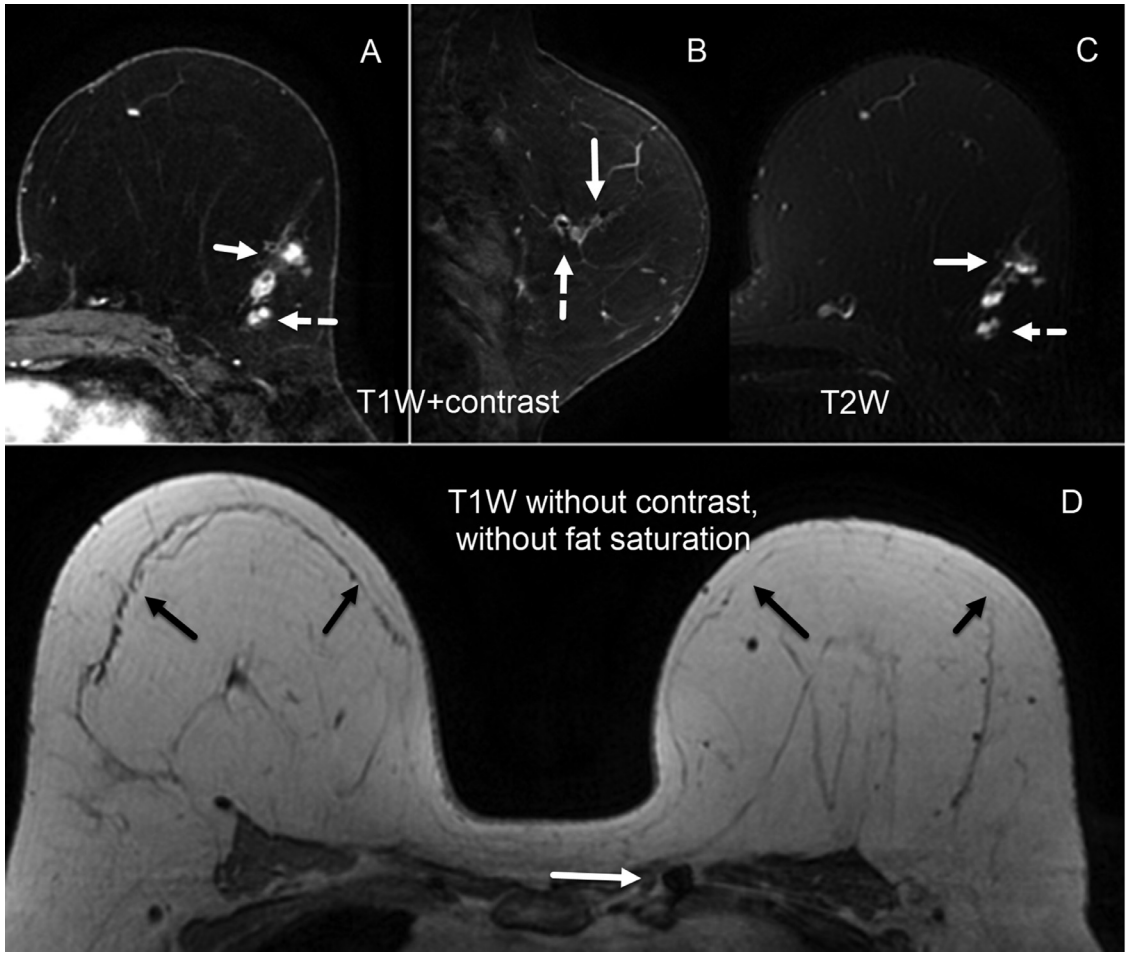

Fig. 3 – Case 1 - Axial gradient echo T1W+contrast MRI (A) shows all 3 recurrent cancers in a line spanning 4.9 cm. The anterior (solid arrow) and posterior (dotted arrow) masses were biopsied to show extent of disease. Sagittal gradient echo T1W+contrast (B) shows the multifocal malignancy in a linear distribution, directed towards the nipple. Axial T2 weighted (T2W) with fat saturation (C) shows the T2 hyperintense signal seen in the mucinous malignancies. Axial T1W without fat saturation (D) at a different level shows the skin/flap anastomosis (black arrows) and one of the surgical clips at the internal mammary artery vascular anastomosis (white arrow).

pable mass which proved to be fat necrosis (Fig. 6A). In yet another case, a palpable mass in a previous area of postsurgical change was differentiated from postsurgical fibrosis and proved to be a recurrence (Fig. 6B).

Discussion

Breast reconstructive flaps are commonly either from the abdomen or flank (latissimus dorsi). The abdominal flap variants include the TRAM and the muscle sparing DIEP flaps. The DIEP flap consists of skin, fat, and the deep inferior epigastric artery without the rectus abdominal muscle.

Even after mastectomy, local recurrence has been observed with an annual incidence of 1% [1]. Possible reasons include residual tumor cells at the mastectomy operative bed, tumor seeding at the time of surgery, or tumor cells in circulation that had already metastasized to the flap even prior to the reconstructive surgery [2]. Overall recurrence rates of 4.2%-11.7% have been reported with most recurrences detected within the first 5 years after surgery [3,4].

Local recurrence risk is dependent on multiple factors related to the original cancer and treatment, that is, tumor size, grade, margin status, and presence of lymphovascular invasion. In cases of breast conserving surgery, adjuvant radiation therapy decreases the local recurrence rate [5]. No differences have been observed in the recurrence rate between patients who have mastectomy alone versus mastectomy with reconstruction [6].

The majority (70%) of recurrences are detected by palpation or pain, changes to the skin, or irregularity of the scar. Recurrences occur commonly at the anastomosis of the autologous flap and residual breast tissue and native skin [2]. Use of screening mammography of the reconstructed breast has been controversial with some authors advocating its use to

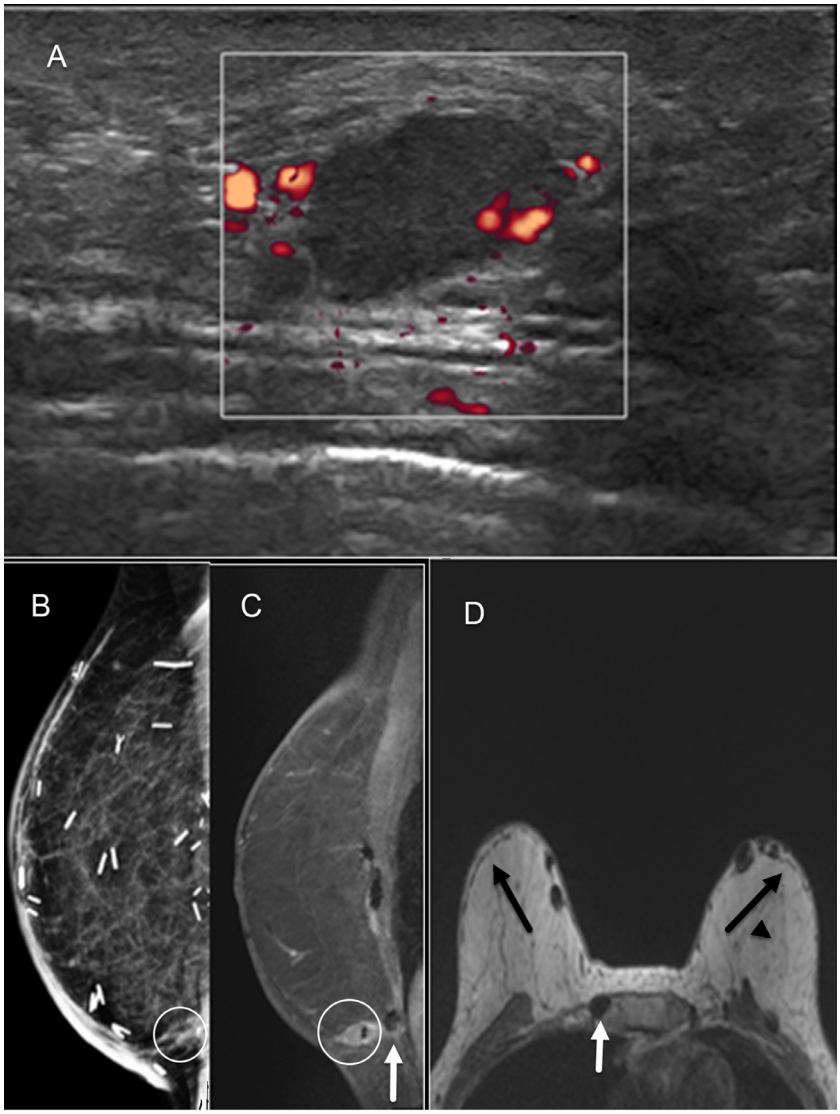

Fig. 4 – Case 2 - A 38-year-old female with past history of right mastectomy with immediate DIEP reconstruction who later developed a recurrence 3 years later. DIEP, deep inferior epigastric perforator.

detect the 30-36% of recurrences that may be clinically occult [7,8,9].

When mammography is performed, the normal DIEP flap reconstructed breast demonstrates abdominal fat only, with no glandular elements. Compared to the TRAM flap, there is no soft tissue density corresponding to the atrophied rectus abdominal muscle. Surgical clips at the internal mammary region indicative of the vascular anastomosis with the internal mammary artery as well as a visible junctional line between the native skin and flap anastomosis may be additional clues to the type of flap reconstruction [10].

A limitation of mammography may be the inability to position and image the recurrence in the mammographic field of view and the nonspecific appearance of benign vs malignant etiologies. Ultrasound with needle biopsy is therefore used in conjunction with mammography or as the initial imaging examination. MRI may be used to exclude chest wall involvement.

Differential considerations for a new mass seen in a reconstructed breast include benign fat necrosis, postsurgical seroma/hematoma, epidermal inclusion cyst or malignant recurrent cancer. Fat necrosis occurs in 6-18% of DIEP flaps [10–12] and is the most commonly encountered breast mass. If characteristic features of benign fat necrosis, seroma or dermal location are encountered, biopsy may be averted. As many as 87% of recurrences have similar imaging features to the primary breast cancer [12]. Because there is a spectrum of benign vs malignant features observed among recurrent cancers, when a new solid mass is encountered on imaging, tissue confirmation with a needle biopsy is often necessary.

Risk factors for recurrence were present in both cases. The first case had lymphovascular invasion at the initial mastectomy specimen and the patient was not completely adherent to antiestrogen therapy. The second case had an elevated Oncotype DX score and therefore neoadjuvant chemotherapy was initiated. The patient was intolerant to side ef-

Fig. 5 – Magnification lateral view mammograms of the same patient at initial presentation of her malignancy 3 years prior. The non-reconstructed breast shows heterogeneously dense breast pattern with normal fibroglandular tissue. Amorphous and punctate calcifications (circle) over a linear distribution were the presenting imaging finding that had yielded her original malignant diagnosis of extensive ductal carcinoma in situ with invasion. Note the difference with the fat compostion of the DIEP reconstruction seen in Figure 4B. DIEP, deep inferior epigastric perforator.

fects and was not able to complete the full recommended chemotherapy regimen. Fortunately, clinical surveillance and self-detected palpable lumps detected both recurrences. In both cases, the recurrence occurred at the location of the initial malignancy but adjacent to surgical clips and had similar presentation and histology as the original breast malignancy.

Magnification exaggerated craniocaudal lateral (A) and medial-lateral (B) mammograms performed after ultrasound guided core biopsy show the ribbon (horizontal solid arrow) and wing (horizontal dotted arrow) shaped clips with internal calcifications in the anterior and posterior masses. There is a surgical clip (vertical arrow) immediately posterior to the recurrences.

Transverse Doppler ultrasound image of the palpable mass/recurrence (A) shows a solid oval mass with internal vascularity. Post biopsy ML mammogram (B) shows the multiple surgical clips at the skin/flap anastomosis and the fat composition of the DIEP flap. The biopsy proven recurrence with clip (circle) is far posterior and difficult to image well on mammography. Sagittal gradient T1W+contrast MRI (C) shows the recurrent cancer as an oval shaped enhancing mass with internal signal void from biopsy clip and another adjacent signal void from the surgical clip (arrow). Axial T1W without fat saturation (D) at a different level shows the skin/flap anastomosis (black arrows) and surgical clip at the internal mammary artery vascular anastomosis (white arrow) and the characteristic fat composition without glandular tissue that is seen in the transposed abdominal fat.

In yet another patient, transverse color Doppler ultrasound (B) over an area of scar demonstrates an irregular shaped mass-like region. Minimal color Doppler flow was present but more importantly, instead of the flat appearance of a postsurgical scar, there was convexity to the hypoechoic mass-like area which was deemed suspicious, despite the presence of an overlying scar. US directed biopsy confirmed recurrence.

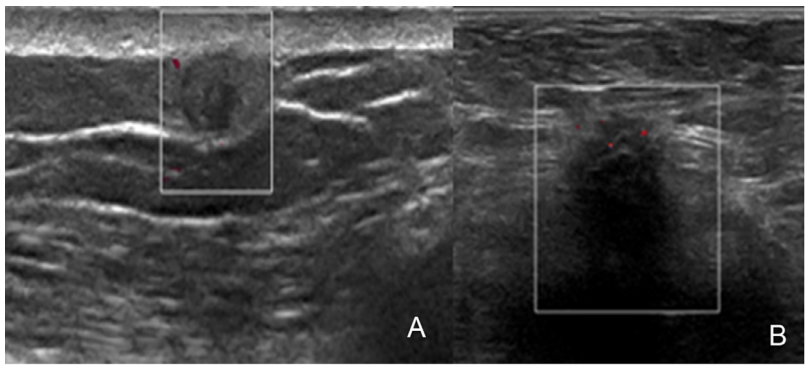

Fig. 6 – Transverse color Doppler ultrasound in a different patient with history of mastectomy with reconstruction (A) shows a palpable round mass of mixed echogenicity, without internal flow, in the subcutaneous fat that represented a biopsy proven fat necrosis. In yet another patient, transverse color Doppler (B) over an area of scar demonstrates an irregular shaped mass-like region. Instead of the flat appearance of a pos-surgical scar, there was convexity to the hypoechoic mass-like area which was deemed suspicious, despite the presence of an overlying scar. US directed biopsy confimed recurrence.

Patient consent statement

The images in this case report are anonymized with patient identifiers excluded from the image files and are not accompanied by text that might identify the individual concerned.

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