Mammographic findings in solid organ transplant patients

Poster No.: C-1074
Congress: ECR 2015
Type: Educational Exhibit
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Keywords: Transplantation, Screening, Mammography, Breast
DOI: 10.1594/ecr2015/C-1074

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Learning objectives

1. To present common, non-malignant mammographic findings in patients who have undergone liver, kidney, or pancreas transplant.

2. To present mammographically-detected malignancies in patients who have undergone liver, kidney, or pancreas transplant.

3. To emphasize that in our experience, post-transplant patients have a higher age-specific incidence of breast cancer than the general U.S. population.
Background

We reviewed imaging of 1257 female patients who have undergone solid organ (liver, kidney, pancreas) transplants, and we identified a number of common non-malignant imaging findings in this patient population. These include cyclosporin-associated fibroadenomas, which have been previously reported multiple times (Weinstein et al., Radiology 2001; Rolles and Calne, Lancet 1980; Baildam Br J Surg 1996). Additional nonmalignant imaging findings we identified in post-transplant patients include diffuse edema/mastitis, suboptimal positioning and visualization due to central lines/ports, and chest wall varicosities. These findings often relate to underlying disease processes and may complicate mammographic interpretation.

Malignancy is a known long-term complication following organ transplant, the most common being lymphoma and cutaneous neoplasms. There is ongoing debate regarding whether patients who have undergone organ transplant carry a higher risk for de novo breast malignancy. There have been conflicting reports regarding the incidence of breast cancer in post-transplant patients when compared to the incidence in the general U.S. population as reported by the National Cancer Institute’s Surveillance, Epidemiology and End Results data.

Two reports (Haagsma et al., J. Hepatol 2001; Jonas et al., Cancer 1997) reported an increased incidence when compared to age-specific incidence rates. These two reported a total of 4 cancers out of 297 female transplant patients, an incidence of 1.34%, compared to the expected age-specific incidence rate of 0.25%.

A more recent report (Oruc et al., Liver Transpl 2004) of a larger number of liver transplant patients reports comparable rates of breast cancer in post-transplant patients compared to the general U.S. population. This report identified 7 breast cancers out of 1337 female liver transplant patients, a 0.52% incidence rate, which was not a statistically significant difference.

In our experience at the Mayo Clinic, we reviewed 1257 female patients who had undergone solid organ (renal, pancreas, liver) transplant. We identified 27 patients (mean age 57.9 years) who developed invasive or in situ breast cancer, for an incidence of 2.1%. This is higher than the age-matched incidence of invasive and in situ breast cancer in the general U.S. population for ages 55-59, which is 0.34%.

The purpose of this exhibit is to present common non-malignant as well as malignant imaging findings in post-transplant patients.
Findings and procedure details

Non-malignant imaging findings in post-transplant patients

Cyclosporin-associated fibroadenoma

- 36 year old woman with renal transplant in 1991 for crescentic necrotizing glomerulonephritis. Treated with cyclosporin, prednisone, and Imuran. History of left breast biopsies in 1992 and 1996 revealing fibroadenomas. Presented in 1997 with significant increase in size of 2 right breast masses. Subsequently had excision of two left breast masses and two right breast masses, all revealing fibroadenomas (Fig. 1 on page 6, Fig. 2 on page 6). Since stopping cyclosporin in 2000, several right breast fibroadenomas have decreased in size.

Diffuse Edema/Mastitis

- Diffuse breast edema in two different patients following renal transplant. Etiology in both cases is likely due to decreased donor renal function and fluid overload. (Fig. 3 on page 7, Fig. 4 on page 8).

Central Lines and Ports

- Transplant patients commonly require central lines and ports for dialysis and medication administration. Because of their location in the chest wall, these often result in suboptimal patient positioning and visualization of at least some of the breast tissue on mammogram. (Fig. 5 on page 9, Fig. 6 on page 10).

Chest Wall Varicosities

- Transplant patients commonly require long-term and/or multiple central lines. This increases the risk for central venous occlusion, as was documented in this renal transplant patient, with resultant varicosity seen on mammogram (Fig. 7 on page 11). Chest wall varicosities may also be seen in renal transplant patients with upper extremity arterio-venous dialysis fistulas. Outflow obstruction from the fistula, as was documented in this patient, may result in chest wall varicosities as well as diffuse interstitial edema (Fig. 8 on page 12).

Malignant imaging findings in post-transplant patients
In our review of post-transplant patients, we found that the majority of breast cancers are found at screening mammogram as either screen-detected calcifications or asymmetries/masses, however some also presented as palpable areas of concern. Representative cases are below:

- A 57 year old female who presented 28 months following kidney transplant, with screening mammogram-detected calcifications. Magnification views demonstrated amorphous and heterogeneous calcifications extending over 4.5 cm in a radial orientation in the lateral left breast (Fig. 9 on page 13, Fig. 10 on page 14). Pathology revealed ductal carcinoma in situ, ER/PR+

- A 64 year old female who presented 46 months following kidney transplant with a screen-detected focal asymmetry. Magnification views demonstrate a 7 mm irregular mass in the upper left breast middle depth (Fig. 11 on page 15). Targeted ultrasound demonstrates an irregular hypoechoic mass at the 12 o'clock position (Fig. 12 on page 16) which corresponded with the mammographic finding. Pathology revealed invasive ductal carcinoma, Grade I/III, ER/PR+. Lymph nodes were negative at surgery.

- A 36 year old female who presented 254 months following renal transplant with a palpable area of concern in the right breast. Mammogram revealed a focal asymmetry in the upper outer right breast (Fig. 13 on page 17). Targeted ultrasound of the right breast at the 10 o'clock position demonstrated a 1.6 cm irregular hypoechoic mass which corresponded to the mammographic finding and the palpable area of concern (Fig. 14 on page 18). Pathology revealed invasive ductal carcinoma Grade III/III, ER/PR-, Her2-. Lymph nodes were negative at surgery.
Images for this section:

Fig. 1: Left MLO view demonstrates the biopsy-proven fibroadenomas in the mid and upper left breast, posterior depth.

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Fig. 2: Representative ultrasound image of one of the known fibroadenomas in the left breast demonstrates a lobulated, hypoechoic solid mass at the 10 o’clock position.

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Fig. 3: Right MLO view demonstrates marked diffuse interstitial edema and skin thickening/edema.

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**Fig. 4:** Right MLO view demonstrates marked diffuse interstitial edema and skin thickening/edema.

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**Fig. 5:** Right MLO view demonstrates suboptimal positioning with central line obscuring a portion of the upper breast on this view. Also note the marked diffuse interstitial thickening and marked skin thickening/edema in this renal transplant patient.

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Fig. 6: Left MLO view demonstrates a port in the left chest wall, making optimal patient positioning and adequate breast compression difficult to achieve.

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Fig. 7: Right MLO view demonstrates a prominent chest wall varicosity in this renal transplant patient with history of multiple central lines and known central venous occlusion.
Fig. 8: Left MLO view demonstrates varicosity in the upper left breast in this renal transplant patient with upper extremity arterio-venous dialysis fistula outflow obstruction. Also note the diffuse interstitial thickening and skin thickening/edema.

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**Fig. 9:** Magnification CC view of the lateral left breast demonstrates amorphous and heterogeneous calcifications extending over 4.5 cm in a radial orientation in the lateral left breast posterior depth.

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Fig. 10: Magnification ML view of the left breast demonstrates amorphous and heterogeneous calcifications extending over 4.5 cm in a radial orientation in the left breast posterior depth.

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**Fig. 11:** Magnification ML views of the left breast demonstrate a 7 mm irregular mass in the upper left breast middle depth.

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Fig. 12: Targeted ultrasound of the left breast demonstrates a 6 mm irregular hypoechoic mass at the 12 o'clock position 3 cm from the nipple.

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**Fig. 13:** Right MLO view demonstrates a focal asymmetry in the upper right breast, underlying a palpable marker.

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Fig. 14: Targeted ultrasound of the right breast at the 10 o'clock position demonstrates an irregular hypoechoic mass measuring 1.6 cm which corresponds to the mammographic findings and palpable area of concern.

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Conclusion

Post-transplant patients demonstrate several common non-malignant mammographic findings which relate to their medications and underlying disease processes. These include cyclosporin-associated fibroadenomas, diffuse edema, suboptimal positioning due to central lines/ports, and chest wall varicosities. In our experience, post-transplant patients have a higher age-specific incidence of breast cancer compared to the general U.S. population.
References


