Appearance of fat necrosis on contrast-enhanced spectral mammography

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DESCRIPTION

Fat necrosis (FN) occurs when there is ischaemia to breast tissue because of trauma, surgery, radiotherapy or a combination of these. It can be asymptomatic or present as a mass lesion that can be misdiagnosed as malignancy or as early recurrence in a patient treated for breast cancer. Blood and tissue lipase that is released during tissue injury causes an aseptic inflammatory process characterised histologically by fat-filled macrophages and foreign body giant cells. The incidence of FN is higher in patients who require complex breast conserving procedures or volume displacing techniques. The therapeutic reduction mammoplasty has been adopted as a breast conserving technique in breast cancer patients with macromastia. The breast changes that can occur can create both clinical and imaging challenges, as they can mimic the findings of breast cancer recurrence.

Contrast-enhanced spectral mammography (CESM) uses dual energy for mammographic acquisition with intravenous iodine contrast agent administration. It provides higher sensitivity and specificity compared with 2D mammography in detecting breast cancer particularly in the heterogeneous or dense breasts. A recent meta-analysis showed that the CESM has a high diagnostic sensitivity for breast cancer, equal to that of MRI.5 There have been multiple publications describing the appearances of FN on standard mammography, ultrasound, MRI and even positron emission tomography. A review of medical databases has revealed no publications describing the appearance of FN on CESM.

Presented here are two patients who underwent CESM at a national breast cancer service. Patient 1 (figure 1) is a woman in her 50s who presented with a right breast mass 4 months post bilateral reduction mammoplasty performed in conjunction with a wide local excision of a left breast lump. Figure 1 is a bilateral CESM that was performed 2 minutes following intravenous injection of 1.5 mL/kg of iodinated contrast (350 mg iodine/mL) at 3 mL/s. The low energy (LE) images (figure 1A,C) showed a circumscribed area of heterogeneous fibroglandular and fat density at the site of the palpable lump. Enhancement of the thin rim and internal septa was visible on the dual energy subtracted (DES) images (figure 1B,D). Core biopsy demonstrated areas of FN, and mild chronic inflammation with no evidence of malignancy.

Patient 2 (figure 2) is an asymptomatic woman in her 70s who presented for work-up of a 6 mm area of localised increased stroma in the right breast at 3 o’clock detected on mammographic screening. The patient was otherwise well and had no personal or family history of breast cancer, trauma or breast surgery. The LE image in figure 2 shows a 7.5 mm focal asymmetry (arrow) which demonstrates homogenous internal enhancement on the DES image. Core biopsy histology confirmed FN with no evidence of malignancy.

CESM is an inexpensive, accessible, accurate, well-tolerated tool and is being increasingly used in the investigation of breast cancer. It is important to begin to catalogue the spectrum of appearances of FN on CESM to reduce over investigation and patient and physician anxiety.

Figure 1 Contrast-enhanced spectral mammography of the right breast in patient 1. Low energy (LE) and dual energy subtracted (DES) views in the mediolateral oblique (A,B) and craniocaudal projections (C,D). In the retroareolar region there is a circumscribed area of low density (solid arrows) on the LE views, traversed by thin curvilinear strands (likely residual Cooper’s ligaments). The DES images show the presence of a thin enhancing rim, and there is enhancement of some of the internal strands (arrows). An apparent ill-defined band of non-mass enhancement is also noted projected over the mass, particularly on the oblique view (double line arrow). This is thought to be real rather than artefactual, as it correlates with the site of increased tracer uptake on the fluorodeoxyglucose-positron emission tomography scan. A postbiopsy marker clip (dotted arrow) is noted at the edge of the lesion.

Figure 2 Low energy and dual energy subtracted (DES) mediolateral oblique (A,B) and craniocaudal (C,D) views of the right breast in patient 2. There is a small ill-defined mass containing a few foci of calcification seen medially at 9 o’clock (arrows). Moderately intense, heterogeneous internal enhancement is noted on the DES images (arrows).

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Fat necrosis (FN) is a common entity with a spectrum of appearances on imaging that can mimic malignancy in the screening and surveillance setting.

- The typical appearance of FN on contrast-enhanced spectral mammography (CESM) is similar to MRI, reflecting presence of liquefied fat and inflammatory change.
- As with other imaging modalities, the appearances of FN on CESM are likely to vary and are yet to be fully documented. Clinicians should be aware of this, given the rapidly increasing use of this modality in everyday breast assessment.

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Case reports provide a valuable learning resource for the scientific community and can indicate areas of interest for future research. They should not be used in isolation to guide treatment choices or public health policy.

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