

A Hospital Based Prospective Clinicopathological Assessment of Mammographic and Sonographic Features of Fat Necrosis of the Breast

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Conflict of interest: Nil

Abstract

Aim: The aim of the present study was to analyze the importance of mammography and sonography in fat necrosis.

Methods: A prospective clinicopathological study was conducted on 50 female patients of different age groups from 30 to 60 years. Patients' information is collected from at Department of Radiology, Icare Institute of Medical Science and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India for one year.

Results: Fifty lesions were identified on mammograms. The predominant mammographic features of the 50 lesions apparent on mammograms were as follows, 13 (26%) radiolucent oil cyst (either with or without curvilinear mural calcification), 6 (12%) round opacity, 8 (16%) asymmetrical opacity or heterogeneity of the subcutaneous tissues 13 (26%) dystrophic calcifications 2 (4%) clustered pleomorphic microcalcifications and 2 (4%) suspicious speculated mass. Fifty lesions were identified at sonography. The predominant US features of the 50 lesions apparent on sonograms were as follows 7 (14%) solid-appearing masses, 8 (16%) anechoic masses with posterior acoustic enhancement (cyst), 8 (16%) anechoic masses with posterior acoustic shadowing (cyst with mural calcification), 5 (10%) cystic masses with internal echoes 2 (4%) cystic masses with mural nodule and 13 (26%) increased echogenicity of the subcutaneous tissues (small cysts inside this area±). In five patients with 7 (14%) masses, no discrete lesion could be identified on sonograms.

Conclusion: In conclusion, there is a wide range of mammographic and ultrasonographic patterns of fat necrosis.

Keywords: Breast Cancer, Screening, Benign, Tumors.

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Introduction:

Fat necrosis is a benign non-suppurative inflammatory process of adipose tissue. It is important to diagnose fat necrosis because it can often mimic carcinoma of the breast. Fat necrosis in the breast is a common pathologic condition with a wide variety of presentations on mammography, ultrasound, and MRI. The incidence of fat

necrosis of the breast is estimated to be 0.6% in the breast, representing 2.75% of all breast lesions. Fat necrosis is found to be 0.8% of breast tumors and 1% in breast reduction mammoplasty cases. The average age of patients is 50 years. [1]

Breast cancer is one of the most common causes of death among women. Fat

necrosis is a form of cancer that develops slowly and does not spread. Fat necrosis is a condition that is caused when fat cells die. Fat necrosis can occur in any area of the body but is most common in the legs, arms, and buttocks. Fat necrosis can lead to pain and swelling and can be difficult to treat. Fat necrosis is a rare but serious complication of obesity that can lead to the development of life-threatening conditions such as gangrene. [2,3]

The presentation can vary from being clinically occult to a hard lump with skin changes highly suspicious for malignancy. A history of accidental trauma raises the suspicion of fat necrosis in a breast lump. The other common predisposing causes include surgery and radiation. [4] The possibility of malignancy should not be overlooked in these cases. The absence of history of trauma does not exclude fat necrosis. [5]

Those which do not resolve, progress to cystic degeneration within weeks to months and are seen as oil-containing cavities on gross pathology. If large, the corresponding imaging findings at this stage would include oil cyst on mammogram, and if small, these would be anechoic areas within the hyper-reflective area on USG. Calcification and fibrotic reaction occur late over months or years and imaging appearances at this stage can mimic malignancy unless the characteristic benign lucent-centered or coarse rim calcifications are seen. Mammography is the most important diagnostic tool in early fat necrosis. [4] However, a normal mammogram does not always exclude underlying pathology and the same holds true for fat necrosis. [6]

USG plays an important role in ruling out malignancy and suggesting fat necrosis as the diagnosis. The USG examination is abnormal in almost all the cases including those cases with normal mammogram. [7] Hyper echogenicity in the subcutaneous tissue which is a reliable predictor of

benignity, is the most common presentation of fat necrosis on USG and often seen in all cases with history of trauma. [5] In the anterior superficial plane of the breast, there is subcutaneous fat with connective tissue, but in the deeper parenchymal layer, fat is interspersed in between the fibroglandular tissue. [8] Hence, one needs to be cautious about hyperechoic nodule in the deeper tissue planes, and findings like "taller-than-wide" morphology, irregular shape, posterior acoustic shadowing need to be given due importance when considering the nature of the lesion. [9]

The aim of the present study was to analyze the importance of mammography and sonography in fat necrosis.

Materials and Methods

A prospective clinicopathological study was conducted on 50 female patients of different age groups from 30 to 60 years. Patients' information is collected from at Department of Radiology, Icare Institute of Medical Science and Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India for one year.

Data has been collected for a one-year period from the imaging laboratory of the mentioned institutes to get real-time clinical information regarding patient condition. Relevant mammographic data were obtained from hospitals' imaging process that includes microscopic view as well. Medical Screening techniques such as mammography and sonography were used to obtain valid clinical insights.

Results

All the 50 patients were women, who ranged in age from 37 to 68 (mean, 46.4 years). 30 patients (60%) had a known history of trauma related to the region of abnormality. Trauma was due to surgery, motor vehicle injury, kick or pinching. 32 patients (64%) had one or more palpable masses. In four patients, the palpable mass was strongly suggesting malignancy.

Table 1: Mammographic features of lesions

Radiolucent oil cyst (mural calcification \pm)	13 (26%)
Round opacity	6 (12%)
Asymmetrical opacity-heterogeneity of subcutaneous tissues	8 (16%)
Calcification — dystrophic	13 (26%)
— clustered pleomorphic type	2 (4%)
Suspicious speculated mass	2 (4%)
Negative	6 (12%)

Fifty lesions were identified on mammograms. The predominant mammographic features of the 50 lesions apparent on mammograms were as follows, 13 (26%) radiolucent oil cyst (either with or without curvilinear mural

calcification), 6 (12%) round opacity, 8 (16%) asymmetrical opacity or heterogeneity of the subcutaneous tissues 13 (26%) dystrophic calcifications 2 (4%) clustered pleomorphic microcalcifications and 2 (4%) suspicious speculated mass.

Table 2: Sonographic features of lesions

Solid	7 (14%)
Anechoic with posterior acoustic enhancement	8 (16%)
Anechoic with posterior acoustic shadowing	8 (16%)
Complex with internal echoes	5 (10%)
Complex with mural nodule	2 (4%)
Increased echogenicity of subcutaneous tissues	13 (26%)
Negative	7 (14%)

Fifty lesions were identified at sonography. The predominant US features of the 50 lesions apparent on sonograms were as follows 7 (14%) solid appearing masses, 8 (16%) anechoic masses with posterior acoustic enhancement (cyst), 8 (16%) anechoic masses with posterior acoustic shadowing (cyst with mural calcification), 5 (10%) cystic masses with internal echoes 2 (4%) cystic masses with mural nodule and 13 (26%) increased echogenicity of the subcutaneous tissues (small cysts inside this area \pm). In five patients with 7 (14%) masses, no discrete lesion could be identified on sonograms.

Discussion

The typical clinical presentation of fat necrosis can range from an incidental benign finding to a lump. However, in around half of the cases patients do not report any injury to the breast and are clinically occult. Following injury to breast tissue, hemorrhage in the fat leads to induration and firmness, which

demarcates and may result in a cavity caused by cystic degeneration. The clinical features of fat necrosis vary from indolent single or multiple smooth round nodules to clinically worrisome fixed, irregular masses with overlying skin retraction. [10-14] Other clinical features associated with fat necrosis include ecchymosis, erythema, inflammation, pain, skin retraction or thickening, nipple retraction, and occasionally lymphadenopathy. [1,10]

Fat necrosis is a process which results from aseptic saponification of fat by means of blood and tissue lipase. [15] Fat necrosis of the breast is important because it is often confused with carcinoma, both clinically and radiologically. The clinical findings vary from non-palpable masses to mobile or fixed hard masses mimicking carcinoma. [7,16] Pathologically, fat necrosis is a sterile, inflammatory process that varies in appearance depending on the stage of the lesion. Foreign body giant cells, fat-filled macrophages, and

interstitial infiltration by plasma cells are consistently present. Saponification of fat leads to the formation of vacuoles that then become surrounded by macrophages. Healing by fibrosis begins at the periphery and eventually may replace the entire area or leave a persistent cystic cavity. [16]

The spectrum of mammographic findings of fat necrosis include lipid filled cysts with or without calcified walls, round water density opacities, dystrophic or clustered pleomorphic calcifications and speculated densities indistinguishable from carcinoma. Although the mammographic spectrum of fat necrosis has been well documented, to our knowledge, the evolution in mammographic appearance has not been previously reported in large series. [16-20]

There are two forms of fat necrosis, depending on the reaction of the surrounding breast, and they differ clinically, mammographically and ultrasonographically. When the fat necrosis stimulates a fibrotic response, it presents as a firm mass that is fixed to the surrounding tissues. The other type forms an oil cyst due to release of free lipid without eliciting a surrounding reaction. [21,22]

In literature, the monographic appearance of most oil cysts are described as hypoechoic masses with smooth walls and have neither posterior acoustic enhancement or shadowing. [23,24] In contrast to these studies, in 19 of the 34 oil cysts diagnosed in the study, US showed either posterior acoustic enhancement or shadowing. The oil cyst which showed posterior acoustic shadowing corresponded to round radiolucent lesions with curvilinear wall calcification on mammography. Soo et al. [7], in their recent study on the US features of fat necrosis on 23 patients, have reported an echogenic-band pattern as a new and specific sonographic indicator of fat necrosis. [25] This was defined as an

echogenic band that shifted in orientation with changes in patient position. Although this finding may be caused by the interface between the more pure oil fat and the serosanguineous fluid components of the lesion, is very reasonable. The most common mammographic findings in our series were dystrophic calcifications, followed by radiolucent oil cysts. On US examination however, the most common finding was increased echogenicity of subcutaneous fat tissues (with or without small cysts). In these patients with palpable masses, history of trauma was also present. In our study with the follow-up patients, we have seen that, in the setting of trauma, the sonographic depiction of increased echogenicity of subcutaneous fat tissues, which probably represents the sterile inflammatory process that defines fat necrosis histopathologically, is strongly suggestive of fat necrosis.

Conclusion

In conclusion, there is a wide range of mammographic and ultrasonographic patterns of fat necrosis. Knowledge of the appearance and evolution of these patterns and a careful investigation of history of the patient may enable imaging follow-up of these lesions rather than unnecessary biopsies.

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