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Original Research Article

Importance of Mammography and Sonography in Fat Necrosis: Clinicopathological Study

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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 40 female patients of different age groups from 30 to 60 years. Patients' information is collected from at Department of Radiology for one year.

Results: Forty lesions were identified on mammograms. The predominant mammographic features of the 40 lesions apparent on mammograms were as follows, 10 (25%) radiolucent oil cyst (either with or without curvilinear mural calcification), 4 (10%) round opacity, 6 (15%) asymmetrical opacity or heterogenicity of the subcutaneous tissues 10 (25%) dystrophic calcifications, 2 (8%) clustered pleomorphic microcalcifications and 2 (8%) suspicious speculated mass. Forty lesions were identified at sonography. The predominant US features of the 40 lesions apparent on sonograms were as follows 5 (12.5%) solid appearing masses, 6 (15%) anechoic masses with posterior acoustic enhancement (cyst), 6 (15%) anechoic masses with posterior acoustic shadowing (cyst with mural calcification), 4 (10%) cystic masses with internal echoes 2 (5%) cystic masses with mural nodule and 10 (25%) increased echogenicity of the subcutaneous tissues (small cysts inside this area±). In 7 (17.5%) 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.

Introduction

A wide range of clinical and radiologic appearances can be seen in fat necrosis, which can be the result of surgical or noniatrogenic trauma. These appearances range from those of a benign oil cyst to those of a mass that is speculated to mimic carcinoma. Fat necrosis is recognized as a sterile inflammatory process by histological examination. This process is characterized by fat-filled macrophages and foreign body giant cells that are surrounded by interstitial infiltration of plasma cells. [1]

It is a rare but serious complication of obesity that can lead to the development of life-threatening conditions such as gangrene. Fat necrosis is a medical condition that can be caused by obesity. [2,3] Both clinically occult and a hard lump with skin changes that are highly suspicious for malignancy are possible manifestations of the condition. The presence of fat necrosis in a breast lump is a candidate for investigation if there is a history of accidental trauma. Surgical procedures and radiation exposure are two additional sources of predisposing factors. [4] In situations like these, it is imperative that the possibility of cancer not be lost sight of. The lack of a history of trauma does not rule out the possibility of fat necrosis from occurring. [5] Early on in the development of many oil cysts, calcifications that are linear and curvilinear begin to form, whereas core calcifications occur much later. Calculations are a common occurrence in patients who have fat necrosis, and they are sometimes the only mammographic result that is observed. [6] The degree of fibrosis can be used to determine the various sonographic characteristics of fat necrosis.

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 40 female patients of different age groups from 30 to 60 years. Patients' information is collected from at Department of Radiology, Shree Narayan Medical Institute & Hospital ,Saharsa, Bihar, 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 ±)	10 (25%)
Round opacity	4 (10%)
Asymmetrical opacity-heterogenicity of subcutaneous tissues	6 (15%)
Calcification — dystrophic	10 (25%)
— clustered pleomorphic type	2 (5%)
Suspicious speculated mass	2 (5%)
Negative	6 (15%)

Forty lesions were identified on mammograms. The predominant mammographic features of the 40 lesions apparent on mammograms were as follows, 10 (25%) radiolucent oil cyst (either with or without curvilinear mural calcification), 4 (10%) round opacity, 6 (15%) asymmetrical opacity or heterogenicity of the subcutaneous tissues 10 (25%) dystrophic calcifications, 2 (5%) clustered pleomorphic microcalcifications and 2 (5%) suspicious speculated mass.

Table 2: Sonographic features of lesions

Solid	5 (12.5%)
Anechoic with posterior acoustic enhancement	6 (15%)
Anechoic with posterior acoustic shadowing	6 (15%)
Complex with internal echoes	4 (10%)
Complex with mural nodule	2 (5%)
Increased echogenicity of subcutaneous tissues	10 (25%)
Negative	7 (17.5%)

Forty lesions were identified at sonography. The predominant US features of the 40 lesions apparent on sonograms were as follows 5 (12.5%) solid appearing masses, 6 (15%) anechoic masses with posterior acoustic enhancement (cyst), 6 (15%) anechoic masses with posterior acoustic shadowing (cyst with mural calcification), 4 (10%) cystic masses with internal echoes 2 (5%) cystic masses with mural nodule and 10 (25%) increased echogenicity of the subcutaneous tissues (small cysts inside this area±). In 7 (17.5%) masses, no discrete lesion could be identified on sonograms.

Discussion

A lump or an accidental benign discovery are the most common clinical manifestations of fat necrosis. Nevertheless, individuals are clinically occult and fail to disclose any breast damage in around 50% of instances. After a breast injury, fat bleeds cause firmness and induration, which marks the area and can eventually lead to a cystic degeneration cavity. Fat necrosis may manifest as a harmless cluster of small, spherical nodules or as a more concerning mass with retracted skin that is both fixed and uneven in shape. [7-11] Fat necrosis is accompanied by a number of other symptoms, such as redness, swelling, pain, pulling or thickening of the skin, nipple retraction, and, in rare cases, lymphadenopathy. [7]

Aseptic saponification of adipose tissue by means of tissue lipase and blood leads to fat necrosis. [12] Breast fat necrosis is significant because, on both the clinical and radiological levels, it is frequently mistaken for carcinoma. There is a wide range of possible clinical manifestations, from inoperable tumors to hard, movable, or fixed masses that resemble cancer. [13] Fat necrosis is an inflamed, sterile process that can look different at different stages of a lesion. There is a constant presence of fat-filled macrophages, interstitial infiltration by

plasma cells, and foreign body giant cells. When fat is saponified, it creates vacuoles, which are subsequently encircled by macrophages. With time, fibrosis-based healing may either completely resurface the affected region or leave behind a cystic cavity that is easier to work with. [13]

Lipidomic cysts with or without calcified walls, spherical water density opacities, dystrophic or clustered pleomorphic calcifications, and speculated densities indistinguishable from carcinoma are all possible mammographic findings of fat necrosis. Despite extensive documentation of fat necrosis's mammographic spectrum, no large-scale reports of the progression of mammographic appearance have been found to our knowledge. [13-17]

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 second kind releases free lipids, which cause an oil cyst to form, but it doesn't trigger any reaction in the surrounding area. [18,19] Mammograms revealed forty lesions. Of the forty lesions seen on mammograms, the most notable ones were these: 10 (25%) radiolucent oil cyst (either with or without curvilinear mural calcification), 4 (10%) round opacity, 6 (15%) asymmetrical opacity or heterogenicity of the subcutaneous tissues 10 (25%) dystrophic calcifications, 2 (8%) clustered pleomorphic microcalcifications and 2 (8%) suspicious speculated mass. Forty lesions were identified at sonography. The predominant US features of the 40 lesions apparent on sonograms were as follows 5 (12.5%) solid appearing masses, 6 (15%) anechoic masses with posterior acoustic enhancement (cyst), 6 (15%) anechoic masses with posterior acoustic shadowing (cyst with mural calcification), 4 (10%) cystic masses with internal echoes 2 (5%) cystic masses with mural nodule and 10 (25%) increased echogenicity of the subcutaneous tissues (small cysts inside this area±). In 7 (17.5%) masses, no discrete lesion could be identified on sonograms.

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. [20,21] 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. The most common mammographic findings in our series were dystrophic calcifications, followed by radiolucent oil cysts. On US examination however, the most prevalent result was increased echogenicity of subcutaneous fat tissues (with or without tiny cysts). In these individuals with palpable tumors, history of trauma was also prevalent. 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

Finally, fat necrosis may show up in a variety of ways on mammograms and ultrasounds. Instead of doing needless biopsies, imaging follow-up of these lesions might be possible with knowledge of how these patterns look and how they've changed over time, as well as a thorough examination of the patient's history.

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