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A prospective observational study analyzing the importance of mammography and sonography in fat necrosis

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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 cysts (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

Fat necrosis, which may be the result of surgical or non iatrogenic trauma has a wide spectrum of clinical and radiologic appearance, varying from that of a benign oil cyst to that of a speculated mass mimicking carcinoma. Histologically, fat necrosis is recognised as a sterile inflammatory process with fat-filled macrophages and foreign body giant cells surrounded by interstitial infiltration of plasma cells [1].

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 of 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 a history of trauma does not exclude fat necrosis [5]. Linear and curvilinear calcifications form early in the growth of many oil cysts, while core calcifications are visible later. Patients with fat necrosis typically experience calcifications, which can occasionally be the only mammographic result [6]. The different sonographic characteristics of fat necrosis reflect the level of fibrosis.

In addition to that, Sonography is useful in distinguishing fat necrosis from other types of necrosis. Sonography can also help to identify the extent and severity of fat necrosis. Although the fibrous edge of the cyst could calcify or collapse and may result in a morphology that is mammographically equivocal and requires a biopsy to rule out malignancy, lipid cysts are symptomatic of benign fat necrosis [7]. Oil cysts, localized asymmetries, coarse calcifications, microcalcifications, or spiculated masses are frequent findings of fat necrosis in mammography [8].

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 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 cysts (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

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 [9-13]. Other clinical features associated with fat necrosis include ecchymosis, erythema, inflammation, pain, skin retraction or thickening, nipple retraction, and occasionally lymphadenopathy [9].

Fat necrosis is a process which results from aseptic saponification of fat by means of blood and tissue lipase [14]. 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 [15]. 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 [15].

The spectrum of mammographic findings of fat necrosis includes 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 [15-19].

There are two forms of fat necrosis, depending on the reaction of the surrounding breast, and they differ clinically, mammographically and ultrasonographically. When 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 lipids without eliciting a surrounding reaction [20, 21]. Forty lesions were identified on mammograms. The predominant mammographic features of the 40 lesions apparent on mammograms were as follows, 10 (25%) radiolucent oil cysts (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 is described as hypoechoic masses with smooth walls and have neither posterior acoustic enhancement nor shadowing [22, 23]. In contrast to these studies, in 19 of the 34 oil cysts diagnosed in the study, the 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 common finding was increased echogenicity of subcutaneous fat tissues (with or without small cysts). In these patients with palpable masses, a 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 the history of the patient may enable imaging follow-up of these lesions rather than unnecessary biopsies.

References

1. Youssefzadeh S, Wolf G, Imhof H. MR findings of a breast oil cyst containing a fat-fluid level: a case report. Acta Radiologica. 1994 Sep;35(5):492-4.
2. Kerridge WD, Kryvenko ON, Thompson A, Shah BA. Fat necrosis of the breast: a pictorial review of the mammographic, ultrasound, CT, and MRI findings with histopathologic correlation. Radiology research and practice. 2015 Mar 16;2015.
3. Chopan M, White JA, Sayadi LR, Buchanan PJ, Katz AJ. Autogenous fat grafting to the breast and gluteal regions: safety profile including risks and complications. Plastic and Reconstructive Surgery. 2019 Jun 1;143(6):1625-32.
4. Taboada JL, Stephens TW, Krishnamurthy S, Brandt KR, Whitman GJ. The many faces of fat necrosis in the breast. AJR Am J Roentgenol. 2009 Mar 1;192(3):815-25.
5. Bilgen IG, Ustun EE, Memis A. Fat necrosis of the breast: clinical, mammographic and sonographic features. European Journal of Radiology. 2001 Aug 1;39(2):92-9.
6. Stefanko NS, Drolet BA. Subcutaneous fat necrosis of the newborn and associated hypercalcemia: A systematic review of the literature. Pediatric Dermatology. 2019 Jan;36(1):24-30.
7. Hanson SE, Kapur SK, Garvey PB, Hernandez M, Clemens MW, Hwang RF, *et al*. Oncologic safety and surveillance of autologous fat grafting following breast conservation therapy. Plastic and reconstructive surgery. 2020 Apr 30;146(2):215-25.
8. Garibotto NL, Chan JK, Taylor D. Appearance of fat necrosis on contrast-enhanced spectral mammography. BMJ Case Reports. 2022 Mar 1;15(3).
9. Haagensen CD. Diseases of the female breast, Transactions of the New England Obstetrical and Gynecological Society. 1956;10:141-156.
10. Hogge JP, Robinson RE, Magnant CM, Zuurbier RA. The mammographic spectrum of fat necrosis of the breast. Radiographics. 1995 Nov;15(6):1347-56.
11. Lee BJ, Adair F. Traumatic fat necrosis of the female breast and its differentiation from carcinoma. Annals of Surgery. 1920 Aug;72(2):188.
12. Pullyblank AM, Davies JD, Basten J, Rayter Z. Fat necrosis of the female breast-Hadfield re-visited. The Breast. 2001 Oct 1;10(5):388-91.
13. Adair FE, Munzer JT. Fat necrosis of the female breast: report of one hundred ten cases. The American Journal of Surgery. 1947 Aug 1;74(2):117-28.
14. Frates MC, Homer MJ, Robert NJ, Smith TJ. Noniatrogenic breast trauma. Breast disease. 1992;5(1):11-9.
15. Evers K, Troupin RH. Lipid cyst: classic and atypical appearances. AJR Am J Roentgenol. 1991 Aug 1;157(2):271-3.
16. DiPiro PJ, Meyer JE, Frenna TH, Denison CM. Seat belt injuries of the breast: findings on mammography and sonography. AJR. American Journal of Roentgenology. 1995 Feb;164(2):317-20.
17. Hogge JP, Robinson RE, Magnant CM, Zuurbier RA. The mammographic spectrum of fat necrosis of the breast. Radiographics. 1995 Nov;15(6):1347-56.
18. Brown FE, Sargent SK, Cohen SR, Morain WD. Mammographic changes following reduction mammaplasty. Plastic and reconstructive surgery. 1987 Nov 1;80(5):691-8.
19. Bargum K, Møller Nielsen S. Fat necrosis of the breast appearing as oil cysts with fat-fluid levels. The British Journal of Radiology. 1993 Aug;66(788):718-20.
20. Bassett LW, Gold RH, Cove HC. Mammographic spectrum of traumatic fat necrosis: the fallibility of" pathognomonic" signs of carcinoma. American Journal of Roentgenology. 1978 Jan 1;130(1):119-22.
21. Tohno E, Cosgrove DO, Sloane JP. Benign processes: trauma and iatrogenic conditions. Ultrasound diagnosis of the breast; c1994, 338.
22. Sullivan TP, Georgian-Smith D. Breast mass detected after blunt chest trauma. American journal of Roentgenology; c1976, 1998, 171(1).
23. Harvey JA, Moran RE, Maurer EJ, De Angelis GA. Sonographic features of mammary oil cysts. Journal of ultrasound in medicine. 1997 Nov;16(11):719-24.