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Original Research Article

# A Retrospective Study to Establish How Useful Mammography and Sonography Was in Confirming the Diagnosis

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**Abstract**

**Aim:** This study is done to establish how useful mammography and sonography was in confirming the diagnosis.

**Methodology:** A retrospective study was undertaken of all patients presenting to Department of Radiology, ICARE Institute of Medical Sciences and Research & Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India for 1 year.whose core biopsy (CB) revealed a diagnosis of fat necrosis. The presenting symptoms, including any history of trauma, were noted. The clinical examination findings were also reviewed. The interpretation of each clinical, mammographic and ultrasonic examination was prospectively classified using a four category scale (1 ¼ normal, 2 ¼ probably benign, 3 ¼ possibly malignant and 4 ¼ probably malignant). Ultrasound findings were sub grouped into (i) depth within the breast tissues planes, (ii) purely solid lesions, (iii) purely cystic lesions, (iv) complex lesions, (v) the transmitted sound characteristics, (attenuation, enhancement), or (vi) normal examinations. Mammographic findings were categorized as (i) well or poorly defined lucencies, (ii) well or poorly defined densities, (iii) parenchymal disturbances, (iv) skin thickening, (v) related or distant calcifications and (vi) normal study.

**Results:** All 50 patients presented with a palpable abnormality, 48 were discrete masses while 2 demonstrated generalized segmental nodularity. The patients' ages ranged from 28 to 75 years (mean 55.4 years). Only 26 (52%) of the 50 cases had a clear history of trauma or demonstrated definite signs, e.g. scar or bruising, to suggest trauma. 19 (38%), lesions were tender. 28 (56%) lesions were associated with bruising at various stages of evolution. 3 (6%) lesions had associated skin dimpling. The mean time from recalled trauma to presentation and imaging was 8.43 weeks. Mammography was performed in 100% of the patients. 27 (54%) of the mammograms were normal. The Wolfe pattern characteristic was grouped as follows: N1 type ¼ 23, P1 type ¼ 8, P2 type ¼ 19, DY type ¼ 0. All 50 ultrasound examinations revealed a visible abnormality corresponding to the site of clinical concern. The lesions were distributed within the breast tissue as follows: (i) 10 lesions (20%) within the superficial subcutaneous tissue of the skin and fatty tissue; (ii) 33 (66%) lying deeper, purely within fatty tissue; (iii) 7 (14%) lying deeper within fat and glandular tissue. The size of the lesions ranged from 5 to 21 mm, mean 13.3 mm.

**Conclusion:** From this study, it can be concluded that when clinically fat necrosis is suspected, the mammogram and ultrasound are the most important diagnostic tools. If there are no suspicious features of malignancy on the mammogram, then USG appearances can be relied upon to give a diagnosis of early fat necrosis.

**Keywords:** Necrosis, ultrasonography, mammography, malignant.

## Introduction

Fat necrosis is a benign non-suppurative inflammatory process of adipose tissue which was initially described in the breast in 1920 [1, 2]. Hadfield de- scribed it as ‘‘an innocent lesion of the breast presenting itself most often in women between the fourth and fifth decades, frequently as a stony- hard tumour firmly fixed to the skin, often resembling an early cancer so closely that a wide resection of the breast has been performed” [3]. The aetiological factors include trauma (21–70%) [1-4], radiotherapy [5], anticoagulation (warfarin) [6], cyst aspiration, biopsy, lumpectomy, reduc- tion mammoplasty, implant removal, breast reconstruction with tissue transfer [7], duct ectasia and breast infection. Other rare causes include polyarteritis nodosa, Weber-Christian disease and granulomatous angiopanniculitis. In some patients, the cause is unknown [8].

The incidence of the disease is estimated to be 0.6% in the breast, representing 2.75% of all benign lesions [1-4]. Fat necrosis is found in 0.8% of breast tumours and 1% of breast reduc- tion surgery cases.[5]The average age of patients is 50 years [1-4]. Fat necrosis is a sterile, inflammatory process which results from aseptic saponification of fat by means of blood and tissue lipase [9]. It varies in appearance depending on the stage of the process. It is recognised histologically as fat-filled macro- phages and foreign body giant cells surrounded by interstitial infiltration of plasma cells [10].

Clinical presentation of fat necrosis can range from an incidental benign finding to a lump highly suggestive of cancer [11, 12]. In most cases it is clinically occult; however, it can present as single or multiple smooth, round, firm nodules or irregular masses. It may be associated with ecchymosis, erythema, inflammation, pain, skin retraction or thickening, nipple retraction and lymphadenopathy simulating carcinoma [7, 11, 13].

Imaging appearances of fat necrosis depend on its stage of evolution [14, 15]. In the early phase, when there is hemorrhage in the fat, initiating edema of the breast trabeculae, it may be seen as an area of hyper reflectivity on USG. Those which do not resolve, progress to cystic degeneration within weeks to months and are seen as oil-containing cavities on gross pathology [15]. 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 [15] unless the characteristic benign lucent-centered or coarse rim calcifications are seen.

Mammography is the most important diagnostic tool in early fat necrosis [15].A radiolucent well-defined cyst is one of the pathognomonic mammographic features seen in early fat necrosis when there is little associated fibrosis. Fat-fluid level when observed is due to oil and serosanguinous fluid layering [16]. Benign lucent-centered calcification, a characteristic late stage feature[2], also requires no additional workup [16, 17]. 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 [18]. An echogenic band within an oil cyst that shifts in orientation with changes in patient position is the most specific feature of fat necrosis [18].

The diagnosis can be confirmed on the basis of either serial imaging studies that show chronological changes compatible with the evolution of fat necrosis or improvement in clinical symptoms (lump no longer detectable on palpation). Histological confirmation may be reserved for indeterminate or suspicious imaging features. This study is done to establish how useful mammography and sonography was in confirming the diagnosis.

## Materials and Methods:

A retrospective review was undertaken of all patients presenting to Department of Radiology, ICARE Institute of Medical Sciences and Research & Dr. Bidhan Chandra Roy Hospital, Haldia, West Bengal, India for 1 year. whose core biopsy (CB) revealed a diagnosis of fat necrosis. The presenting symptoms, including any history of trauma, were noted. The clinical examination findings were also reviewed. The interpretation of each clinical, mammographic and ultrasonic examination was prospectively classified using a four category scale (1 ¼ normal, 2 ¼ probably benign, 3 ¼ possibly malignant and 4 ¼ probably malignant).

Ultrasound was performed in all patients using an Ecosee Toshiba Ultrasound Machine, Model SSA-340A, with a 7.5 MHz annular array probe (Toshiba Medical Systems, Japan). Ultrasound findings were sub grouped into (i) depth within the breast tissues planes, (ii) purely solid lesions, (iii) purely cystic lesions, (iv) complex lesions, (v) the transmitted sound characteristics, (attenuation, enhancement), or (vi) normal examinations. Mammographic findings were categorized as (i) well or poorly defined lucencies, (ii) well or poorly defined densities, (iii) parenchymal disturbances, (iv) skin thickening, (v) related or distant calcifications and (vi) normal study.

In addition, a category was assigned to the predominant breast density, according to Wolfe criteria [19] P1, P2, N1 or DY types. All patients underwent an ultrasound-guided core-biopsy using a 16-gauge needle and an automated biopsy device (Bard Magnum, Bard Ltd. Covington, Georgia). Between two and four passes were made of each lesion (depending upon the operator's confidence that an adequate tissue specimen of the lesion had been acquired).

## Results:

In the study period, there were 50 patients whose core biopsies revealed a definite diagnosis of fat necrosis. All 50 patients presented with a palpable abnormality, 48 were discrete masses while 2 demonstrated generalized segmental nodularity. The patients' ages ranged from 28 to 75 years (mean 55.4 years). Only 26 (52%) of the 50 cases had a clear history of trauma or demonstrated definite signs, e.g. scar or bruising, to suggest trauma. The traumas included falls from a bike and a chair, a motor vehicle accident, horse bite, an inflamed insect bite, and other minor injuries. 19 (38%), lesions were tender. 28 (56%) lesions were associated with bruising at various stages of evolution. 3 (6%) lesions had associated skin dimpling. The mean time from recalled trauma to presentation and imaging was 8.43 weeks.

**Table 1: Mammography findings**

| Findings | Number | % |
|---|---|---|
| No abnormality detected | 27 | 54 |
| Well-defined lucency | 2 | 4 |
| Ill-defined lucency | 3 | 6 |
| Well-defined densities | 5 | 10 |
| Ill-defined densities | 8 | 16 |

| | | |
|---|---|---|
| Complex lesion | 2 | 4 |
| Parenchymal distortion only | 2 | 4 |
| Scattered calcifications | 1 | 2 |

Mammography was performed in 100% of the patients. 27 (54%) of the mammograms were normal. The Wolfe pattern characteristic was grouped as follows: N1 type ¼ 23, P1 type ¼ 8, P2 type ¼ 19, DY type ¼ 0.

**Table 2: Ultrasound findings**

| Findings | Number | % |
|---|---|---|
| Well-defined | 17 | 34 |
| Ill-defined | 33 | 66 |
| Homogenous, echo-poor | 12 | 24 |
| Homogenous echo-bright | 24 | 48 |
| Complex | 14 | 28 |
| Acoustic shadow | 4 | 8 |
| Distal enhancement | 9 | 18 |

All 50 ultrasound examinations revealed a visible abnormality corresponding to the site of clinical concern. The lesions were distributed within the breast tissue as follows: (i) 10 lesions (20%) within the superficial subcutaneous tissue of the skin and fatty tissue; (ii) 33 (66%) lying deeper, purely within fatty tissue; (iii) 7 (14%) lying deeper within fat and glandular tissue. The size of the lesions ranged from 5 to 21 mm, mean 13.3 mm. An interpretation was made of the pathological nature of each detected lesion by each individual examination technique. More than half of the mammographic examinations were normal. No lesion had features specific to malignancy; abnormalities were largely indeterminate. In comparison, no ultrasound examination was considered normal. Again, no lesion was definitely malignant; the majority were indeterminate.

**Table 3: Key results and conclusions from clinical and imaging examinations**

| Category | Clinical examination | | Mammography | | Ultrasound | |
|---|---|---|---|---|---|---|
| | Number | % | Number | % | Number | % |
| 1 (normal) | 4 | 8 | 29 | 58 | 0 | 0 |
| 2 (probably benign) | 32 | 64 | 6 | 12 | 14 | 28 |
| 3 (possibly malignant) | 12 | 24 | 15 | 30 | 36 | 72 |
| 4 (probably malignant) | 2 | 4 | 0 | 0 | 0 | |

## Discussion:

The management of fat necrosis continues to be challenging in practice. Even with modern diagnostic modalities, fat necrosis of the female breast can still be difficult to diagnose. In patients who have undergone breast conservation surgery or reconstruction for breast cancer, fat necrosis must be distinguished from cancer recurrence. Although there is a definite association with trauma, surgery or biopsy of the breast, not all patients present with a clear history for fat necrosis [20]. As the commonest presentation is that of a lump there, an underlying malignancy must be considered [21]. Even with a clear history of previous trauma, the possibility of a malignancy should not be overlooked, as patients' attention may only be drawn to the lump by an episode of trauma [22].

Management may include short-term follow-up with imaging and physical

examination, to reduce the number of unnecessary biopsies. In one series on the mammographic follow-up period of 3 years, it was noted that six round opacities decreased in size and density, and in two of them, a radiolucent oil cyst and calcifications developed. Eleven dystrophic calcifications changed to a benign appearance [4]. In ultrasonographic follow-up, the most common finding was normalisation of the subcutaneous tissue echogenicity and formation of small cysts [12]. Solid masses remained solid, whereas complex lesions tended to evolve. Most of the solid masses decreased in size confirming a benign process. None of the complex lesions became more solid, while some became more cystic. No mass enlarged on ultrasound follow-up in this series.

Although the changes in echo texture on ultrasound may be chronologically and morphologically consistent with the diagnosis of fat necrosis, one must be wary of sinister pathology obscured by increased density on mammography. Multiplicity and distribution along the seat-belt line may warrant follow-up rather than a biopsy, particularly in young patients [23]. Furthermore, 66% of mammographic abnormalities and 74% of ultrasound lesions were classified as indeterminate or suspicious. For best practice, the histological result should be considered in conjunction with the clinical and imaging findings, with involvement of a multidisciplinary team. [24]

We clearly identified all of our cases of palpable fat necrosis at ultrasound examination. In comparison, only 21/50 (42%) were mammographically visible. Our findings differ from those of Scott Soo et al. [12], where 93% of their sonographically visible lesions were detected on the mammogram. This discrepancy may be due to a different distribution of background mammographic density between the two series. Two of the non-visible lesions in the Scott Soo study were sited in fatty breasts, that is, Wolfe type N1, the other in a breast of P1 type. However, we have found no consistent correlation between Wolfe categories and mammographic detection in our series.

## Conclusion:

From this study, it can be concluded that when clinically fat necrosis is suspected, the mammogram and ultrasound are the most important diagnostic tools. If there are no suspicious features of malignancy on the mammogram, then USG appearances can be relied upon to give a diagnosis of early fat necrosis.

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