# AIM OF THE WORK

The aim of this study is to:

- Evaluate the ultrasonographically hyperechoic lesions of the breast to detect whether they are always pathologically benign or they can be malignant.
- Detect sonographic features those are able to predict malignancy in hyperechoic breast lesions.

# PATIENTS

Among the 1250 females who attended the breast clinic of main Alexandria university hospital starting from the first of April 2013 to the end of March 2014, 33 patients were diagnosed by ultrasound to have hyperechoic breast lesions; only 30 patients were included in the study and 3 were excluded as they didn't fulfil the requirements of this study . As all of them refused biopsy of the lesions for histopathological correlation.

# METHODS

**All 30 patients included in the study were subjected to the following:**

## 1- Full history taking including

- Personal history: name, age, marital status.
- Symptoms:
  - Breast lump.
  - Mastalgia.
  - Nipple discharge, its type (bloody, milky,..), its consistency, its colour(yellow, red, pink, white,….) and whether it was spontaneous or evoked by squeezing.
  - And symptoms of bteast inflammation (redness, hotness and tenderness of the breast).
- Menstrual history: age of menarche, regularity of the cycle, and duration of the cycle, amount of bleeding in the cycle and age of menopause.
- Past history of:
  - Breast pathology.
  - Radiation therapy
  - Previous surgery (lumpectomy, mastectomy)
  - Cancer in any other site in the body especially colon, ovaries and uterus.
- Family history: for any breast disease.
- Past medical history: History of
  - Oral contraceptives.
  - Hormonal replacement therapy.
  - Ovulation stimulators.
- Obstetric and gynecological history: Number of children and age of first conception, status of lactation, History of gynecological disease(cancer uterus, ovaries, ovarian cysts,…..etc)

## 2- Clinical examination

It included local and general examination:

**Local examination of the breast** included mammary area and both axillae taking in consideration asymmetry in breast size and recent changes in breast size and contour.

At first, the breast was examined for the presence of any palpable lesions, any sign of inflammation (redness, hotness, tenderness,…..), changes in the size or contour, the presence of any signs of oedema ….etc.

Then complete assessment of the breast mass if palpable including:

- Size
- Site (in any quadrant)
- Shape
- Consistency (whether solid or cystic and if solid is it soft, hard or firm)
- Borders ( is it will or ill defined )
- Mobility ( whether it is mobile or fixed to the surrounding tissues)
- And the presence of any associated breast changes.(dilated veins, peau d'orange….etc).

Both axillae were scrutinized for the presence or absence of skin changes, masss or enlarged lymph nodes

### General examination of the whole body

If there is any sign of distant metastasis (chest crepitations, bone tenderness, hepatomegally,……etc)

## 3- Mammography

Mammography was only performed to 26/30 patients with hyperechoic lesions as the remaining 4 patients were young aged, having small breasts and only referred for sonographic assessment. All mammograms were obtained using a dedicated X-ray mammography unit (siemens, MAMMOMAT Nova machine) having dual target focal spot, a standard one for routine mammographic views which is 0.3mm and a fine one for imaging of a specific area of the breast which is 0.1mm in size, in a molybdenum anode, grid size 18x24 or 24x30 and a film size of 18x24 and 24 x30.

The Technique used for a mammogram is low kilo-voltage peak (KvP) about 24 to 30 KVP.

The milliampere- seconds (mAs) automatically determined by the machine depending on breast tissue density, ranging from 30 to 60 mAs. This technique resulted in mammograms with a high film contrast, making it easier for the radiologist to read.

### Views

Four projections were obtained, two views for each breast,

### Craniocaudal position

Positioning started with the patient facing the receptor. The breast was manipulated by lifting to elevate the inframammary fold above the receptor as the breast is pulled with both hands onto the receptor. The patient's head was then turned towards the opposite breast with the chin slightly pointed up. The patient's shoulder on the same side of the body as the breast being positioned slouching down to allow relaxation of the lateral tissue as the breast is pulled. The mammographer standed on the lateral aspect of the patient, to maintain a firmer grasp, keeping medial tissue in place and nipple forward as the lateral tissue is pulled, while smoothing out lateral folds. Then compression was applied by compression paddle and mammographer should be sure that there is no skin folds.

### Mediolateral oblique view

The X-ray tube was rotated approximately 40° to 45° for most women and approximately 55° to 60° angle for women who have thin body types. The angle was decreased for women who are short and increased for women with taller frames. The height of the detector was leveled with the axilla and in a plane parallel to the pectoralis muscle. The corner of the image receptor should be placed in the hollow portion of the axilla, between the pectoral and latissimus muscle. Finally, the elbow was kept flexed behind the detector with the shoulder relaxed and internally rotated. The patient's arm was never placed higher than the shoulder.

The pectoralis muscle was located by palpation then placed onto the receptor, pulling all deep lateral tissue. The breast was then held firmly until the compression paddle can replace the mammographer's hand.

All views were taken while the patients were standing. Compression was applied to breasts of all patients. As Proper and adequate compression is necessary in order to reduce the radiation dose, displace the tissue apart and avoid blurring due to motion.

## Interpretation and data analysis

A comparison of both breasts was done. Both MLO and CC views were mounted back to back, so that the right breast is compared with the left breast. The contour, size of the breasts and its symmetric density were evaluated.Any suspicious area which causes disruption of the normal symmetrical pattrn of the breast and architectural distortion was looked for.

Interpretation involved careful viewing of the normal mammographic pattrn and any abnormalities which present itself as disruption of the normal pattrn.

# 4- US

All the patients were subjected to bilateral breast US using Siemens X 300 system. It is a portable digital diagnostic ultrasound imaging system. The system utilizes advanced imaging processing and transducer technology. The operating system is based on windows technology.

Operating modes of the system include:

- 2d- mode
- Split mode
- Dual- mode
- 4B mode
- 2D/M-
- Color doppler
- Power doppler

The system is equipped with a DIMAQ-IP integrated workstation.The workstation provides capabilities for digital acquisition, storage,and review of ultrasound studies. Additional system options provide integration into a networking environment.

- The transducer used named VF 13-5 with frequency 7.5MHZ

The x300 ultrasound system supports examination of small parts and breast.

The transducer was directly applied to the skin surface with the patient in the supine position to examine the inner quadrants of the breasts, and the supine oblique positions, to evaluate the outer quadrants, where the examined side was elevated and the ipsilateral arm was extended above the head to stabilize the breast and flatten it against the chest wall. The sequence in steps was followed in all examinations. Scanning was performed in the radial and antiradial planes in relation to the nipple, and/or sagittal and transverse planes were used, where it begins in the upper inner quadrant of the breast and proceeds slowly to the outer quadrant to obtain sagittal images. The transducer was then moved lower on the breast and the scanning action was repeated until the whole breast has been examined.At that point the transducer was rotated 90 degrees and transverse scans were taken proceeding from inner to outer aspects. Both axillary regions were then examined by longitudinal scanning. All nodes were examined in the longitudinal and transverse nodal planes that demonstrated the largest and smallest diameters of the node.

## Interpretation and data analysis

By US the following was evaluated:

- Breast tissue and the presence of any changes and if it was fatty or fibroglandular breast.
- The duct system and if there was duct ectasia or dilatation or the presence of any contents inside the ductal system.
- The lesion, its size, site, shape, borders, echogenicity and doppler blood flow.
- Mass criteria on US, the skin (if there is skin thickening or not) and subcutaneous fat.
- Fascial planes including premammary, retromammary fascia and retromammary fat plane.
- The regional lymph nodes: the size, site, shape and the ratio of the thickness of the cortex to fatty sinus.

# 5- Histopathology

The specimens were obtained by US guided techniques including:

## Ultrasound guided fine –needle aspiration biopsy and core needle biops:

### a) US guided FNAB procedure

- The procedure was explained to the patient.
- Skin was disinfected with alcohol or povidone iodine.
- Acoustic coupling between the transducer and the skin was obtained with sterilized gel.
- The patient was placed in a supine position with her ipsilateral side elevated to a variable degrees depending on the position of the lesion.
- The free hand method was applied. The transducer was held in one hand and the needle in the other. The needle (18 gauge) was inserted and directed towards the target lesion and followed up by US probe. The needle was passed parallel and lateral to the transducer.
- The needle appeared as a bright echo.
- The needle stylet was removed leaving the outer sheath of the needle within the lesion. The non dominant hand is used to stabilize the needle. While creating constant suction, a series of short forceful rapid thrusts in and out together with rotatory movements were done, piercing the lesion repeatedly under real time US guidance. Suction is then discontinued when blood appeared in the nozzle of the needle, releasing the negative pressure and the biopsy needle with the attached syinge were then removed. The syringe-needle combination were then immediately handed to eject and expel the aspirated material and spread over glass slides.
- The Sample was expressed and smeared by the attending pathologist on labeled glass slides. Then was immediately fixed in 95% ethyl alcohol and stained with hematoxylin and eosin (H&E) stain.

### b) Core needle biopsy

A 16 or 18 gauge, long core biopsy needle was used. The long axis of the tranducer is oriented in radial plane. An entry site is localized at the periphery of the breast, few centimeters from the edge of the transducer this allows the needle to be parallel to the chest wall to avoid its injury.

## Pre biopsy procedure

Complete blood picture, platelet count, prothrombin time and activity were performed within one week of the scheduled biopsy to exclude bleeding diatheses.

The patient lied supine on the examination table with the epsilateral arm resting above the head.If the breast is large, an oblique position facilitated lesion access.

Also if the lesion is medial the patient maintain supine position and if the lesion is lateral the patient maintain supine oblique position.

The lesion is localized with US guidance.

According to the determined pathway using parallel approach,The exact skin entry site was chosen and the location of this point on the patient's skin was marked where the needle will be inserted.

The skin is cleansed with povidone iodine and anaesthesized with a 2% lidocaine solution infiltrating it by a syringe.

## Placement of the needle

Free hand technique was used to insert the needle and advanced to the lesion under real time image monitoring. The needle tip appears as a bright spot in real time, gray scale imaging. Once the semi automated cutting needle was within the target lesion, the needle gun was fired. Sampling of small amount of normal tissue proximal or distal to the lesion is necessary in lesions <2cm. Specimens obtained were dislodged in formaline solution and sent for pathological assessment.

## Post biopsy procedure

The skin was gently cleaned and covered and compression centred on the estimated site of the lesion was applied for 5 minutes to achieve haemostasis.

# RESULTS

## Age

30 female patients proved to have ultrasonographically hyperechoic breast lesions were included in the study. Their ages ranged from 20 to 72 years (mean±S.D 47.93 ± 15.79) the most commonly affected age group was the fifth decade (26.6%) (table IV)

**Table (IV): Age distribution of 30 patients with hyperechoic breast lesions.**

| Age group | No | percentage |
|---|---|---|
| 20 < 30 | 5 | 16.6% |
| 30<40 | 4 | 12.14% |
| 40 <50 | 8 | 26.6% |
| 50 <60 | 4 | 12.14% |
| 60<70 | 6 | 20% |
| 70 < 80 | 3 | 9.9% |
| **total** | **30** | **100%** |

## Clinical history

Seven out of 30 patient (23.3%) had a family history of breast malignancy.

As shown in table (V) Out of the 30 patients included in the study:

Seven (23.3%) patients had a personal history of breast cancer.

Four of them were managed by conservative breast surgery followed by radiotherapy. One of these four patients had post irradiation fat necrosis at the surgical bed. Another patient had infected seroma at the surgical bed whereas tumor recurrence at the surgical bed was expressed by the third patient. The last patient proved to have lipoma on the contralateral breast.

The remaining 3 out of 7 patients were managed by mastectomy followed by radiotherapy. One of them had multiple lipomas on the contralateral side and the other two had hyperechoic breast lesion proved to be breast cancer on the contralateral breast.

Fibrocystic disease was expressed by one out of 30 patients.

Three/30 (9.9%) patients had breast trauma localized to the affected side. Two of these three patients had traumatic fat necrosis and the third patient had breast hematoma.

Five/30 (16.7%) patients were lactating, Two of them had focal mastitis while the other three patients had galactocele.

Four/30 (12.14%) patients had a history of oral contraceptive use. One of these patients had traumatic fat necrosis.The second patient had focal mastitis. Where as the third and fourth patients had breast lipomas.

**Table (V): Personal history of 30 patients with hyperechoic breast lesions.**

| Clinical history | No. | % |
|---|---|---|
| Negative | 10 | 33.3% |
| Breast cancer | 7 | 23.3% |
| Fibrocystic disease | 1 | 3.3% |
| lactation | 5 | 16.7% |
| Breast trauma | 3 | 9.9% |
| Usage of oral Contraceptives | 4 | 12.14% |
| total | 30 | 100% |

## Presenting symptoms

Among the 30 patients forming the study group:

Fourteen (46.7%) patients had breast lumps, Ten (33.3%) patients had breast pain (mastalgia). Four (12.14%) patients were enrolled in a follow up regime of breast pathology (cancer). One (3.3%) patient had nipple discharge. The last patient (3.3%) was integrated in routine checkup for breast pathology. (Table VI)

**Table (VI): The clinical presentation of the 30 patients with hyperechoic lesions.**

| Clinical Presentation | No. | % |
|---|---|---|
| Breast lump | 14 | 46.6 |
| Breast pain | 10 | 33.3 |
| Follow up | 4 | 12.14 |
| Routine checkup | 1 | 3.3 |
| Nipple discharge | 1 | 3.3 |
| Total | 30 | 100.0 |

All 30 patients included in the study were subjected to US guided FNAC or core needle biopsy.

Histopathological findings confirmed the presence of breast lipoma in 10/30 (33.3%) patients, traumatic fat necrosis was diagnosed in 7/30 (23.3%), infiltrating ductal carcinoma was diagnosed in 4/30 patients (13.3%). Focal mastitis and galactocele were diagnosed in three patients for each. Breast hematoma, breast abscess and infected seroma were expressed by one patient for each pathology (Table VII).

**Table (VII): Histopathological Diagnosis of the 30 patients with hyperechoic breast lesions.**

| Diagnosis | No. | % |
|---|---|---|
| Breast lipoma | 10 | 33.3 |
| Traumatic fat necrosis | 7 | 23.3 |
| Infiltrating ductal carcinoma | 4 | 12.14 |
| Focal mastitis | 3 | 9.9 |
| galactocele | 3 | 9.9 |
| Hematoma | 1 | 3.3 |
| Breast abscess | 1 | 3.3 |
| Infected seroma | 1 | 3.3 |
| total | 30 | 100 |

## Mammographic findings

Mammographic evaluation was performed in 26 out of 30 patients; the remaining 4 patients were not subjected to breast mammographic evaluation as they were young aged, having small breasts and only referred for sonographic assessment. The examined 26 patients showed positive mammographic findings in 11 patients (42.3%) while the remaining 15 mammograms (57.7%) were diagnosed as negative (Table VIII).

From these 15 negative mammograms eight patients were histopathologically diagnosed as lipomas, four patients were histopathologically diagnosed as fat necrosis. Infected seroma, galactocele and focal mastitis were the histopathological diagnoses for three patients. The causes of non demonsration of these lesions were isoattenuation of lipomas with the breast fat lobules or the presence of extremely dense breasts that didn't facilitate the lesions demonstration.

Among the mammographically positive diagnoses the following findings were detected.

Two/11(18.9%) positive mammograms showed well defined mass shadows. They were diagnosed histopathologically as breast hematoma (fig.36) in one patient and galactocele (fig.32) in the other one. Thus mammogram succeeded in detection and prediction of benignity of all of these two patients (true negative for malignancy).

Irregular spiculated mass lesions were expressed in four out of 11 (36.3%) positive mammograms. One of these four lesions was associated with clustered microcalcifications. All lesions showed irregular shape, ill defined borders, heterogenous predominately hyperechoic echopattern and posterior shadowing on related sonograms. All of them were pathologically proved to be invasive ductal carcinomas (fig.34). In this group of lesions mammogram successfully detected and predicted malignant nature proved by histopathology (true positive diagnoses for malignancy).

An ill defined mass with increased parenchymal density and thick trabeculations were noticed in 1/11(9.09%) mammograms, sonographically showed a lesion which is oval, lobulated, hyperechoic with posterior enhancement and histopathologically diagnosed as breast abscess.

Mammographically rounded moderately defined homogenous hypodensity was detected in one out of eleven (9.09%) positive mammograms. The lesion showed oval shape, well defined margins, hyperechoic pattern and homogenous echotexture on corresponding ultrasound. It was histopathologically diagnosed as lipoma. Subsequently mammography successfully detected and predicted benign fatty nature of this lesion (True negative finding for malignancy).

One of the eleven (9.09%) positive mammograms showed fat containing globular lesion with a fibrous scar of previous surgery which was demonstrated by US as an oval well defined heterogenous predominately hyperechoic mass. The lesion was diagnosed as traumatic fat necrosis (fig.31) on both mammogram and ultrasound; A diagnosis which was confirmed on histopathology (true negative finding for malignancy by both mammography and sonography).

The remaining 2/11(18.18%) positive mammograms showed focal asymmetric density which was demonstrated on US as oval well defined heterogenous predominantly hyperechoic masses, These were diagnosed histopathologically as traumatic fat necrosis (false positive for malignancy).

**Table (VIII): The mammographic findings of the 26 hyperechoic lesions.**

| Mammographic finding | | No. | benign | malignant | False* | | True* | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Negative | Positive | Negative | Positive |
| **Negative** | | **15** | **15** | **0** | **0** | **0** | **15** | **0** |
| **positive** | Well defined mass | 2 | 2 | 0 | 0 | 0 | 2 | 0 |
| | Irregular Speculated mass | 4 | 0 | 4 | 0 | 0 | 0 | 4 |
| | rounded lucent area | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| | Ill defined mass shadow | 1 | 1 | 0 | 0 | 1 | 0 | 0 |
| | Fat containing lesion with surrounding fibrosis | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| | Focal asymmetric density | 2 | 2 | 0 | 0 | 2 | 0 | 0 |
| | **Total positive** | **11** | **7** | **4** | **0** | **3** | **4** | **4** |
| **total** | | **26** | **22** | **4** | **0** | **3** | **19** | **4** |
| **percentage** | | | **84.6%** | **15.3%** | **0%** | **11.5%** | **73.08%** | **15.3%** |

(*) False and true for malignant diagnosis.

## The ultrasonographic results of 30 patients with hyperechoic lesions

All 30 hyperechoic lesions were selected on basis of US. All cases of the study expressed solitary lesions. As regards consistency, the study group expressed 21(70%) solid lesions out of 30 cases, 1/30(3.3%) cystic lesions and 8/30(26.6%) lesions with mixed consistencies. The largest diameters of such lesions ranged from 1.15 cm to 4 cm with mean±S.D. 4.0 ± 2.39 As regard the location, 8/30 lesions were located in the upper lateral quadrant, 6/30 lesions were located in the lower lateral quadrant, 5/30 lesions were located in the upper inner quadrant, 6/30 lesions were located in the lower inner quadrant and 5/30 lesions were located in the retro-areolar area.

## The ultrasound findings of focal hyperechoic breast lesions showed

### Shape of the lesion

Oval shape was expressed by 26/30 (86.6%) lesions (all proved to be of benign nature by histopathology). Irregular shape was expressed by 4/30 lesions One out of these four irregular lesions is associated with suspicious lymph node, histopathologically proved to be malignant lymph node (all of these four lesions proved to be of malignant nature).

### Margins of the lesion

Lesions with well defined margins were found in 25 out of 30 patients (all proved to be benign). Ill defined margins were expressed by 4 out of 30 lesions (all proved to be of malignant nature), Only one lesion expressed lobulated margins and proved to be of benign nature (breast abscess). (Table IX).

**Table (IX): Margins of the lesions of the 30 patients with hyperechoic breast lesions.**

| margins | No | % |
|---|---|---|
| **Well defined** | 25 | 83.3 |
| **Ill defined** | 4 | 12.14 |
| **lobulated** | 1 | 3.3 |
| **total** | 30 | 100 |

## Lesions' echogenicity

Ten/ 30 patients were diagnosed histopathologically as lipomas, on US they showed oval shape, well defined margins, homogenous pattern and hyperechoic echotexture with no posterior shadowing and lack of Doppler blood flow. These sonographic findings came in concordance with the histopathological diagnosis as benign lesions. So US succeedecd in prediction of the benign nature of the lesions (true negative) 100% US diagnostic accuracy (fig.30).

Histopathological diagnoses in 7/30 hyperechoic lesions were traumatic fat necrosis, the sonographic findings of these patients' lesions were oval shape, well defined margins, heterogeous pattern but mainly hyperechoic and no posterior shadowing were detected in these lesions, Doppler blood flow was absent in such lesions. The sonographic findings and histopathological diagnosis were concordant, so US succeeded in prediction of the benign nature of the traumatic fat necrosis (true negative) 100% diagnostic accuracy (fig.31).

Infiltrating ductal carcinoma was the histopathological diagnosis of 4/30 patients whose ultrasonographic findings were irregular shape, ill defined margins, heterogenous pattern and hyperechoic echotexture was the main, posterior shadowing was also found in these lesions, these lesions showed prominent vascularity and increased Doppler blood flow. The sonographic findings here succeeded in prediction of the malignant nature of these lesions (true positive for malignancy) (fig.34).

Focal mastitis was the histopathological diagnosis of 3/30 patients (fig.33), and galactocele was the histopathological diagnosis of other 3/30 patients (fig.32), in all of these patients US showed oval shaped, well defined, hyperechoic, homogenous lesion with no posterior shadowing, in these lesions there were no Doppler flow but vascularity and Doppler flow were prominent in inflammed tissues surrounding these lesions. These US findings predicted benignity of these lesions which was confirmed by histopathology, therefore US succeeded in prediction of the benign nature of these lesions (true negative for malignancy).

Hematoma (fig.36) and infected seroma were the histopathological diagnoses of 2/30 hyperechoic lesions, sonographically they were oval, well defined, heterogenous (mainly hyperechoic). These sonographic findings were confirmed by histopathology so Us succeeded in prediction of these lesions' benign nature (true negative for malignancy).

Breast abscess (1/30 lesions) was sonographically oval shaped, with macrolobulated margins, homogenous, hyperechoic with posterior enhancement and prominent Doppler vascularity at the periphery or at the wall of this lesion; these findings suspected benignity of the lesion and histopathological diagnosis as breast abscess confirmed this suggestion, so US succeeded in prediction of the benign nature of this lesion.(true negative for malignancy) (fig.37).

**Table (X): Statistical analysis of mammography in verification of nature of focal breast lesions**

| | Mammography (n=26) |
|---|---|
| **True positive for malignancy** | 4 (15.3%) |
| **True negative for malignancy** | 19(73.08%) |
| **False positive for malignancy** | 3 (11.5%) |
| **False negative For malignancy** | 0 (0%) |
| **Sensitivity** | 100.0% |
| **Specificity** | 86.36% |
| **Positive predictive value** | 57.14% |
| **Negative predictive value** | 100.0% |

Table X demonstrates the diagnostic yields of mammogram compared to sonography in verification of nature of focal breast lesions in the current study. Mammography succeeded only in detection of breast lesions in 11/26 patients upon whom mammography was performed. While in the remaining 15/26 patients mammogram failed in detection of any breast lesions. From the Patients who performed mammography 4 patients were true positive for malignancy, Nineteen patients were true negative for malignancy, No patients were false negative for malignancy while there were three false positive patients for malignancy. So, Sensitivity was100.0%, Specificity was 86.36%, the positive predictive value was 57.14%, the negative predictive value was100.0%.

As regards ultrasonography, evaluation of the diagnostic yields was outside the scope of the current study. As all of the patients forming the study group were selected based upon ultrasonographic detectability and no other gold standard was present for assessment of the statistical parameters of the diagnostic yields of ultrasonography.

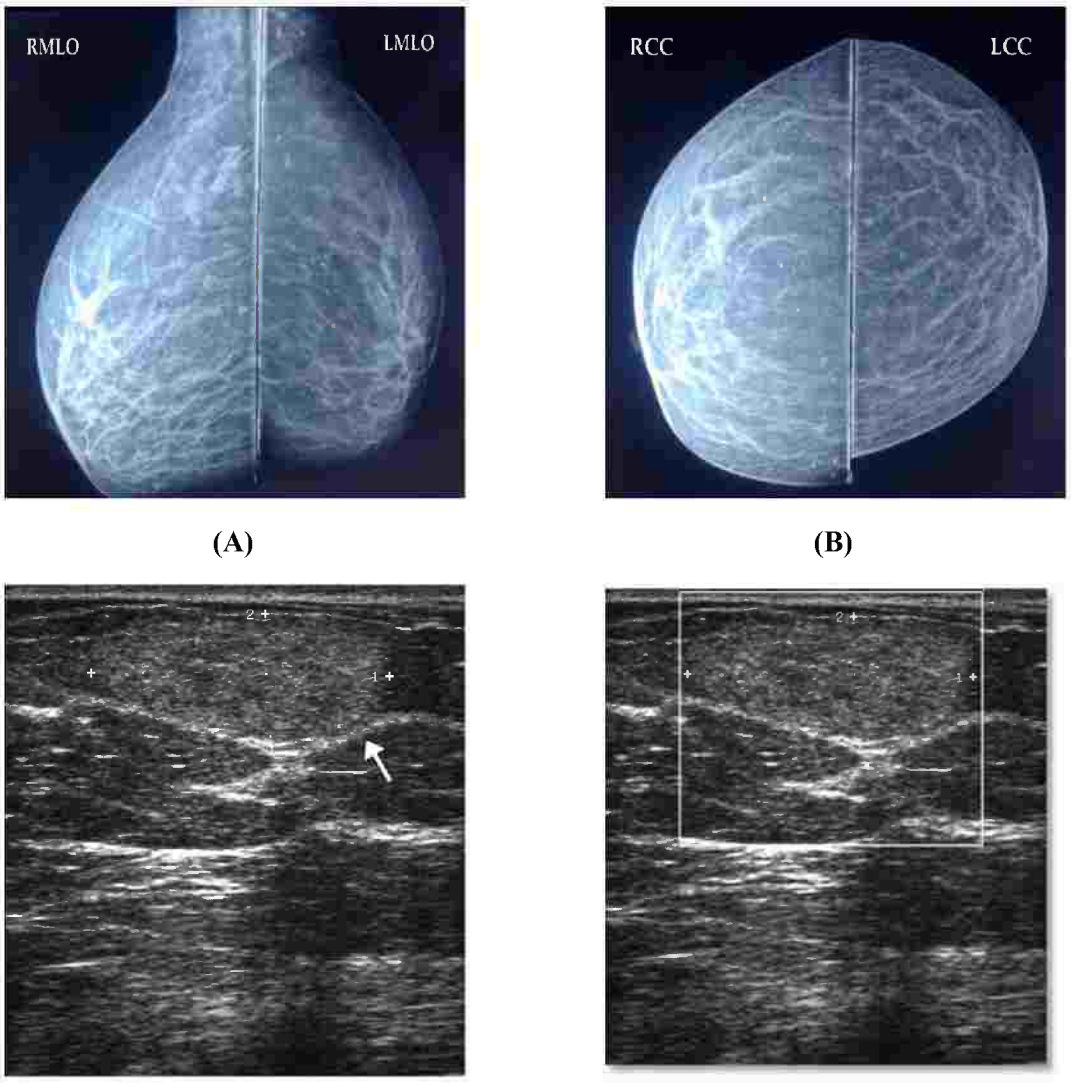


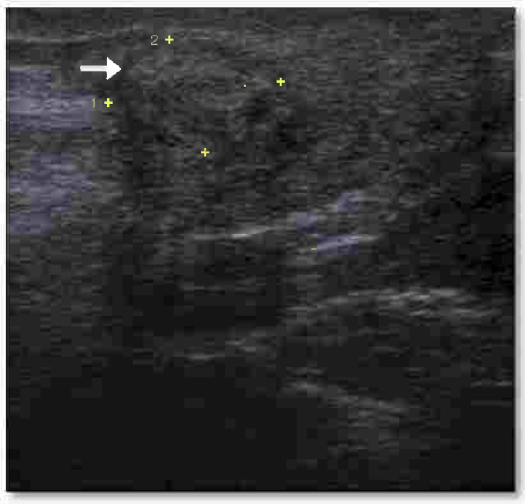

**Figure (30)**: A female patient aged 39 years with breast lump in the upper outer quadrant of the right breast.

A&B-Mammography was reported as negative.

C- Sonomammography showed a mass lesion located in the upper outer quadrant sized 2.5 x1.7 cm with oval shape, well defined margins, homogenous pattern and hyperechoic echotexture, Histopathologically this lesion was diagnosed as capsulated breast lipoma.

D- Doppler ultrasound shows negative doppler signal.


(A) (B)

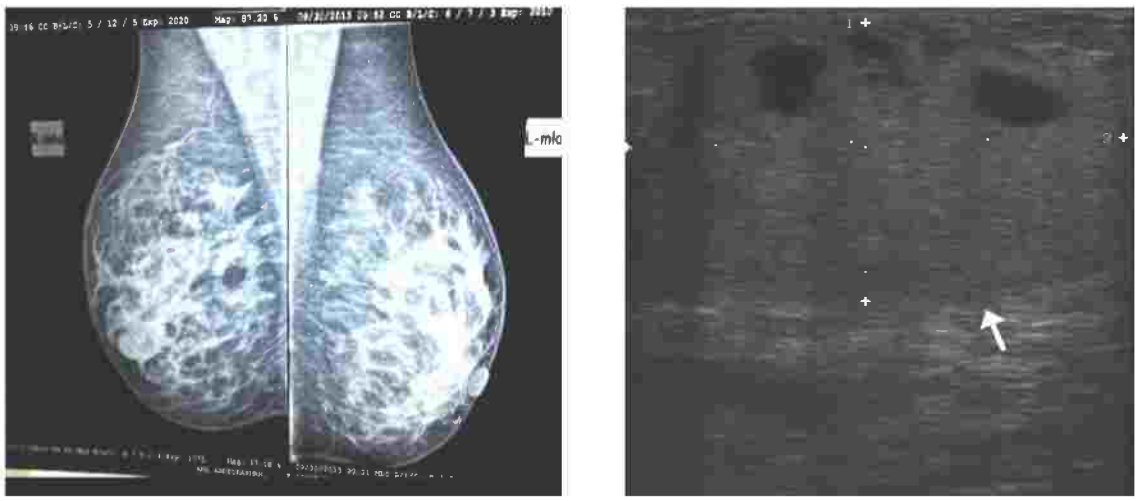


(C)

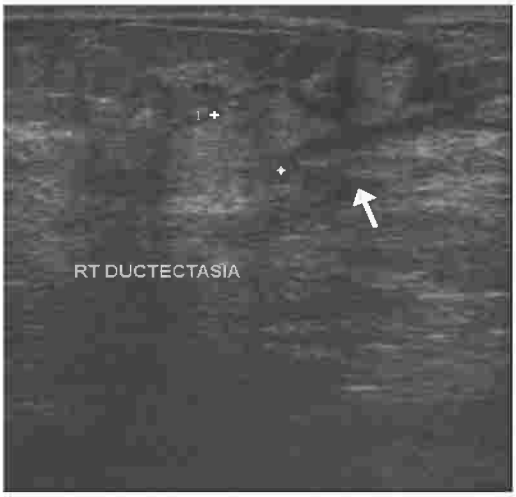
**Figure (31):** Female patient aged 62 years complaining of breast lump in the upper outer quadrant of the right breast and had history of lumpectomy for breast cancer in the same breast.

A&B- Mammography showed a globular fat containing lesion in the upper outer quadrant with surrounding fibrosis.

C- Sonography showed a mass lesion with oval shape, well defined margins and heterogenous predominately hyperechoic echotexture in the form of echogenic back ground with multiple oil cysts, depending upon these benign features a sonographic diagnosis of traumatic fat necrosis was established. This diagnosis was confirmed by histopathology.



(A) (B)

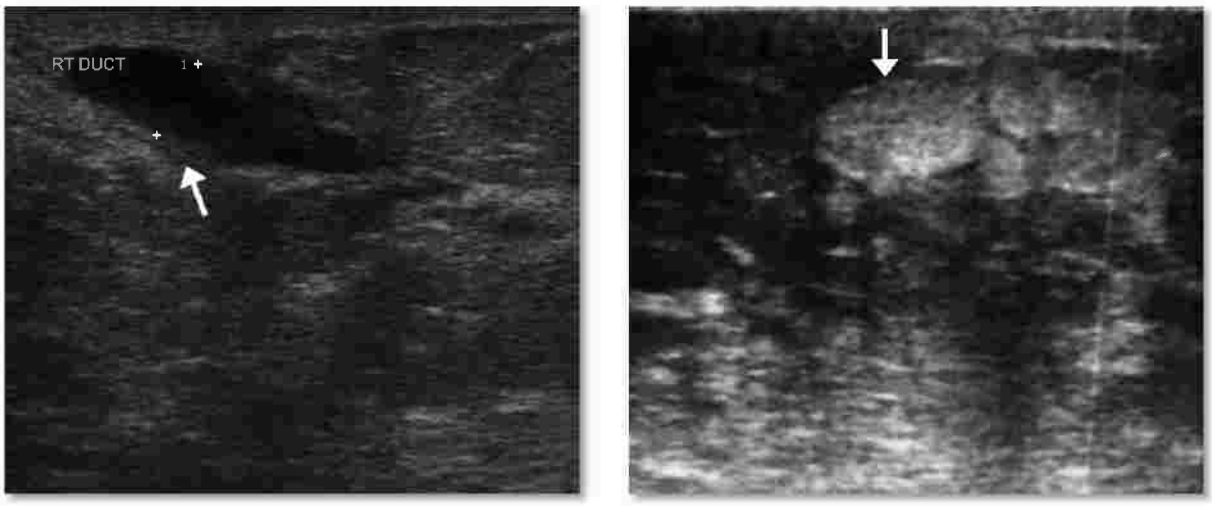



(C)

**Figure (32):** A female patient aged 25 years was complaining of breast pain , she was lactating.

A- Mammography: MLO view showed dense lactating breast in which there is no definite focal masses. (non conclusive)

B&C- A background of duct ectasia,, some of the ducts distended by echogenic contents forming rather well defined oval shaped echogenic mass lesion about 3.6 x 2.2 cm suggested by US and proved by histopathology to be lactational galactocele.




**(A)** **(B)**

**Figure (33):** A female patient aged 23 years complaining of right mastalgia, with some focal skin change such as redness and oedema. She was lactating. Mammography was not done for this patient.

A&B: Ultrasound pictures of the right breast showing lactational duct dilatation associated with mild overlying skin thickening in (A), nearby interstitial oedema and hyperechoic fat lobules are demonstrated in B, no associated tissue necrosis nor abscess formation. Features were interpreted as purpural mastitis confirmed by histopathological findings.

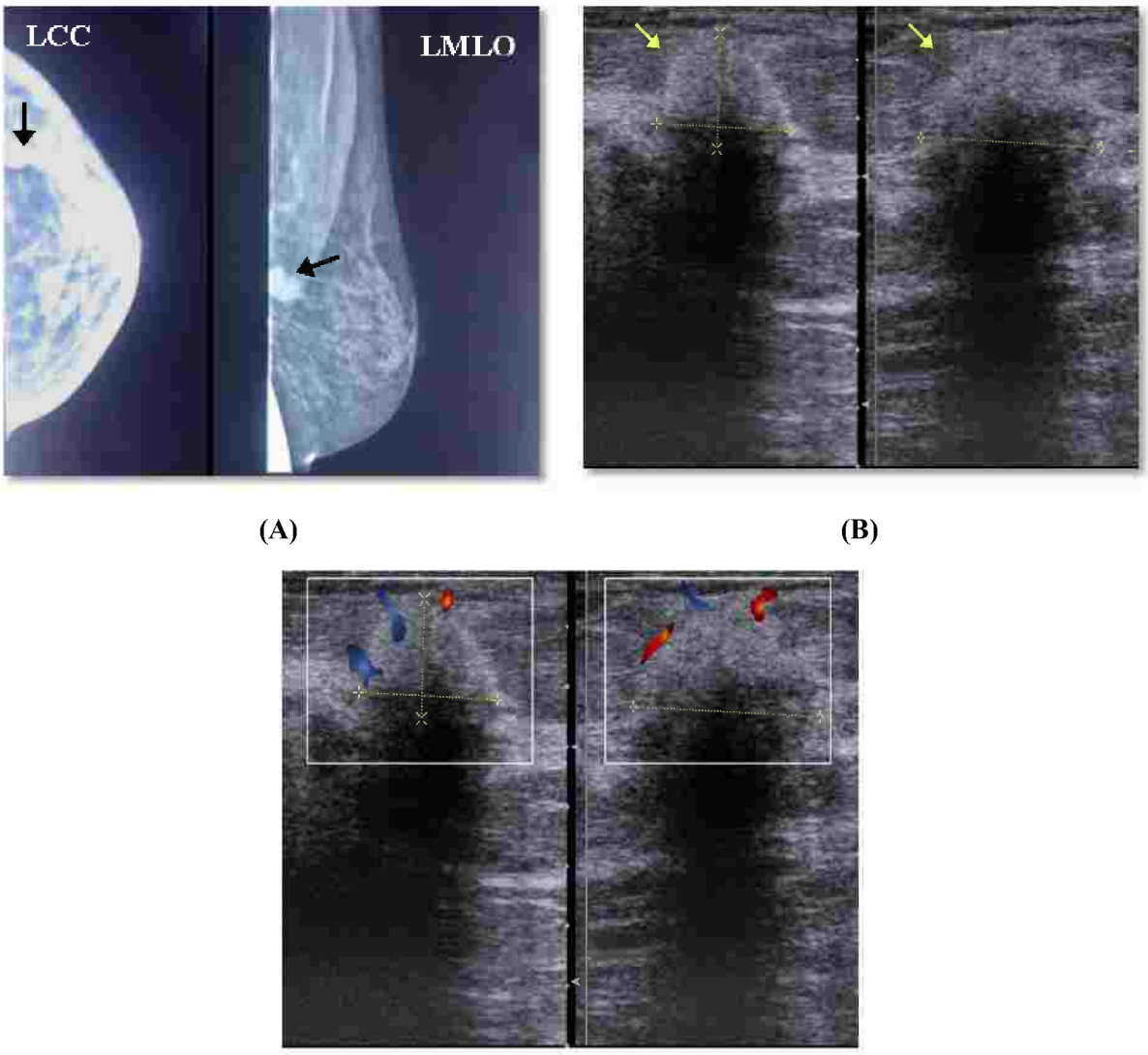



**Figure (34):** A female patient aged 71 years complaining of breast lump in the upper outer quadrant of the left breast, she had a history of breast cancer on the contralateral breast which was managed by mastectomy followed by radiotherapy.

A- Mammogram of the left breast showed an irregular mass lesion diagnosed as infiltrating ductal carcinoma.

B- Ultrasonographic picture of the lesion showed its irregular ill defined margins, hyperechoic pattern with hypoechoic nidus inside and posterior wall loss of definition with dense posterior shadowing. Ultrasonographic diagnosis was infiltrating ductal carcinoma which was confirmed by histopathology.

C- Doppler ultrasound shows positive intralesional doppler signal.

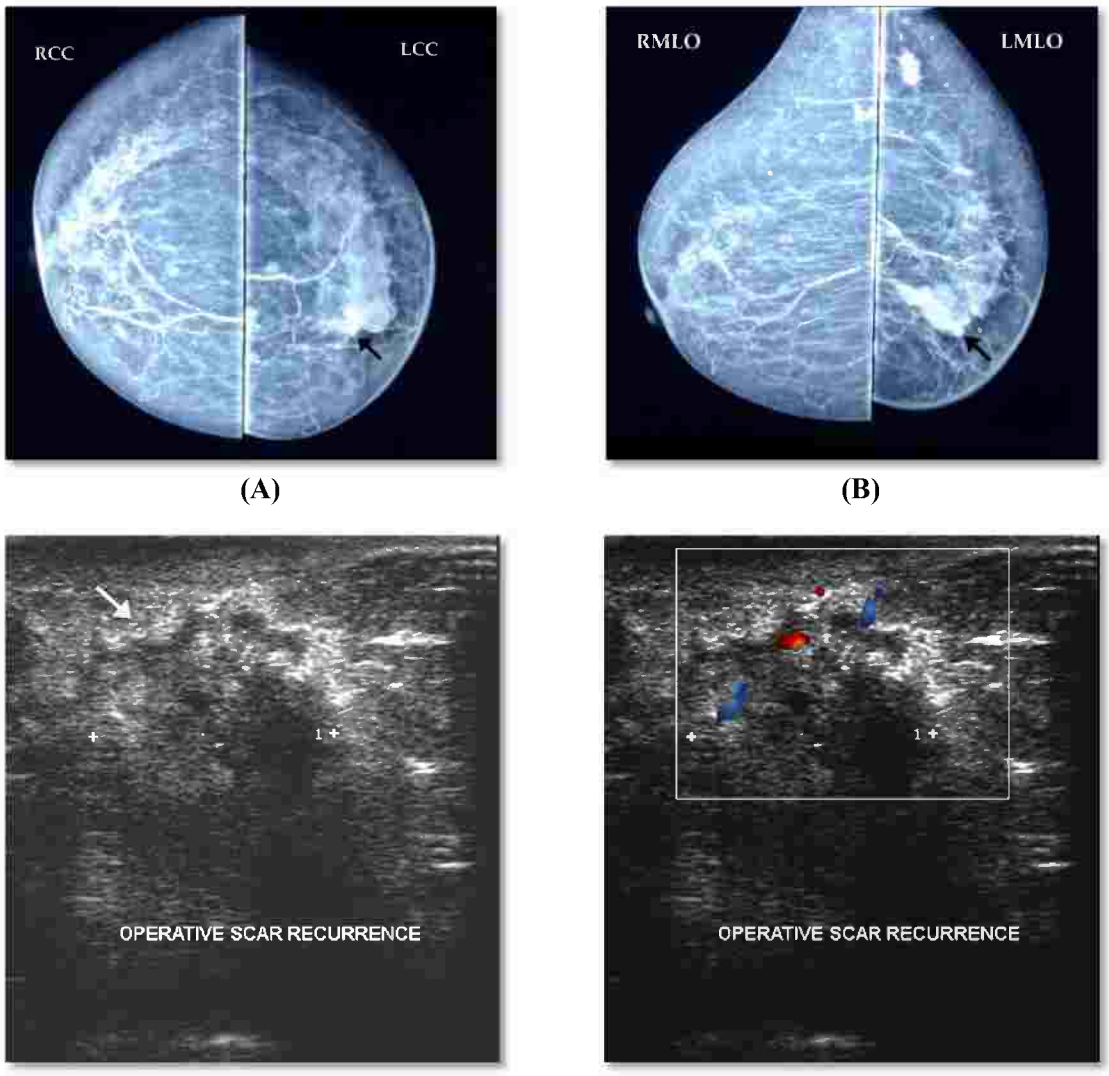



**Figure (35):** Female patient aged 72 years she had a history of breast cancer managed by lumpectomy followed by radiotherapy during follow up of the surgically managed side it was found that:

A&B- Craniocaudal and mediolateral oblique mammographic images of both breasts. The left breast showed multiple irregular mass shadows occupying retroareolar and upper lateral sector expressing spiculated margins with peritumoral lipomatosis features favor the diagnosis of multicentric recurrent malignancy, noted also mild diffuse left breast skin thickening attributed to previous surgery and radiotherapy.

C- Ultrasonographic picture of the retroareolar mass shadow detected by mammography showing shaggy ill defined irregular margins hyperechoic pattern with a hypoechoic central nidus inside, loss of definition of the posterior wall and posterior acoustic shadowing (diagnosed as infiltrating ductal carcinoma).

D- Doppler ultrasound showed intralesional doppler signal and prominent vascularity.

The other upper outer quadrant malignant mass detected by mammography was hypoechoic on US, so not included in the study. Histopathology confirmed the diagnosis of infiltrating ductal carcinoma of heterogenous hyperechoic retroareolar lesions.

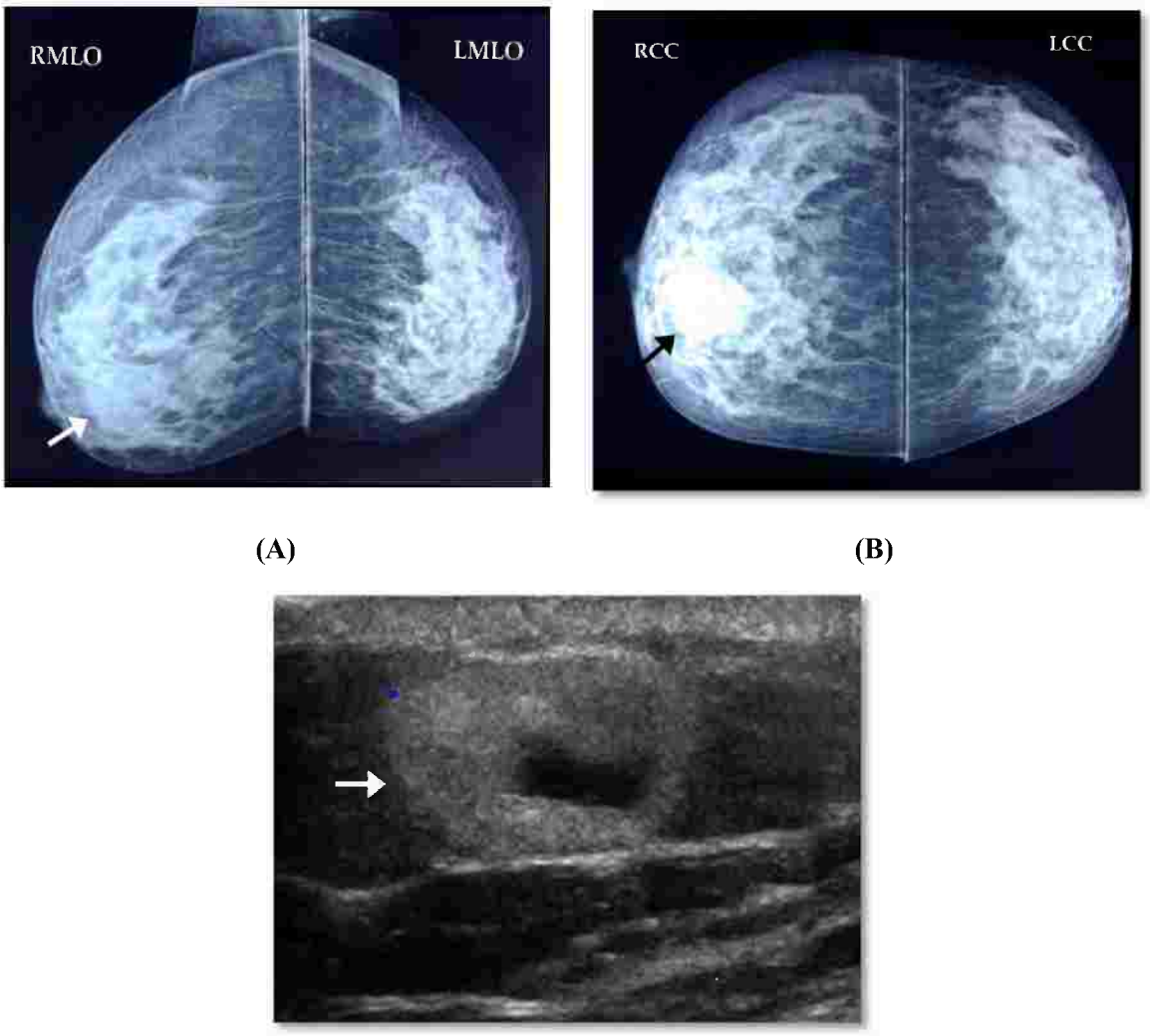



**Figure (36):** A female patient aged 53 years complaining of breast lump in the retro areolar region, she gave a history of breast trauma.

A&B- Mammography showed a well defined mainly oval shaped mass occupying the inferomedial sector of the right breast and heterogeneously increased mammographic density with no calcifications or overlying breast changes.

C- Ultrasonographic picture of the lesion revealed an oval shaped well defined predominately hyperechoic mass showing an irregular internal hypoechoic component showing ill defined margins with morphological dependent fluid fluid level suggested by ultrasound to be organized hematoma. A diagnosis which was not reported by mammography although the lesion was mammographically diagnosed as benign lesion.. Aspiration cytology findings confirmed the diagnosis of breast hematoma.

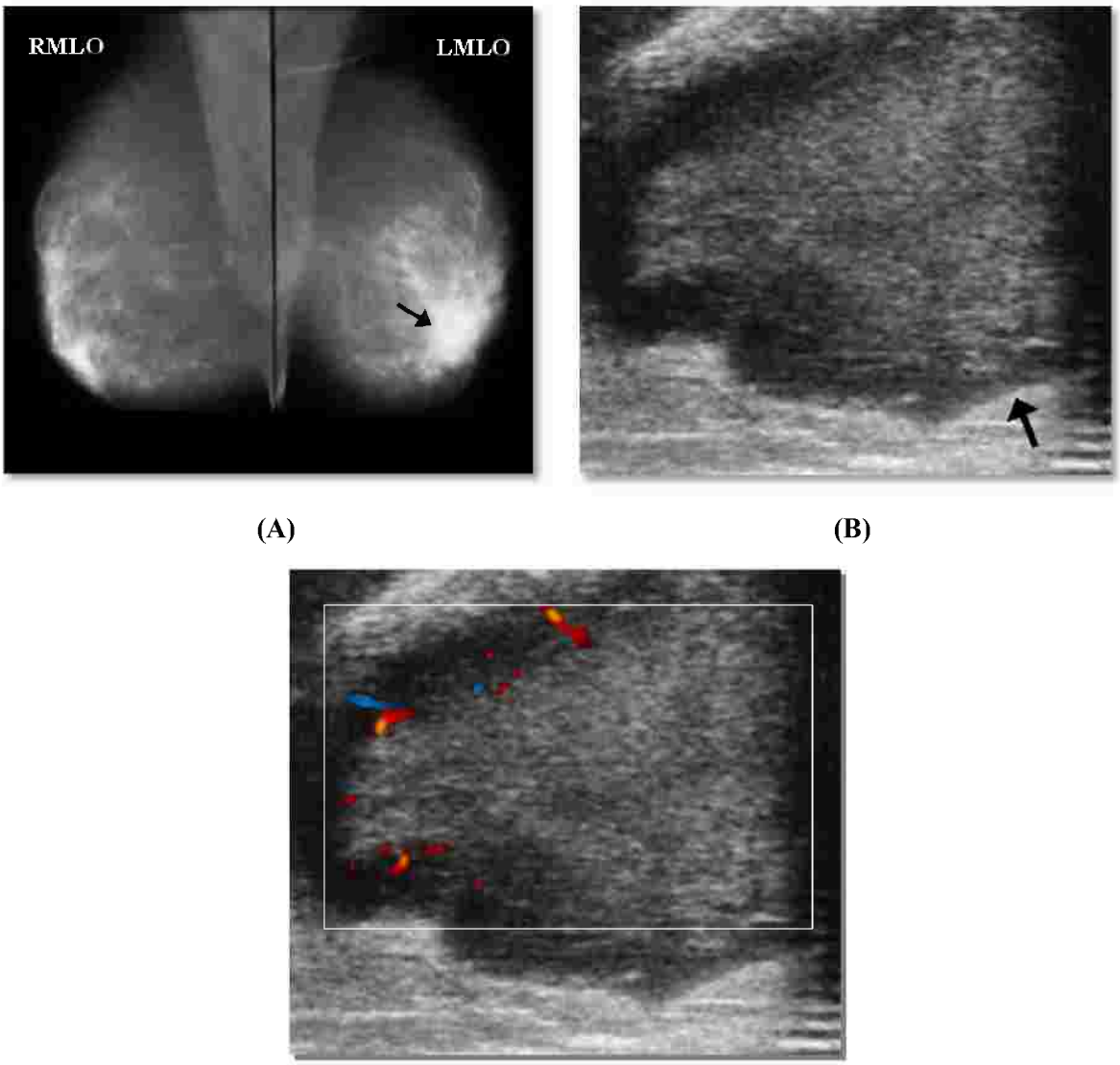



**Figure (37):** A female patient aged 64 years complaining of left mastalgia.

A- A bilateral mediolateral oblique mammography showed an oval ill defied retro areolar mass shadow, increased parenchymal density, breast tissue oedema, thick trabeculae and mild skin thickening. So provisional mammographic diagnosis was left breast inflammatory lesion.

B- Sonography showed an oval, lobulated, hyperechoic homogenous mass with posterior enhancement with.

C- Increased perilesional colour Doppler signal at the lesion's wall. So ultrasonographic diagnosis was necrotizing inflammatory breast lesion (breast abscess) which was confirmed by histopathology as breast abscess.