

A PROSPECTIVE COHORT STUDY OF CYSTIC LESIONS OF THE BREAST, THEIR TYPES AND MANAGEMENT

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ABSTRACT

BACKGROUND

Mass lesions of the breast require sonological evaluation in women of any age group. It is difficult to reach a diagnosis of the cause of the mass lesion without ultrasonographic correlation. This study aims at evaluating subjects who underwent ultrasonography for evaluation of cystic mass lesion of the breast.

Objective- To evaluate subjects presented with cystic lesions of the breast using ultrasonography and to understand the management of different types of cystic lesions of breast.

MATERIALS AND METHODS

80 sonologically detected cystic lesions of the breast were enrolled in the study and were followed up for a minimum period of 6 months. Study was conducted after IEC approval and written informed consent was obtained from each study participant.

RESULTS

Majority of the study subjects (36.25%) were in the age range of 41-50 years. 53.75% of the study subjects had simple cysts. 88.3% of the study subjects with simple cysts underwent needle aspiration and 5 cysts required excision. 3 subjects with simple cysts required aspiration more than once. Two of the three subjects with galactocoele underwent aspiration and one subject developed infection which required antibiotics and excision. Intracystic papillary carcinoma were detected in 21.25% and invasive ductal carcinoma were seen in 20% of the study subjects.

CONCLUSION

The age group of patients presented with cystic lesions of breasts indicate probable lower awareness regarding self-examination of the breasts after 30 years of age. This is a matter of concern. Breast cysts are usually benign though some radiologically complex masses may be malignant. Another differential diagnosis could be tuberculosis which has to be kept in mind.

KEYWORDS

Breast Cysts, Intracystic Papillary Carcinoma, Invasive Ductal Carcinoma, Galactocoele.

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BACKGROUND

Cystic lesions of the breast are seen commonly in females in the age group 30-50 years. These subjects often present with complaints of swelling in the breast or nipple discharge and at times these are incidental findings during a screening mammography. Subjects presenting with cystic breast lesions require an ultrasonographic evaluation as an initial investigation.

MATERIALS AND METHODS

Our study is a prospective cohort study which enrolled 80 subjects with palpable cystic lesions of the breast during a period of 36 months. Sample size was calculated using Epi Info Version 6®. Subjects with palpable solid mass, known

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cases of carcinoma breast and subjects not willing to participate in the study and not willing for sonography of the breast were excluded from the study. Only those cases which are sonologically proven to be cystic were included in the study. All patients were clinically followed up for a period of at least six months. Sonography was done with 7.5–12 MHz, linear array (11L) transducer of Wipro GE Logiq P6. Our study was conducted after obtaining clearance from ethics committee and written informed consent was obtained from each study participant. Statistical analysis was done using free to use software R and descriptive statistics were used for analysis. A p value <0.05 was considered statistically significant.

RESULTS

Simple cysts were encountered commonly (53.75% of the study subjects). Other diagnoses were intracystic papillary carcinoma, invasive ductal carcinoma and the least frequent diagnosis was intracystic papilloma. The various diagnoses of subjects included in the study are demonstrated in Table 1.



Type of Cyst	n (%)
Simple cyst	43 (53.75)
Intracystic papillary carcinoma	17 (21.25)
Invasive ductal carcinoma	16 (20)
Galactocoele	3 (3.75)
Intracystic papilloma	1 (1.25)

Table 1. Different Types of Cysts Encountered

Majority of subjects with cystic lesions of the breast were in the age range of 41-50 years. The age stratification of the subjects enrolled in the study is shown in table 2.

Age	n (%)
21-30	3 (3.75)
31-40	15 (18.75)
41-50	29 (36.25)
51-60	26 (32.5)
60 -70	7 (8.75)

Table 2. Age Distribution of the Patients Enrolled in the Study

The study subjects were followed up clinically for a minimum period of 6 months for understanding the treatment undergone. Aspiration was the most common treatment modality. 38 subjects (88.4%) with simple cysts underwent needle aspiration, among which 3 subjects (6.9%) required more than one aspiration. 5 study subjects underwent excision of the cyst since they recurred even after 3 aspirations. Two of three study subjects with galactocoele were successfully treated with aspiration alone while the 3rd one required excision and antibiotics since it was infected. All the subjects with intracystic papillary carcinoma (n=17, 21.25%) underwent modified radical mastectomy. All the subjects with invasive ductal carcinomas (n=16, 20%) underwent radical mastectomy with axillary clearance and chemotherapy. Hydatid cysts and tuberculosis were not detected in any of the subjects even though they are not uncommon.

DISCUSSION

Cystic breast lesions include a wide spectrum of breast diseases, ranging from the most frequent simple cyst to the uncommon papillary intracystic carcinoma. Sonologically they appear as round, oval or lobulated mass with well-defined margins. The margins may become obscure if associated pericyclic fibrosis is present. Ultrasonography is considered as a good diagnostic tool since it can differentiate cystic lesions from solid mass. Cystic lesions of the breast are classified as simple, complex and complicated. Simple cysts are most common type of cystic lesions of the breast and are caused due to effacement and dilatation of the terminal duct.¹ Mammographic features include a well-circumscribed, anechoic lesion with a thin capsule. Complicated cysts have low level internal echoes, fluid-fluid or fluid-debris level which changes with shift in position of the patient and should also fulfil all the sonological criteria for simple cysts. A complex cyst contains thick walls with a solid component inside the cyst such as mural nodules or septa. Cystic lesions have galactocoele, haematoma, fat

necrosis, breast abscess as differential diagnosis. The following prospective cohort study aims at evaluating the ultrasonographic findings and management of patients with cystic lesions of the breast.

Cystic lesions of the breast are quiet harmless with good prognosis although they cause high degree of alarm and panic in patients. These lesions can occur in any age group, but are commonly seen between the age range of 30-50 years. Our study demonstrates 55% (n=44) of the subjects within the age group of 31-50 years. An alarmingly high number of subjects (n=55, 68.75%) in the age group of 41-60 years were seen in our study. This could either indicate self-examination at a later age or delayed onset of disease. If it is the former case, it requires drastic measures since it indicates lower awareness among females to do self-examination of the breast. If it is the latter the cause of the shift in the age pattern of the patients with cystic lesions should be evaluated. This could also be an indicator of higher use of hormone replacement therapy among subjects included in the study. In our study, the maximum number of subjects (n= 29, 36.25%) were between 41-50 years. The aetiology of breasts cysts are not clearly understood but hormonal dysregulation is an important role in development, hence pharmacotherapeutic agents like oral contraceptives and danazol do have a role in the treatment of subjects not willing for needle aspiration. Paradoxically, subjects who are taking oral contraceptives are at a higher risk of developing breast cysts. The possible explanation being the abnormalities in the hormonal levels produced by oral contraceptives. Oral contraceptive as an aetiological agent for development of breast cysts is low since the use of oral contraceptive among females in the reproductive age group is as low as 30%. Our study demonstrated a higher number of subjects in the age range of 41-60 years with breast cysts which cannot fully rule out the possibility of oral contraceptive as an aetiological agent since history of oral contraceptive use was not recorded.

Sonological classification of breast cysts includes simple cysts, complex cysts and complicated cysts depending on the sonological features suggested by Stavros.^{1,2,3} Simple cysts are the commonest among the cystic lesions. They are well circumscribed with a thin echogenic capsule, round or oval anechoic mass. The echogenic capsules are occasionally thick due to fibrosis of the capsule. These are due to dilatation and effacement of the terminal duct lobular unit. Careful sonographic technique is mandatory since significant internal echoes are easy to be missed with improper gain settings; likewise, the appearance of internal echoes could be created where none exist. Demonstration of posterior acoustic enhancement may also be difficult in small cysts. The technical details of sonographic evaluation such as spatial compounding and tissue harmonics, may help clarify equivocal findings. Complicated cysts are uncommon and they have all the features of simple cysts. The differentiating feature of complicated cysts is low level internal echoes, fluid-fluid or fluid-debris levels which shift with change in the position of the patient. The internal echoes of a simple cyst are due to cell debris, protein, blood, white blood cells,

epithelial cells or cholesterol.¹ Complex breast cysts have thick walls and can be differentiated from simple cysts by the presence of solid elements such as thick septa (> 0.5 mm thickness), mural nodules or other discrete solid components.^{4,5} While diagnosing a complex cyst, differential diagnosis such as haematoma, fat necrosis, abscess, galactocoele and necrotic neoplasm should be considered. The differential diagnoses of complex cyst with mural nodules are atypical ductal hyperplasia, ductal carcinoma in situ, papillary carcinoma and intracystic papilloma. The chances of malignancy with complex breast cysts can range from 23-31% which were reported in two case series.^{6,7} Complex cystic breast mass can be classified into four classes based on ultrasonographic features as suggested by Berg et al.^{4,6} Class 1 includes masses having thick outer wall or thick internal septa or both. Class 2 includes masses that contain one or more intracystic mass. Class 3 includes masses with both cystic and solid components of which at least 50% is cystic. Class 4 includes masses with predominant solid components ($\geq 50\%$) with eccentric cystic foci. Complex cystic breast lesions can be benign, atypical (high risk) or malignant.

Benign lesions that can be considered as differential diagnosis for complex cystic breast mass includes fibroadenoma, fibrocystic changes, intracystic or intraductal papilloma without atypia.^{4,6} Commonly seen atypical pathological findings in complex cystic lesions of the breast include atypical ductal hyperplasia and atypical papilloma. Malignancies like ductal carcinoma in situ and infiltrating ductal carcinoma are the most common malignancies seen in patients with complex cystic mass of the breast. Complex cystic appearance is also seen with infiltrating lobular carcinoma.

Ultrasonography, mammography and fine needle aspiration cytology (FNAC) are necessary investigations to diagnose breast cysts. Ultrasonography helps to differentiate between simple, complicated or complex cysts. Mammography will help to characterise the mass and to detect microcalcifications and also shows suspicious lesions in case of complex cystic masses. Hence, it is a necessary investigation for ultrasound diagnosis of complex cysts. If fat containing lesions are observed with mammography it could be an oil cyst or galactocoele which would help us avoid an unnecessary biopsy. Galactocoeles can be treated by aspiration. Surgery is reserved for those that cannot be aspirated or are infected. For lesions diagnosed as malignant, mammography could be used to know about the extent of disease which could be useful in the surgical management.^{1,4,9}

A diagnosis of a cystic lesion can be made definitively with fine needle aspiration or ultrasonography. Aspiration fluid may be straw coloured, opaque or dark green and may contain debris. Cytological analysis is not always necessary for the cyst fluid unless the cyst fluid contains blood or the mass does not disappear following aspiration, since the chances of malignancy are rare with cysts.¹⁰ Cyst recurrence more than twice or blood containing cyst fluid is an indication for FNA biopsy for evaluation of the solid contents. Surgical

removal is only indicated in cases of multiple recurrence of cysts. Galactocoeles are also treated by aspiration and surgery is performed in cases which are infected or aspiration is not possible.

BI-RADS in Ultrasonography ¹¹

The American College of Radiology Breast Imaging Reporting and Data System (BI-RADS) offers standard terminology as part of their recommended lexicon for breast ultrasound reporting. This terminology can be consistently applied, and management recommendations based on BI-RADS descriptors have been validated for both solid and cystic lesions.

According to the BI-RADS Lexicon, a Simple Cyst must meet the following Criteria (3)-

1. Its margins must be circumscribed (A margin "that is well defined or sharp, with an abrupt transition between the lesion and surrounding tissue").
2. It must be anechoic ("Without internal echoes").
3. It must show posterior acoustical enhancement ("A column that is deep to the mass is more echogenic").

The walls of the cyst must be assessed in all planes and must be thin. The cyst may be oval, round, or lobulated, and it may contain thin avascular septations. The absence of internal echoes and presence of posterior acoustical enhancement define its contents as fluid. A sonographic mass that meets these criteria is benign and requires no further diagnostic evaluation; it is categorised as BI-RADS 2 (benign finding).

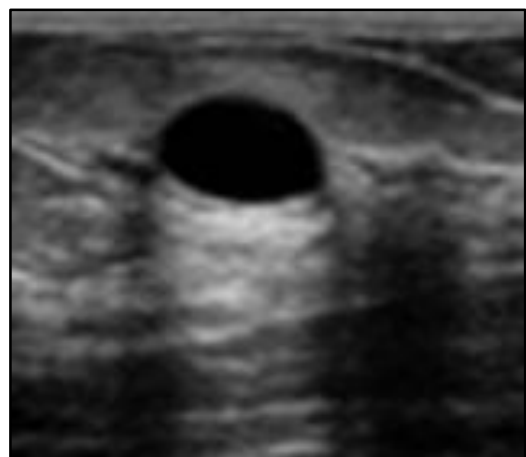


Figure 1. A simple cyst with well-defined sharp margin and acoustic enhancement

Management of a simple cyst is based on clinical features. If it is symptomatic, obscures clinical evaluation, or a new palpable or mammographic finding, it may require aspiration. Breast cysts frequently change in size, and enlargement alone of an otherwise simple cyst does not require intervention.¹²

Complicated cyst is identical to a simple cyst, except with regard to internal echoes. Complicated cysts are circumscribed and show posterior acoustical enhancement, but are not anechoic. Complicated cysts contain low-level

internal echoes representing proteinaceous fluid, cholesterol crystals, blood, or other material. Swirling internal echoes may be accentuated by increasing the sound energy focused on the mass, through either increasing the ultrasound gain settings or applying power Doppler. If a cyst with fluid contents with changing 'fluid – fluid' or 'fluid – debris' level with changing posture otherwise meets criteria of a simple cyst, it may be managed in the same way as any simple cyst (BI-RADS 2).¹¹

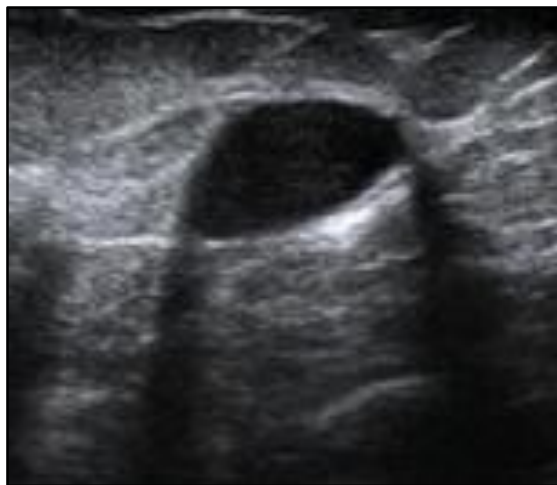


Figure 2. A complicated cyst with well-defined margins, acoustic enhancement and fine internal echoes which are changing with posture

If these features are not present, the mass may be solid. Doppler evaluation has got a role here, because demonstration of internal vascularity suggests a solid matrix. In the absence of flow, the mass cannot be definitively characterised as solid or cystic, and management will depend on the clinical setting and correlation with other imaging findings. If the mass is clinically or mammographically new or is symptomatic, aspiration should be attempted. If aspiration fails, biopsy is required since the mass is considered as a new solid mass. Biopsy should also be considered if aspiration is successful but yields bloody fluid.¹¹

If the mass is incidentally discovered and shows no suspicious clinical or mammographic features, these are categorised as (BI-RADS 3) and attempted aspiration or short-interval followup may be appropriate because the risk for malignancy is very low.¹¹

Frequently in fibrocystic change, ultrasound shows numerous small, hypoechoic to anechoic nodules that meet criteria for simple and complicated cysts. Here the risk for malignancy is again very low, as with multiple circumscribed nondominant mammographic masses. These are categorised as (BI-RADS 2); no additional focused evaluation may be required. In high-risk patients or other complex situations, breast MRI may provide additional information because most malignant masses will enhance, whereas complicated cysts will not.¹¹

The BI-RADS lexicon defines a complex cyst as a "mass which contains both anechoic and echogenic components" or it has "both cystic and solid components".

The mass may be predominantly cystic or solid; it may be cystic except for asymmetric thickening of its wall, a focal mural mass, or thickened septations. As with indeterminate solid masses, complex cysts usually require biopsy (BI-RADS 4). If the lesion is predominantly solid, core needle biopsy may be appropriate. If the lesion is predominantly cystic, percutaneous biopsy or surgical excision may be required because the lesion may disperse and become unapparent after initial core needle targeting, resulting in incomplete sampling.¹¹

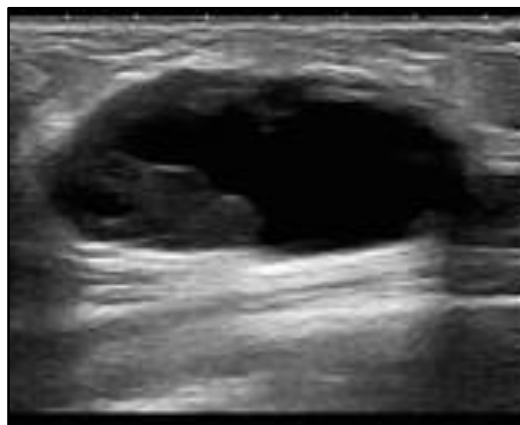


Figure 3. A complex cyst with thick irregular margins and internal echoes which are attached to the walls. Same revealed Doppler flow as well

Other cystic lesions in the breast are clustered microcysts, dermal cysts, galactocoele, seromas, fat necrosis, abscesses, and haematomas. Clustered microcysts may be followed (BI-RADS 3) but careful sonographic evaluation is needed to ensure that the lesion is not a complex mass. Differentiating clustered microcysts from micropapillary ductal carcinoma in situ is difficult. When doubt exists, percutaneous biopsy may be required, especially in postmenopausal women not taking hormonal replacement, since it is less likely to develop new fibrocystic changes in them.¹¹

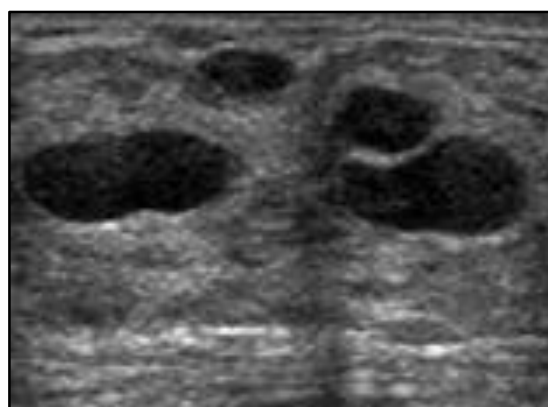


Figure 4. Clustered microcysts

Dermal cysts are usually readily apparent because of their cutaneous location; they most likely represent sebaceous or epidermal inclusion cysts and vary from anechoic to echogenic. Galactocoele is a specific form of complicated cyst that contains fat or milk products, and are

generally managed on clinical grounds. Seromas and abscesses are having variable sonographic features and usually diagnosed based on the clinical setting.¹¹

In summary, even though ultrasound findings are variable, cystic lesions can be classified based on specific sonographic features as outlined in the BI-RADS lexicon, and this classification can be used to select appropriate management pathways.¹¹

Role of Elastography¹²

Stiffness of the mass and surrounding tissue is elicited by manual compression (strain) or by introduced ultrasonic energy into a mass ("shear wave"). The FDA approved m/s and kPa as a unit of measure of lesion stiffness for shear-wave elastography. Cancers and surrounding tissue are expected to be hard, and benign to be soft but there is overlap.¹² Non-viscous fluids are incompressible, and simple cysts should therefore not display signals of deformability at RTE; however, artifacts may produce a typical "tri-stratified" or "target" pattern according to the type of algorithm used by the equipment.¹²

With regard to shear wave elastography of the breast, different pressure wave propagation velocities have been observed in various tissues. This allows a good differentiation of medium elasticity measured in adipose tissue (3 kPa), dense parenchyma (45 kPa), benign lesions (< 80 kPa) and malignant lesions (> 100 kPa). In general, the stiffer the tissue, the greater is the velocity with which a pressure wave travels through it. Simple cysts yield a velocity value of 0 as the shear waves do not propagate in non-viscous fluids.¹²

Descriptions that are applicable are 'soft, intermediate and hard'.¹²

Ultrasonic criteria of shape, margin, and echogenicity are far more predictive for malignancy than hardness or softness, and elastography evaluation should not override the more predictive morphologic features of malignancy for patient management.

CONCLUSION

Breast cysts are usually benign though some radiologically complex masses may be malignant. Ultrasonography is a definitive investigation to identify cysts. In case of complex cysts a mammography or FNA biopsy needs to be done. A diagnosis of galactocoele and tuberculosis has to be kept in mind.

Limitations

Low sample size and absence of long term follow up are the limitations of our study.

REFERENCES

- [1] Hines N, Slanetz PJ, Eisenberg RL. Cystic masses of the breast. *American Journal of Roentgenology* 2010;194(2):122-133.
- [2] Stavros AT, Thickman D, Rapp CL, et al. Solid breast nodules: use of sonography to distinguish between benign and malignant lesions. *Radiology* 1995;196(1):123-134.
- [3] Stavros AT. Sonographic evaluation of breast cysts. In: Stavros AT, ed. *Breast ultrasound*. Philadelphia, PA: Lippincott Williams & Wilkins 2004:276-350.
- [4] Doshi DJ, March DE, Crisi GM, et al. Complex cystic breast masses: diagnostic approach and imaging-pathologic correlation. *Radiographics* 2007;27:53-64.
- [5] American College of Radiology. *ACR BI-RAD ultrasound*. In: *ACR breast imaging reporting and data system, breast imaging atlas*. Reston, VA: American College of Radiology 2003.
- [6] Berg WA, Campassi CI, Ioffe OB. Cystic lesions of the breast: sonographic-pathologic correlation. *Radiology* 2003;227(1):183-191.
- [7] Doshi DJ, March DE, Coughlin BF, et al. Accuracy of ultrasound-guided percutaneous biopsy of complex cystic breast masses. In: *Radiological Society of North America scientific assembly and annual meeting program*. Oak Brook, Ill: Radiological Society of North America 2006:655.
- [8] Hunt KK, Green MC. Breast. In: Townsend C, Beauchamp RD, Evers BM, eds. *Sabiston text book of surgery*. 19th edn. Saunders 2012:824.
- [9] American College of Radiology. *ACR practice guidelines for the performance of diagnostic mammography*. In: *ACR guidelines and technical standards*. Reston, VA: American College of Radiology 2006.
- [10] Mukhopadhyay M, Chatterjee TK, Piplai G, et al. Cystic lesions of the breast: a study of fifty cases. *Journal of Evolution of Medical and Dental Sciences* 2014;3(34):9046-9049.
- [11] Huff JG. The Sonographic findings and differing clinical implications of simple, complicated, and complex breast cysts. *J Natl Compr Canc Netw* 2009;7(10):1101-1105.
- [12] Berg WA, Sechtin AG, Marques H, et al. Cystic breast masses and the ACRIN 6666 experience. *Radiol Clin North Am* 2010;48(5):931-987.