

## CLINICAL STUDY

# The value of fine needle aspiration and cytologic examination of impalpable complicated breast cysts

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**Abstract:** *Background:* The purpose of the study was to evaluate the utility of fine needle aspiration – FNA and cytologic analysis of impalpable complicated breast cysts.

*Material and methods:* We reviewed the imaging findings, aspiration, cytology and biopsy results and follow-up imaging findings of 246 complicated cysts in 166 women retrospectively.

*Results:* FNA was performed in 169 out of the 246 complicated cysts. Thirtyone lesions were followed-up with US. Surgical biopsy was performed from five lesions. No malignant cells (137 cysts), insufficient cellular material (17 cysts), atypical cells (4 cysts) were seen in cytological examination of the aspirates. None of these lesions were found to represent malignancy at the time of surgical excision and during follow-up.

*Conclusion:* Impalpable complicated breast cysts may be classified as probably benign and can be managed with follow-up imaging studies instead of intervention. Routine cytologic examination is unnecessary if the fluid is not bloody (Tab. 2, Ref. 18). Full Text (Free, PDF) [www.bmj.sk](http://www.bmj.sk).

Key words: complicated breast cyst, ultrasound, cytology.

The widespread use of mammography and sonography in symptomatic and screening populations has resulted in an increasing detection of occult breast lesions, a substantial portion of which are benign cysts. If a breast lesion is anechoic, thin walled, and has good through transmission it can be confidently diagnosed as a simple cyst and no further tests are needed. However, some breast cysts do not fulfill all criteria for simple cysts and are often referred to as complicated cysts.

Complicated breast cysts represent a very heterogenous group of entities with significantly different risk of malignancy. Sonography is useful in risk stratification of malignancy in breast cysts. Thick cyst wall, thick internal septae, intracystic mass or mural tumor are predictive of neoplasm and must be biopsied (1, 2, 3). Controversy arises frequently when the lesion encountered has internal echoes without a distinctly visible solid mass or, alternatively,

when the lesion is anechoic but lacks posterior wall enhancement. For such lesions, recommendations vary from annual follow-up to biopsy (4, 5).

Venta et al's (4) study suggests that complicated breast cysts (internal echoes or no posterior acoustic enhancement) can be rather followed than undergo aspiration because only 0.3 % of

the complicated cysts in their series were shown to be malignant (2, 6). We reviewed the reports of the cytologic analysis of fluid from all such complicated cysts that were aspirated with the use of ultrasonography at our institution during a 44 month period. Our study was undertaken to evaluate the need for intervention for impalpable complicated breast cysts and the utility of routine cytologic examinations of cyst fluid.

## Materials and methods

Between October 2000 and June 2004, 7700 consecutive ultrasound examinations were performed at our institution using a 7.5-MHz linear array transducer. Five radiologists interpreted the breast ultrasounds and found 246 nonpalpable complicated cysts in 166 women, representing 2.1 % of all ultrasounds. The term complicated cysts as used at our institution, refers to lesions that differ from simple cysts in appearance: In complicated cysts, visible posterior wall enhancement is absent or internal echoes are present. Cysts with thick walls or septa, containing solid component or mural nodules have not been described as complicated cysts.

For 169 out of the 246 lesions, sonographically guided aspiration was performed (Tab. 1).

Aspiration was performed by using an 18 or 20 gauge needle and all aspirates were sent for cytologic examination. The presence of residue after aspiration was checked with US. The next stage was confirmation according to the color of the aspirated fluid and cytology findings. If no fluid was obtained during attempted aspiration these masses were considered solid and subsequent recommendations for each patients were based on

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**Tab. 1. The number of lesions and patients.**

	Number of patients (%)	Number of lesions (%)
Fine Needle Aspiration Biopsy	112 (67.4%)	169 (68.6%)
Follow-up with US	24 (14.5%)	31 (12.6%)
Not returned	30 (18%)	46 (18.6%)
Total	166	246

the result of cytologic finding and the appearance of the mass on mammograms or sonograms.

Thirty one of the 246 complicated cysts were followed-up with US (mean 15 month, range 6–36 month). Forty six lesions in 30 patients could not be evaluated because these patients did not return for follow up.

## Results

The mean age of the patients was 47 years (age range 21–74). Of the group, 98 (59 %) were aged 40 to 50 years, 7.2 % younger than 40 years and 33.7 % older than 50 years. The lesions ranged in diameter from 4 to 41mm (mean, 15 mm). 112 women (66.4 %) had one complicated cyst, 38 women (22.8 %) had two complicated cysts, 6 women (3.6 %) had three complicated cyst and 10 women (6 %) had more than three complicated cysts.

A review of sonography reports revealed that complicated cysts were accompanied by other lesions in 132 (79.5 %) women. Only in 20.4 % of the women were the complicated cysts solitary lesions (Tab. 2).

Mammography was available for review in 124 women. In 56 of them (45.1 %) lesions were visible on mammograms as medium density nodules with circumscribed or partially circumscribed borders. In the other 68 women (54.8 %), lesions were not seen on mammograms; they were found incidentally during evaluation with sonography of separate findings on mammograms or detected with screening US of women with dense breast tissue.

Of the 169 aspirated lesions, 165 (97 %) were fluid filled and deflated to minimum of 75 % of original volume. None of these lesions have a substantial residual volume suggestive of an intracystic mass after aspiration. No fluid was obtained during attempted aspiration from 4 (2.3 %) lesions. These masses were considered solid and were followed up sonographically (mean: 18 months range: 6–36 months). All lesions appeared stable at the time of follow-up.

**Tab. 2. Lesions accompanying complicated cyst in US.**

No other lesion	34 (20.4%)
Simple cyst	33 (19.8%)
Complicated cyst	35 (21%)
Simple and complicated cyst	40 (24%)
Probable benign solid lesion	11 (6.6%)
Probable benign solid lesion and cystic lesion	13 (7.8%)

No malignant/atypical cells were identified in the 144 (87.2 %) cysts during cytologic examination. Insufficient cellular material was seen with examination of fluid from 17 (10.3 %) cysts and atypical cells were seen in 4 (2.4 %) lesions. All of these 4 lesions subsequently underwent surgical biopsy. At the time of excision three of these lesions showed fibrocystic changes; the lesion of the fourth patient was a fat necrosis.

16 (9.6 %) of the 165 aspirated cysts were bloody. Of these, three were dark in color suggesting the presence of old blood, or other bright red fluid suggesting traumatic origin. No malignant/atypical cells were seen with cytologic analysis of these aspirates. 64 lesions (12 bloody, 52 nonbloody) were followed with US after aspiration. (2–36 mean 13 months) and recurrence was found in 16 (25 %). A lesion that contained dark blood and recurred two months after underwent biopsy. Pathologic specimen showed an intraductal papilloma. Other recurrent lesions were nonbloody and were followed routinely.

Of 31 complicated cysts followed with US, 15 remained the same size, 9 became smaller, 6 disappeared and 1 was enlarged. One lesion that was enlarged was aspirated and no atypical cells were found in its cytology.

## Discussion

Breast cysts are extremely common and can be seen in most women over 40 years. Cysts may be multiple, solitary, palpable, and/or occult. Most cystic changes regress after menopause; however, estrogen replacement in this age group may cause cyst to redevelop. 33 percent of patients in this series were older than 50 years.

On mammograms, a cyst usually appears as a circumscribed, round mass that is of low to medium density. Most often, however, the adjacent breast tissue obscures a portion of the margin. Distinguishing a cyst from a solid lesion is not possible with mammography, but US is extremely useful for this differentiation. US is the most reliable method of diagnosis, with a reported accuracy of 98–100 % when all of the criteria of a simple cysts are met (posterior acoustic enhancement, smooth walls and anechoic) (7). Because a breast cyst often contains debris, which is mildly echogenic, differentiation of complicated cyst from a solid lesion can be problematic at times; particularly if the lesion is deep or very small. When internal echoes are seen within a cyst, the most common causes are artifactual, usually from improper gain or power adjustment, reverberation, or other artifacts. Lesions with lack of posterior wall enhancement may be due to technical factors. Lack of posterior-wall enhancement has been described in as many as 25 % of the complicated cysts in an early series. When real echoes are found within a cyst, they usually are attributed to proteinaceous material, cellular debris, hemorrhage, infection, or cholesterol crystals within the cyst (7, 8, 9). Thickening and inspissation of cyst contents, small intracystic septa, and cyst wall calcification may result in posterior shadowing. Partially collapsed or multiloculated cysts and cysts with thickened walls may appear poorly defined or microlobulated. As many as 10–20 % of small cysts have an atypical sonographic

appearance (10). Although generally highly accurate, breast US's diagnostic capabilities are limited in such lesions (4, 5).

US-guided aspiration of impalpable breast masses, which may be cysts, is helpful for diagnosis in complicated cysts, may obviate surgical biopsy or short-term follow-up (5, 10, 11). If nonbloody material is aspirated and the lesion completely collapses, the diagnosis of a complicated cyst can be done with confidence and additional follow-up is not required. If aspiration fails, sonographically guided core needle biopsy or excisional biopsy can be performed subsequently (5, 10). Lesions which were evaluated as complicated cysts by US and in which aspiration was not possible, CNB and excisional biopsy have been carried out after aspiration and lesions shown to be benign were solid ones such as fibroadenoma, lymph node or focal fibrosis (2, 4, 11). Lesions which were not aspirated but followed up were reported to be stable (12). In the series of Venta et al (4), only one (0.3 %) of 308 complicated cysts proved malignant, which was a 3mm focus of DCIS diagnosed at CNB. Buchberger et al (10), found none of 133 of such lesions to be malignant, and Kolb et al (12), found none of 126 of such lesions to be malignant in their series of screening sonography. In the series of Vargas (3), no malignancy was found in 18 palpable, probably benign complicated cysts. In our series, none of 200 complicated cysts proved to be malignant. Thus, cumulatively, only one (0.1 %) of 785 complicated cysts has been proved malignant. Thus, although the sonographic appearance of complicated cysts overlaps with that of solid benign mass, some authors maintain that these lesions may be classified in the probable benign group and followed with imaging studies (4). Nevertheless, Louie et al (5), found cancer in two of 78 nonpalpable complicated cysts (2.5 %), which is not compatible with the previous literature and our results.

This discrepancy may be due to the differences between the studies in the definition of lesions defined as complicated cysts. In the series of Louie et al, lesions with irregular borders were evaluated as complicated cysts. The definition of complicated cysts differs in the literature, hence the malignancy rates turn out to be different.

The utility of cytologic examination of fluid from breast cysts has been questioned by many authors. Most reports in the surgery literature that examine the utility of cytologic analysis of fluid from breast cysts do not include descriptions of radiologic images (13). Cytological examination is not recommended unless aspirated fluid is bloody in palpable cysts (14). Smith et al (13) have evaluated the utility of cytologic examination of fluid from impalpable breast masses whose appearances on sonograms suggested cysts but did not completely fulfill strict criteria for simple cysts. In this study, no malignancies were detected with routine cytologic examination of aspirated fluid obtained during mammography or sonography from 660 breast masses. Authors concluded that routine cytologic examination is unnecessary if the fluid obtained with radiologically guided aspiration from impalpable breast cysts is not bloody. Our policy is to routinely send aspirated fluid to cytopathologists for evaluation, with the understanding that this is a very low-yield effort.

The unusually low incidence of cystic malignant breast tumors does not justify routine cytologic examination, except for specific circumstances. These include a bloody aspirate, a residual mass after aspiration or prompt recurrence of a mass after successful aspiration. In fact, false negative cytologic diagnosis due to insufficient number of tumor cells is not an uncommon problem in cystic breast neoplasms (15, 16). Tabar et al (17) found that cytologic examination of fluid from breast cysts was less reliable for detecting a malignancy than gross inspection of fluid at the time of aspiration. In the series of Venta (6), 8 % of all aspirated complicated cysts were bloody and cytologic results showed all cases to be benign. In the series of Smith (13), 6 % of all aspirated lesions were bloody and in 13 % of these fluids, atypical cells have been detected. In the pathological examination of these lesions, fibrocystic changes and intraductal papilloma have been found. In the present study, 9 % of the aspirated cysts were bloody and in cytological examination, no atypical/malignant cells were seen and no malignant lesions were observed in histopathological examination and follow up evaluations. Vargas et al (3) recommend tissue diagnosis if the aspirate is bloody or if there is a residual solid component after aspiration and complicated cyst larger than 3 cm.

Follow-up of palpable breast cysts aspiration is critical. If nonpalpable complicated cyst is nonbloody and is resolved completely with aspiration, routine follow up is adequate. There is high risk of recurrence after cyst aspiration (20–80 %). Recurrence is more frequent in patients with a previous history of cysts and in patients with bilateral or multiple cysts relative to single cysts (6). Cysts that recurred and were excised proved to be benign (2). Bodian et al (18) suggested that the risk of malignancy was proportional to the number of cysts aspiration. In the series of Venta, two complicated cysts, from which bloody fluid was aspirated and which recurred with US follow up underwent excisional biopsy, with fibrocystic changes in one and fibrocystic changes and ductal papilloma in the other. In this study, 52 nonbloody and 12 bloody lesions have been followed with US and recurrence was found to be at the rate of 25 %. Nonbloody recurrent cysts have not undergone aspiration again. Yet, in one recurrent cyst with dark bloody fluid, intraductal papilloma was established with surgical biopsy.

Neither a bloody aspirate nor refilling of a complicated cyst is diagnostic of underlying malignancy.

In conclusion, the majority of complicated cystic lesions detected in this study have been classified to actually incidental occult lesions. The number of cases observed as solitary lesion in mammography hence complicated cysts that were detected after US examination is limited. One of the conclusions to be drawn from this study is that complicated cysts are mostly occult and usually accompanied by other cystic or benign solid lesions. The detection of these lesions gives rise to anxiety of the patient and leads the radiologist to spend effort and time, whether they are followed or undergo intervention. In addition, on the basis of the collective experience of this series and of the literature, the majority of incidental nonpalpable complicated cysts containing internal echoes or absent posterior wall enhancement may be

classified as probably benign and can be managed with follow-up imaging studies instead of intervention.

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