

## Quantity Insufficient Lesions in Ultrasonography-guided Fine-needle Aspiration Cytology of Breast Lesions

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### ABSTRACT

**Objective:** To reassess 'quantity insufficient' fine-needle aspiration cytology breast lesions and explore ways to minimise such reporting.

**Methods:** Ultrasonography-guided fine-needle aspiration cytology of breast lesions performed in 2009 and labelled 'quantity insufficient' were reviewed. The nature and size of lesion, the fine-needle aspiration cytology needle size, the number of passes, years of sampling experience of the respective radiologist, and outcome of the lesion / patient were assessed.

**Results:** A total of 593 women, having 673 breast lesions of Breast Imaging-Reporting and Data System of R2 or above, underwent ultrasonography-guided fine-needle aspiration cytology during the defined period. In all, 88 lesions (all hypoechoic) in 76 women (24-78 years old) with at least one 'quantity insufficient' report in 2009 were identified. Most fine-needle aspiration cytology was performed by two passes with a 22G hypodermic needle. All were performed by radiologists with experience in such biopsies ranging from 1 to more than 10 years. Most lesions were 5 mm to less than 10 mm in size. The fine-needle aspiration cytology reported as 'quantity insufficient' had a rate of 15%, and the mean number of aspiration attempts for each lesion was 1.8. Five lesions eventually underwent core biopsy or excision. Of the 88 lesions, 40 (45%) were benign lesions, 12 (14%) were cysts, and 3 (3%) were fat lobules. Based on interval ultrasounds, 20 (23%) of the lesions were static or shrunken, and 5 (6%) were not found; the remainders were pending interval ultrasound.

**Conclusion:** The rate at which ultrasonography-guided fine-needle aspiration breast lesion cytology reported as 'quantity insufficient' could be minimised by remarking the nature of lesion, modifying the method of sampling, and maximising interdepartmental communication. More than 90% of 'quantity insufficient' lesions were eventually found to be benign or static on repeated fine-needle aspiration cytology or follow-up.

**Key Words:** Biopsy, fine-needle; Breast neoplasms; Mammography; Predictive value of tests; Stereotaxic techniques

## 中文摘要

### 超聲引導細針穿刺抽吸活檢病變組織量不足乳腺病變

黃卓琦、馮小玲

**目的：**探討乳腺病變細針穿刺抽吸活檢病變組織量不足的情況，及找出方法盡量減少此類問題出現。

**方法：**回顧2009年在本院進行乳腺病變超聲引導細針穿刺抽吸活檢被認為病變組織抽吸量不足病例。並評估病灶的類別及大小、用針的大小、穿刺的次數、放射科醫生對抽取有關組織的經驗年

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資、及病灶/病人的結果。

**結果：**2009年期間有593名女性，共673個乳腺病變，於乳腺影像報告和數據系統（BI-RADS）達R2級或以上，進行超聲引導細針穿刺抽吸活檢。當中發現76名介乎24至78歲的病人中，88個乳腺病變（均為低回聲灶）有至少一次抽吸量不足的報告。大部份檢查都以22G皮下穿刺針穿刺兩次。所有活檢均由有一年至超過十年的相關經驗放射科醫生進行。多數病灶為5毫米至少於10毫米不等。被認為是病變組織抽吸量不足的比率為15%，每個病灶平均有1.8次的活檢。有5個病灶最終進行小切片或切除手術。88個乳腺病變中，40個（45%）為良性、12個（14%）為囊腫、3個（3%）為脂肪小葉。中期超聲檢顯示有20個（23%）病灶呈靜止狀態或縮小，5個（6%）為陰性；其餘的病灶有待進一步超聲檢結果。

**結論：**要減少超聲引導細針穿刺抽吸活檢中乳腺病變組織量不足的情況發生，須要知悉病變的類別、修改抽取組織的方法、並加強各部門間的溝通。超過九成抽吸量不足的病變通過重複細針穿刺細胞學或隨訪後發現為良性組織或呈靜止狀態。

## INTRODUCTION

Breast lesions are characterised according to the Breast Imaging–Reporting and Data System (BI-RADS).<sup>1</sup> Ultrasonography (USG)–guided fine-needle aspiration cytology (FNAC) of breast lesions were labelled ‘quantity insufficient’ (QI) at a rate of 8 to 34%.<sup>2-4</sup> The current study aimed to reassess breast lesion specimens obtained by FNAC that were reported as QI and explore ways to minimise the ‘QI’ reporting rate.

## METHODS

All the records of patients with breast lesions investigated by USG-guided FNAC in the Department of Radiology in Tuen Mun Hospital, Hong Kong from 31 December 2008 to 29 December 2009 were retrospectively reviewed. All lesions with at least one FNAC performed during that period with a pathology report stating QI were included. Lesions with a definitive histopathology result and those biopsied by core needle and stereotactic guidance were excluded. None of the lesions with USG or a stereotactic-guided core needle had QI result. The initial and follow-up USG reports, USG-guided FNAC reports, and cytology forms and reports were reviewed. The size of the respective breast lesions, USG features, FNAC needle sizes, number of repeated FNAC attempts, nature of each lesion, years of experience of the responsible radiologist, and lesion / patient outcome were retrospectively reviewed.

The cytology result was assessed by pathologists according to accepted criteria<sup>5</sup>:

- C1: insufficient cells for cytological analysis

- C2: cells present all benign; no suspicious features
- C3: cells suspicious but probably benign
- C4: cells suspicious but probably malignant
- C5: definitely malignant

Lesion outcomes were determined by cytology results, lesion characteristics and size on follow-up ultrasounds, and review of the cases in clinical radiological histopathological meetings (CRHMs). Possible outcomes included being benign (by cytology), cysts (reported on cytology or after FNAC), fat lobules (suspected on USG), not detectable on follow-up ultrasounds and those pending follow-up imaging.

## RESULTS

A total of 593 women, with 673 breast lesions of BI-RADS category R2 or above, underwent USG-guided FNAC during the defined period. There were 102 lesions reported as QI from 88 breast lesions (Table 1). All the lesions were hypoechoic, and identified in 76 women

**Table 1.** Summary of the number of breast lesions underwent FNAC, QI lesions, and patient selection in 2009 in Tuen Mun Hospital.\*

Summary	No.
Patients who underwent FNAC of breast lesions	593
Breast lesions for FNAC	673
Breast lesions that had at least one QI result	88

Abbreviations: FNAC = fine-needle aspiration cytology; QI = ‘quantity insufficient’; USG = ultrasonography; CRHM = clinical radiological histopathological meeting.

\* All USG-guided breast FNAC from 31 December 2008 to 29 December 2009; data collection includes all CRHM-discussed cases, breast USG / FNAC reports, and cytology reports.

**Table 2.** Summary on the outcome of the QI breast lesions (n = 88).

	No. (%) of lesions
Biopsy benignity	40 (45)
FU USG fat lobule	3 (3)
Cyst	12 (14)
FU USG static	20 (23)
Not identified	5 (6)
Pending FU USG	8 (9)

Abbreviations: QI = 'quantity insufficient'; FU = follow-up; USG = ultrasonography.

(age range, 24-78 years old). During this period, 14 were repeatedly reported as QI. The overall FNAC rate reported as QI was 15%. The outcomes of these 88 lesions were followed up and were last updated in January 2011.

In our breast FNAC unit, most aspirations were performed using two passes with a 22G hypodermic needle. Attempts have been made to investigate combinations of different needle size, and number of passes. However, the relatively small numbers in each combination limits the assessment. Regarding the 88 breast lesions, the mean number of FNAC attempts per appointment was 1.8.

Two QI lesions were eventually submitted to core biopsy and three were surgically excised. The outcomes of the 88 QI lesions are listed in Table 2; 40 (45%) were eventually diagnosed as benign based on cytology / histopathology (e.g. fibrocystic disease, or fibroadenoma), 20 (23%) were static or shrunken, 5 (6%) were not identified, and 3 (3%) were fat lobules on follow-up USG, 12 (14%) were cysts. Six of the patients with cysts probably underwent unnecessary FNAC attempts, which could have been avoided had the findings been based on initial radiological reports and as reviewed in our combined CRHM.

No evidence of malignancy was detected in any of the QI-labelled lesions up until the last review in January 2011, though eight (9%) of the relevant breast lesions were still pending interval ultrasound reassessment. Included in these specimens were one C3 papillary lesion (No. 16), one C3 lesion (No. 58), and one showing atypical epithelial proliferation of indeterminate nature (No. 35). These warrant further management although all their first USG follow-up showed no interval enlargement and are pending a second follow-up USG.

Radiologists performing USG-guided FNAC had a range of less than one year to more than ten years of FNAC experience at the time of study. The total number of

**Table 3.** Maximum dimension of the fine-needle aspiration cytology 'quantity insufficient' (QI) breast lesions.\*

Maximum dimension (nearest mm)	No. (%) of all QI breast lesions
<5	6 (8)
5 to <10	39 (51)
10 to <15	24 (32)
≥15	7 (9)

\* No. of solid lesion excluding cysts = 76.

FNACs performed by each radiologist varied. Moreover, the FNAC QI labelling rate also depended on the nature of the lesion and thus individual FNAC QI labelling rates cannot be directly compared.

Of the 76 non-cystic solid lesions encountered in 2009, 39 (51%) had the longest dimensions between 5 mm and just less than 10 mm (Table 3).

## DISCUSSION

This review of all our QI-labelled cases from 31 December 2008 to 29 December 2009 has helped to identify possible ways to improve the yield from FNAC of breast lesions and thus reduce the QI labelling rate.

The required needle size may be gauged by the nature and size of the lesion. Direct comparison between different sizes and combinations was not accurate, due to the small sample size of some of the combinations. However, most FNAC procedures were carried out using a 22G needle passed twice. Walker<sup>5</sup> found that there was no difference in the cytological yield when use of a 21G needle was compared with that of a 23G needle for aspirating breast lumps.

However, anticipating the nature of the lesions may help to improve aspiration yield and therefore reduce 'QI' labelling. Aspiration of cysts and fat lobules yields relatively small numbers of cells. If a cyst is uncomplicated and has no solid component, it collapses completely upon aspiration. Rarely, aspiration of cyst is unsuccessful if the fluid is gelatinous and thick (sometimes due to high protein concentration or the age of the cyst).<sup>6</sup> If suspected, a larger-bore aspiration needle may help to overcome this problem. Nevertheless, smaller needles (down to 25G) may be considered for FNAC of targets composed mainly of dense connective tissue stroma (fibrocystic disease, breast cancer of invasive

lobular or scirrhous type), whose consistency may resemble rubber. Such small needles may allow easier penetration of dense fibrous tissue, whilst larger needles often yield dry taps.<sup>7</sup>

Fat lobules are hypoechoic fatty tissue delineated by echogenic Cooper's ligament and may manifest as pseudolesions.<sup>6</sup> When fat lobules are aspirated, the sample could contain mostly lipid droplets. Thus, cell counts in these samples may be inadequate for pathological assessment. Therefore, if a lesion is suspected to be fat lobule, this should be entered in the cytology form and radiology report, with a view to avoid further ineffectual aspirations.

Radiologists, pathologists, and surgeons must be aware of the limitation of FNAC of breast lesions. Inadequate sampling is common from collagenous lesions.<sup>8</sup> Low-grade cancer histotype, cancer size of <1 cm, and lobular and tubular histotypes also limit the possibility of obtaining positive results by FNAC.<sup>9</sup>

Observation and information should be shared by radiologists and pathologists. The best way to achieve this is by entering specific details on the cytology request form, for instance "partially collapsed cyst after aspiration", "thick-content of cyst", or "suspected fat lobule". The cytological assessment could become more thorough and diagnosis more definitive.

Regular interdepartmental meetings are also essential in discussing and understanding the possible nature of various lesions, excluding unnecessary further FNAC procedures, and thus reducing the QI labelling rate.

Having FNAC experience of more than one year appears to reduce the inadequate labelling rate as demonstrated in this study. Operator experience may be enhanced by training and active involvement using a multidisciplinary approach involving triple assessment of each breast lesion.<sup>9</sup> A recent study by Berner et al<sup>9</sup> found that the 15% inadequate sampling rate with the use of FNAC was partly related to submitted specimens sampled by physicians lacking experience with the procedure.

Of the QI-labelled lesions with cytological result, two were found to be C3 in type and one had atypical epithelium, warranting further investigation. Most QI lesions (>90%) were eventually found to be benign (after repeated FNAC or follow-up). A recent article by

Manfrin<sup>10</sup> et al found that the FNAC sensitivity rate was 100% in medullary, mucinous, and papillary cancers, and there was no instance of inadequate sampling.

For lesions persistently labelled as QI that have suspicious features, further investigation (e.g. core biopsy) should be considered. Berner et al<sup>9</sup> stated that "FNAC is a valuable method, although moderately less sensitive than core biopsy. Core biopsy is the preferred method for preoperative diagnosis when sampling FNAC provides scarce material and suspicion of a fibrotic and collagenous lesion such as lobular carcinoma and radial scar arises. FNAC is most accurate when experienced cytologists are available and when immediate assessment by professionals is performed for evaluation of material adequacy, so that additional aspirations can be done when needed."

FNAC is a useful tool for making a preliminary diagnosis and guide further management (core biopsy or surgery).<sup>10</sup> We conclude that the FNAC QI-labelling rate may be reduced by the following measures.

1. Clear mention of cysts and suspected fat lobules in the cytology request form and radiology FNAC reports.
2. Performing most procedures with a 22G needle; a previous study found no difference in the cytological yield between use of 21G and 23G needles.<sup>5</sup>
3. Consider using larger-bore needles on second pass, when thick cystic fluid is anticipated, and smaller-bore needles in anticipation of dense (rubbery) connective tissue stroma.
4. Regular interdepartmental meetings between radiologists, pathologists, and breast surgeons with a multidisciplinary approach to managing breast lesions in light of triple assessments and experienced expertise to guide further management and / or follow-up.
5. Enhancing operator experience of radiologists and cytologists, through training and interdepartment communication.

## CONCLUSION

The USG-guided FNAC breast lesion QI-labelling rate could be minimised by detailing the lesion's nature, modifying the sampling method, and maximising interdepartmental communication. Moreover, most (>90%) of the lesions labelled QI were eventually found to be benign on repeated FNAC or follow-up. Receiving QI in the report is distressing for radiologists, clinicians,

pathologists, and of course the patients. This study may help to reduce the frequency of such reports following FNAC of breast lesions. Hopefully if this guideline is tested and found useful in other studies, it may be extended to other forms of FNAC sampling (e.g. for thyroid lesions and lymph nodes).

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