
ORIGINAL ARTICLE

Ultrasound-guided Biopsy of Solid Breast Lesions: Should Fine-needle Aspiration be Replaced by Core Biopsy?

WS Mak¹, CY Fong¹, CY Lui²

¹Department of Radiology, Princess Margaret Hospital, Hong Kong; and ²Department of Radiology, Kwong Wah Hospital, Hong Kong

ABSTRACT

Objectives: To compare the outcome of fine-needle aspiration and core biopsy of solid breast lesions under ultrasound guidance and to evaluate if fine-needle aspiration should be replaced by core biopsy.

Methods: This retrospective review was conducted at Kwong Wah Hospital, Hong Kong from 1 January 2007 to 31 December 2009. All women with sonographically detected solid breast lesions who underwent both ultrasound-guided fine-needle aspiration and core biopsy for the same lesion were included in this study. The pathological diagnosis, tissue insufficiency rate, and the need of further intervention, such as vacuum-assisted biopsy or surgical excision, were directly compared for the two methods of tissue sampling.

Results: Regarding the 208 breast lesions biopsied, the specimen insufficiency rate was 16% (n = 34) for fine-needle aspiration and 2% (n = 4) for core biopsy. A total of 26 patients (13%) had a discordant pathological diagnosis between the two types of biopsy. Among these 26 discordant results, core biopsy was more accurate than fine-needle aspiration in nearly all cases (n = 25, 96%), and such discrepancies could be further categorised into fine-needle aspiration under-call (6/25, 24%) or over-call (19/25, 76%). The overall fine-needle aspiration under-call rate was 3% (6/208), while the over-call rate was 9% (19/208). All the 19 fine-needle aspiration over-call cases were benign, based on subsequent vacuum-assisted biopsy, surgical excision, or conservative management with clinical or sonographic follow-up. On the other hand, all the six fine-needle aspiration under-call lesions were deemed to require operative treatment by subsequent pathology results (5 were confirmed carcinomas and 1 was proven to be atypical ductal hyperplasia).

Conclusion: Core biopsy of solid breast lesions offered many advantages over fine-needle aspiration under ultrasound guidance, including a lower specimen insufficiency rate, lower false-positive and false-negative rates, and less need for subsequent interventions such as vacuum-assisted biopsy and / or surgical excision to achieve a definitive diagnosis. It is therefore recommended that in clinical practice, ultrasound-guided fine-needle aspiration should be replaced by core biopsy. By this means it should be possible to reach a more definitive diagnosis and better patient care, in terms of minimising anxiety and the potential risks of further invasive diagnostic procedures such as vacuum-assisted biopsy and surgical excision.

Key Words: Biopsy, fine-needle; Biopsy, needle; Breast neoplasms; Ultrasonography

Correspondence: Dr WS Mak, LG1/F, Department of Diagnostic Radiology, Princess Margaret Hospital, 2-10 Princess Margaret Hospital Road, Laichikok, Hong Kong.
Tel: (852) 2990 1340 ; Fax: (852) 2990 3276; Email: makws@ha.org.hk

Submitted: 25 Oct 2011; Accepted: 6 Jan 2012.

中文摘要

乳房實質病灶的超聲導引活檢：是否應該讓粗針組織切片代替細針穿刺細胞學檢查？

麥詠詩、方俊仁、呂振英

目的：比較使用超聲導引細針穿刺細胞學檢查（FNA）及粗針組織切片（CB）對於乳房實質病灶組織取樣的結果，以及評估應否讓CB代替FNA。

方法：本研究回顧從2007年1月1日至2009年12月31日期間，所有因乳房實質病灶而於香港廣華醫院進行超聲導引FNA及CB的病人。比較使用兩種組織取樣的方法對於相同病灶在以下幾方面的不同之處：病理學診斷、組織不足率、是否需要依賴如真空輔助切片或手術切除的方法來進一步確診。

結果：研究期間共進行了208次乳房灶活檢，FNA的組織不足率為16%（34例），CB的則為2%（4例）。兩種組織取樣的方法下，有26位患者（13%）的病理學診斷結果不符合，其中CB的準確度較FNA高，前者準確度達至96%（25例）。再仔細分析可以把這25例分為FNA診斷不足（6例，24%）及FNA過度診斷（19例，76%）。總FNA診斷不足率為3%（6/208），FNA過度診斷率為9%（19/208）。其後真空輔助切片、手術切除、或者是臨床或超聲跟進結果顯示全部FNA過度診斷的腫瘤均為良性。此外，根據其後病理學結果，FNA診斷不足的6例需進行手術治療，其中5例確診為癌細胞，另1例為非典型乳管增生。

結論：對於乳房實質病灶，CB比FNA優勝，原因包括CB有較低的組織不足率，較低的假陽性和假陰性結果，以及較少機會依賴其他確診方法如真空輔助切片及 / 或手術切除。所以臨床上應以CB代替FNA，以減少病人憂慮及對其他方法的依賴（如真空輔助切片及 / 或手術切除），得到更明確的診斷及提供更佳的醫護服務。

INTRODUCTION

Breast cancer is the most common female malignancy in Hong Kong, and accounted for 24% of all female cancers in 2007.¹ Because of the improvements in health awareness and education levels, both self-paid and funded breast cancer screening programmes are becoming popular in our society. As a result, more and more symptomatic and asymptomatic breast lesions are detected by sonography, and if they are considered to require further evaluation, tissue diagnosis is usually indicated.

Ultrasound-guided fine-needle aspiration (FNA) and core biopsy of solid breast lesions are common diagnostic tools to guide further management of women presenting with such solid breast lesion.^{2,3} Core biopsy is generally regarded as a better alternative to FNA in terms of lower rates of inadequate sampling and having comparable accuracy to excisional biopsy.⁴

We therefore aimed to compare ultrasound-guided FNA and core biopsy for solid breast lesions, with a view to

deciding on the better option both for diagnosis and for management.

METHODS

From 1 January 2007 to 31 December 2009, 208 women attending our department had had both ultrasound-guided FNA and a core biopsy performed on the same solid breast lesion. The patient ages ranged from 30 to 75 years. These lesions were either non-palpable or small palpable ones (<1.5 cm in diameter). All of the ultrasound-guided FNAs and core biopsies were performed by either specialists in breast radiology or trainees in breast radiology who were Fellows of Royal College of Radiologists and under the supervision of specialists.

Before the FNA and core biopsy, available previous ultrasound images in all the women were reviewed to localise the target lesion. All ultrasound-guided FNAs were performed using a 21-G hypodermic needle directly attached to a 10-ml syringe, while core biopsies were performed by means of an automated biopsy gun

fitted with a 14-gauge needle (14 G, 14 mm stroke margin, Pro-Mag 1.4; MDTech Inc., Gainesville, US).

Corresponding pathological results of the FNAs and core biopsies were retrieved from the electronic Patient Record and Radiology Information System. Clinical progress and any further management of the patients were reviewed. The FNA and core biopsy results were compared with respect to tissue insufficiency rates, pathological diagnoses, resorting to subsequent vacuum-assisted biopsy (VAB) or surgical excision, and the final pathological outcomes.

RESULTS

Among the 208 breast lesions, 34 FNA specimens and 4 core biopsy specimens were insufficient for diagnosis, representing 16% and 2% of total specimens, respectively (Figure 1).

There were 26 cases showing discordant pathological diagnoses between FNA and core biopsy of the same

lesion, accounting for 13% of all cases. Among these, there was only one case (1/26, 4%) yielding C5 from the FNA but the core biopsy showed no malignancy, but subsequent repeated biopsies showed invasive ductal carcinoma.

Otherwise, core biopsy was more accurate than FNA in all the remaining cases (25/26, 96%). Discordant cases of FNA showing less accurate results could be categorised into: (1) FNA under-call (i.e. C2 or C3 cytology grading with core biopsy result of atypical ductal hyperplasia or malignancy), or (2) FNA over-call (i.e. C3 or higher cytology grading but with benign histology). The overall FNA under-call rate was 3% (6/208) and the over-call rate was 9% (19/208) [Table 1].

Among the FNA under-call cases, one (4%) yielded C2 cytology from the FNA and atypical ductal hyperplasia from the core biopsy, one (4%) had C2 cytology with the core biopsy yielding suspicious invasive ductal carcinoma, one (4%) had C3 cytology and yielded

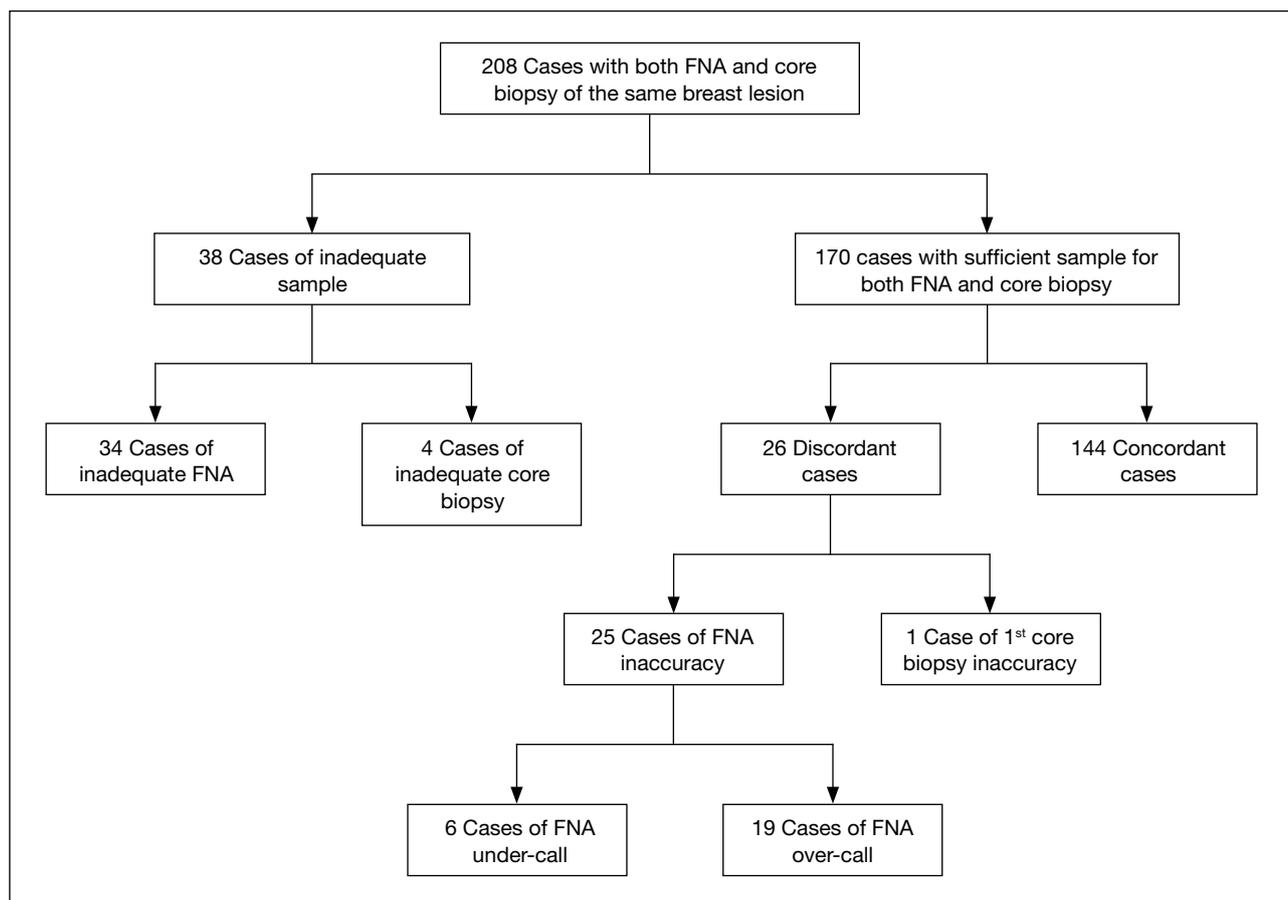


Figure 1. Flowchart showing the diagnosis of breast lesions by fine-needle aspiration (FNA) and core biopsy.

suspicious malignancy from the core biopsy, three (12%) had C3 cytology and the core biopsy showed ductal carcinoma in-situ. All these six patients had lumpectomy or mastectomy, and five of the lesions were confirmed to be carcinoma and one was proven to have ductal hyperplasia (Table 2).

Of the 26 discordant cases, 19 (73%) entailed FNA over-call, in that they were graded C3 cytology but they were shown to have benign histology in the core biopsy. The higher accuracy of core biopsy over FNA

was proven by subsequent interventions or conservative management. Of these 19 cases, seven had surgical excision or VAB that yielded a benign histology. The remaining cases were treated conservatively and clinical and / or sonographic follow-up showed that the lesions were stable.

DISCUSSION

Ultrasound-guided FNA has been one of the most common methods for the diagnosis of small solid breast lesions, because it is simple, quick, low-cost, and safe. Moreover, patients usually tolerate FNA well, as it causes minimal pain and bleeding.

Table 1. 25 Cases of fine-needle aspiration (FNA) inaccuracy.

	B1	B2	B3	B4	B5
C1					
C2					
C3	19		1	1	3
C4					
C5					

□ : FNA under-call cases
 ■ : FNA over-call cases

Cytological assessment of breast lesions (C1-C5):

- C1: Inadequate for assessment
- C2: Benign epithelial cells
- C3: Benign epithelial cells with mild cytological atypia: suspicious probably benign
- C4: Epithelial cells with moderate-to-severe cytological atypia: suspicious probably malignant (insufficient evidence for malignant diagnosis)
- C5: Malignant epithelial cells

Core biopsy assessment of breast lesions (B1-B5):

- B1: Normal breast tissue: no lesion to account for imaging findings is present, therefore, probably missed
- B2: Benign lesion to account for imaging findings is present
- B3: Benign in the material present but the abnormality present may be associated with malignant lesions nearby — diagnostic excision is necessary — for example, papillary lesions, radial scar / complex sclerosing lesions, atypical ductal hyperplasia
- B4: Suspicious, probably malignant, but core shows technical artefact or too little tumour present (insufficient evidence for malignant diagnosis)
- B5: Malignant tumour present, either ductal carcinoma in-situ or invasive carcinoma

Core biopsy is a similar procedure in terms of technique and time involved. With the use of local anaesthesia, patients generally tolerate the procedure well.⁵ There was no reported complication in all the 208 cases described in our series. The cost of core biopsy is higher than that of FNA, but the former offers much more tissue for accurate pathological assessment. Core biopsy also has the advantage over FNA in terms of the ability to arrive at a histological diagnosis, assessment of pathological invasiveness, and hormone receptor status evaluation.

This review confirmed the significantly higher rate of inadequate sampling for solid breast lesions after FNA under ultrasound guidance compared to core biopsy, which was consistent with reports from other centres.^{6,7} Patients having insufficient FNA sampling usually require a tissue biopsy to be repeated, which implies increased management costs and potential risk of the procedure.

Even if FNA showed adequate tissue sampling, its intrinsic disadvantage in terms of limited pathological accuracy renders it inferior to core biopsy. Experience from all over the world has shown that the additional costs to prove an FNA over-call lesion to be benign is unavoidable in patients who could have undergone core biopsy.^{8,9}

Table 2. Six cases of fine-needle aspiration (FNA) under-call according to final pathological diagnoses.

Patient No.	Cytology (FNA)	Histology (core biopsy)	Surgical pathology
1	C2	Atypical ductal hyperplasia	Atypical ductal hyperplasia
2	C2	Suspicious invasive ductal carcinoma	Invasive ductal carcinoma
3	C3	Suspicious malignancy	Invasive ductal carcinoma
4	C3	Ductal carcinoma in-situ	Invasive ductal carcinoma
5	C3	Ductal carcinoma in-situ	Ductal carcinoma in-situ
6	C3	Ductal carcinoma in-situ	Ductal carcinoma in-situ

Performing an additional FNA to cover potential false negatives of core biopsy, like our single discordant case with C5 cytology grading but core biopsy showed no malignancy, is theoretically possible. In reality however, malignancies are not likely to be missed, even without FNA. Under the current triple assessment of breast lesion used worldwide, clinically and radiologically, suspicious lesions showing negative pathological results should be tackled with repeated biopsies or surgical treatment, as practised in our case. In retrospect, we postulated that the possible cause of the false negative could have been due to technical factors such as inadequate experience of the operator. We therefore concluded that the false-negative rate could be minimised if the procedure was performed by experienced hands.

CONCLUSION

Obtaining a tissue diagnosis is an important step for managing breast lesions. The ultimate goal is to obtain an accurate tissue diagnosis effectively, whilst causing minimal physical and psychological distress to patients. Considering the effectiveness of obtaining adequate diagnostic samples, the accuracy of interpretation, and the need of further diagnostic procedures, it is recommended that ultrasound-guided FNA of solid breast lesion should be replaced by core biopsy in clinical practice.

REFERENCES

1. Hong Kong Cancer Statistics 2007. Hong Kong Cancer Registry, Hospital Authority. Hong Kong. Version II. Dec 2009.
2. Ciatto S, Cariaggi P, Bulgaresi P, Confortini M, Bonardi R. Fine needle aspiration cytology of the breast: review of 9533 consecutive cases. *Breast J.* 1993;2:87-90.
3. Parker SH, Jobe WE, Dennis MA, Stavros AT, Johnson KK, Yakes WF, et al. US-guided automated large-core breast biopsy. *Radiology.* 1993;187:507-11.
4. Satchithananda K, Fernando RA, Ralleigh G, Evans DR, Wasan RK, Bose S, et al. An audit of pain/discomfort experienced during image-guided breast biopsy procedures. *Breast J.* 2005;11:398-402.
5. Sauer G, Deissler H, Strunz K, Helms G, Rimmel E, Koretz K, et al. Ultrasound-guided large-core needle biopsies of breast lesions: analysis of 962 cases to determine the number of samples for reliable tumour classification. *Br J Cancer.* 2005;92:231-5.
6. Oyama T, Koibuchi Y, McKee G. Core needle biopsy (CNB) as a diagnostic method for breast lesions: comparison with fine needle aspiration cytology (FNA). *Breast Cancer.* 2004;11:339-42.
7. Evans WP. Fine-needle aspiration cytology and core biopsy of nonpalpable breast lesions. *Curr Opin Radiol.* 1992;4:130-8.
8. Pisano ED, Fajardo LL, Caudry DJ, Sneige N, Frable WJ, Berg WA, et al. Fine-needle aspiration biopsy of nonpalpable breast lesions in a multicenter clinical trial: results from the radiologic diagnostic oncology group V. *Radiology.* 2001;219:785-92.
9. Boerner S, Fornage BD, Singletary E, Sneige N. Ultrasound-guided fine-needle aspiration (FNA) of nonpalpable breast lesions: a review of 1885 FNA cases using the National Cancer Institute-supported recommendations on uniform approach to breast FNA. *Cancer.* 1999;87:19-24.