Experience with hookwire localisation excision biopsy at a medical centre in Malaysia

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ABSTRACT

Introduction: With an increasing number of women undergoing breast screening, an effective method of removing non-palpable lumps detected by mammography or sonography is by hookwire localisation excision biopsy (HWLB). The aim of this paper was to audit the practice of HWLB at the University Malaya Medical Centre.

Methods: Patients with benign or suspicious preoperative diagnoses of a non-palpable lump and who underwent HWLB were included in this study. Pathological examination of the surgical specimens was conducted and a correlation with preoperative assessment modalities was reported.

Results: A total of 59 HWLBs were carried out in 57 female patients. The mean age of the patients was 51.5 years. The overall malignancy rate was 32.3 percent (19 out of 59 cases) with a benign to malignant ratio of 3.1 to 1. Ten of these cases were ductal carcinoma-in-situ. Out of 25 patients who were suspicious on preoperative assessment, 16 malignancies were found, while in the 33 patients thought to be benign on preoperative assessment, there were three malignancies, giving a sensitivity of 84.2 percent and a specificity of 76.9 percent (p is less than 0.05). The mean tissue volume excised in 53 available records was 50.0 cm^3, with pathological tissue comprising only 15.4 percent of the total excised volume. Clear margins were obtained in 42.1 percent of the patients. The overall operative complication rate was 10.2 percent.

Conclusion: Malignancy was reported in one third of women undergoing HWLB, of which 16 had suspicious features on radiological assessment and/or fine needle aspiration cytology/core needle biopsy preoperatively. Non-palpable lumps should be excised by HWLB for a definitive diagnosis in case of any suspicion on preoperative assessment, as the prognosis is excellent.

Keywords: breast cancer, excision biopsy, hookwire localisation, non-palpable breast lesion

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INTRODUCTION

An increasing number of non-palpable breast lesions are being detected due to the widespread use of screening mammography in asymptomatic women. The sensitivity of the first screening mammogram increases with age.[1] The ability of mammography to differentiate malignant lesions from benign ones is quite variable, where 9%–63% of all reported mammographic abnormalities are eventually diagnosed as malignant.[2-4] Needle localisation open breast biopsy was first introduced in 1965 in order to obtain a histological diagnosis of such lesions. The placement of the radio-opaque wire percutaneously into the lesion, under the guidance of either a mammogram or an ultrasonography, is done preoperatively by the radiologist. The rationale for this is that the wire guides the surgeon to the exact site of the lesion and hence avoids the removal of an unnecessarily large volume of breast tissue. The only problem is that this may lead to an inadequate excision for an unexpected cancer, hence requiring a second operation to achieve margin clearance. Bosch et al reported that adequate excisions with tumour-free margins were achieved more often when lesions were preoperatively reported as 'high suspicion of malignancy'. This same study also revealed that patients who received an "uncertain" preoperative diagnosis had a high frequency of inadequate excisions when an unexpected malignancy was found, hence necessitating a second operation in order to achieve clear margins.[5]

In this audit, we examined our institution's experience with performing hookwire localisation biopsy for mammogram-detected lesions that were preoperatively classified as equivocal or benign on initial radiological assessment with or without percutaneous biopsy.

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Table I. Demographic background and reasons for presentation.

Demographic/presentation	No (%)
Mean age ± SD (range) (years)	51.5 ± 7.8 (37–77)
Ethnicity	
Chinese	30 (52.6)
Malay	16 (28.1)
Indian	10 (17.5)
Others	1 (1.8)
Total	57 (100.0)
Presentation	
Routine screening	24 (40.7)
Symptomatic	21 (35.6)
Surveillance	14 (23.7)
Total	59 (100.0)

SD: standard deviation

Table II. Radiographic results according to the BI-RADS classification.

Category	No.(%)
0 (assessment incomplete)	5 (8.5)
1 (normal)	0 (0.0)
2 (benign lesion)	11 (18.6)
3 (probable benign finding)	20 (33.9)
4 (suspicious abnormalities)	23 (39.0)
5 (highly suspicious)	0 (0.0)
6 (known malignancy)	0 (0.0)
Total	59 (100.0)

BI-RADS: breast imaging reporting and data system

METHODS

This was a retrospective study of 57 patients with a non-palpable lesion seen on a screening mammogram, which was benign or equivocal on radiological and cytological/histological investigations preoperatively, who underwent hookwire localisation excisional biopsy (HWLB) between January 2005 and December 2006 at the University Malaya Medical Centre. Two patients who had two simultaneous HWLBs were each considered as two separate cases, hence resulting in 59 cases for analysis.

The patients' demographic information and method of presentation were retrieved from the hospital medical records. Details of the surgery performed were obtained from the theatre surgical log. All patients had undergone a two-view mammographic examination preoperatively, with or without ultrasonography. The results were classified according to the American College of Radiology (ACR) Breast Imaging Reporting and Data System (BI-RADS).[6] A total of 50 patients underwent fine needle aspiration cytology (FNAC) and/or core needle biopsy (CNB) preoperatively, and the results were classified using the National Health Service Breast Screening Programme (NHSBSP) reporting system.[7]

The hookwires were inserted by radiologists on the day of the surgery under ultrasonography or mammogram. All surgical resections were done by the breast surgery team under one consultant breast surgeon.

The histopathology reports of the excised specimens were retrieved and the diagnoses were then grouped into five broad categories for analysis: fibroadenoma, fibrocystic disease, papillary lesions, malignancy (includes invasive and *in situ* carcinoma) and others (e.g. granulomatous mastitis, adenomyoepithelioma, intra-mammary reactive lymph node, lymphangioma, mesenchymal lesion and foreign body giant cell reaction).

Pearson's chi-square test or Fisher's exact test was performed, and all significance tests were two-tailed. A p value of less than 0.05 was considered to be statistically significant.

RESULTS

A total of 59 open biopsies were performed with the guidance of hookwires inserted either with mammogram or ultrasonography guidance. The mean age of these patients was 51.5 ± 7.8 (range 37–77) years. Three (5.1%) patients were < 40 years of age, 24 (40.7%) were 40–49 years old, 23 (39.0%) were 50–59 years old and 9 (15.2%) patients were > 60 years old. The majority of the patients (52.6%) were of Chinese ethnicity (30 out of 57 patients), followed by 28.1% Malay (16 out of 57), 17.5% Indian (10 out of 57) and 1.8% others (1 out of 57) (Table I). 24 breast lesions were detected through routine screening mammography, 21 were detected through surveillance for previous breast disease, and the remaining 14 were detected in patients with vague lumps, nipple discharge or breast pain. All patients had received at least one two-view mammographic examination preoperatively, with or without sonographic scanning (Table II).

Out of the 59 lesions, 50 had either FNAC (36 out of 50) or CNB (37 out of 50). Among the other nine patients, six underwent HWLB without FNAC and/or CNB, while three had their biopsies performed at other hospitals so the results were missing from their case notes (Table III).

All the hookwires were inserted by the radiologist on the day of the surgery either with ultrasonography in 37 cases (62.7%) or mammography guidance in 21 cases (35.6%). The method of insertion was not specified in one (1.7%) case. All the wires were inserted without any difficulty. Specimen mammography was performed in 19

Table III. Pathology grading and classification.

Grading/classification	No. (%)	
	FNAC	CNB
C1/B1 (inadequate assessment)	3 (8.3)	4 (10.8)
C2/B2 (benign)	25 (69.4)	13 (35.2)
C3/B3 (atypia/probably benign)	1 (2.8)	10 (27.0)
C4/B4 (suspicious)	7 (19.5)	10 (27.0)
C5/B5 (malignant)	0 (0.0)	0 (0.0)
Total	36 (100.0)	37 (100.0)

FNAC: fine needle aspiration cytology
CNB: core needle biopsy

Table IV. Histopathological results.

	No. (%)
Benign	35 (59.3)
Fibrocystic disease	25
Fibrocystic changes	11
Sclerosing Adenosis	4
Atypical ductal hyperplasia	4
Fibroadenosis	3
Fibroproliferative disease	2
Epithelial hyperplasia	1
Fibroadenoma	6
Papilloma	4 (8.4)
Intraductal Papillomatosis	2
Duct papilloma	2
Others	5
Malignant	19 (32.3)
DCIS	10
Invasive carcinoma	9
Total	59 (100.0)

DCIS: ductal carcinoma *in situ*

cases, the majority (15 out of 19) of which occurred when the localisation was done by mammogram. The excised specimens were reported as containing the lesion of concern. No re-excision due to a radiographical residual lesion was reported. If the abnormality could be felt intraoperatively and the surgeon was sure that the lesion had been removed, the specimen mammogram was not carried out.

The overall malignancy rate was 32.3% (19 out of 59 cases) with a benign to malignant ratio of 3.1:1 (Table IV). The malignancy rate was higher among the symptomatic group at 42.9% (6 out of 14 patients), followed by the screening group at 33.3% (8 out of 24 patients) and the surveillance group at 23.8% (5 out of 21 patients). The mean ages for the benign and malignant groups were 50.2 and 54.3 years, respectively; this was not statistically significant. (*t*-test, p = 0.06).

All preoperative assessment modalities, in isolation or in combination, showed a significant association with the final histopathological results (Table V). When radiological assessment was combined with FNAC and CNB, the sensitivity was 84.2% and the specificity was 76.9% (p = 0.00).

Among the 19 cases of malignancy, clear surgical margins were reported in eight cases (42.1%), while in 11 cases (57.9%), the margins were reported as close or involved. The surgical margin status did not significantly correlate with the preoperative prediction of malignancy (p = 0.574), neither did it show any difference in the amount of tissue excised (p = 0.530).

The mean tissue volume excised in 53 available records was 50.0 ± 44.9 (range 3.1–231.0) cm^3. The measurements of the lesion size in the single greatest dimension ranged from 0 cm (not visible macroscopically) to 6 cm, giving a mean lesion volume of 7.7 ± 17.2 (range 0.0–113.0) cm^3. Pathological tissue comprised only 15.4% of the total excised tissue volume. No significant difference was observed in the mean volume of tissue excised between the groups with a high and low overall preoperative suspicion of malignancy (52.8 cm^3 vs. 50.1 cm^3, p = 0.839).

The overall operative complication rate was 10.2% (6 out of 59 patients). Three (5.1%) cases of haematoma required surgical re-exploration, and two (3.4%) cases of intraoperative wire dislocations and one (1.7%) case of minor wound infection were noted. No major surgical complications were reported.

DISCUSSION

The early detection and treatment of breast cancer has been proven worldwide to be desirable in reducing mortality in any large-scale population.[8,9] With smaller tumours, breast conserving surgery is also possible.[10] Despite worldwide variation in the 5-year relative survival rate among countries, ranging from 40% to more than 80%,[11] the prognosis of breast cancer is closely correlated to the size of the lesions at the time of detection.[12] Mammography has been widely utilised as a screening modality for detecting early disease among asymptomatic women who are apparently healthy. However, although 6% of screening mammograms identify 'abnormalities' that do not always indicate the presence of malignancy, only less than 6% eventually result in a diagnosis of cancer.[13] Hence, triple assessment combining clinical examination, imaging evaluation and FNAC or CNB is extensively utilised to aid further management; triple assessment has been reported to be 100% sensitive and 95.5% specific when the three modalities are in agreement.[14]

In this study, we examined a group of patients with non-palpable lesions, where triple assessment reported

Table V. Association of final histopathological results with other preoperative diagnostic modalities.

Diagnostic modality	Final histopathology		Remarks
	Malignant	Benign	
Radiographic results			
High suspicion (BI-RADS 4–5)	13	9	-
Low suspicion (BI-RADS 1–3)	5	27	Sensitivity: 72.2%
Total	18	36	Specificity: 75.0%; p = 0.001
Cytology			
High suspicion (Grade 4–5)	7	0	-
Low suspicion (Grade 1–3)	7	22	Sensitivity: 50.0%; FET
Total	14	22	Specificity: 100.0%; p = 0.000
Core needle biopsy			
High suspicion (Grade 4–5)	8	2	-
Low suspicion (Grade 1–3)	9	18	Sensitivity: 47.1%; FET
Total	17	20	Specificity: 90.0%; p = 0.015
Combination of cytology and CNB			
High suspicion	10	2	-
Low suspicion	8	30	Sensitivity: 55.6%; FET
Total	18	32	Specificity: 93.8%; p = 0.000
Combined preoperative radiological, FNAC and CNB assessments			
High suspicion	16	9	-
Low suspicion	3	30	Sensitivity: 84.2%
Total	19	39	Specificity: 76.9%; p = 0.000

FET: Fisher's exact test; BI-RADS: breast imaging reporting and data system; FNAC: fine needle aspiration cytology; CNB: core needle biopsy

the lesions as equivocal or benign. In this group of patients, hookwire localisation excisional biopsy yielded a positive malignancy rate of 32.3% observed in a total of 59 cases, which is comparable to the 9%–52% observed in the published literature.[15] Two previous studies done locally showed a 17.0% and a 26.3% positive malignancy rate from HWLB.[16,17]

No statistically significant association was found between the malignancy rate and age in this study population, which consisted mainly of patients between the ages of 40 and 59 (79.7%), with a mean age of 51.5 years. An interesting observation is that patients in the surveillance group showed a lower malignancy rate (23.8%) compared to those in the symptomatic (42.9%) and screening (33.3%) groups, suggesting that patients with previous breast lesions, whether benign or malignant, tend to be over-treated when the yield of malignancy is only one in four.

In cases of palpable breast masses, Steinberg et al reported that mammography alone showed a sensitivity of 85.3% and a specificity of 70.6%.[14] In this study, a mammography of non-palpable breast lesions with or without sonography provided almost equivalent results (sensitivity 72.2%; specificity 75.0%). However, this study also showed that while FNAC and/or CNB was more specific, 90%–100% in isolation and 93.8% in combination, the sensitivity was low (47.1%–55.6%). Combined preoperative assessments yielded a sensitivity of 84.2%, a specificity of 76.9% and a positive predictive value of 64.0%. Hence, we would advocate that all non-palpable breast lesions that show any suspicious features on triple assessment should be surgically biopsied using HWLB.

The role of hookwire localisation biopsy as a definitive therapeutic procedure has been a key subject of debate among investigators for the past decade.[3,5,15,18] In our study, tumour-free margins were obtained in 42% of the 19 malignancies. Bosch et al reported no association between the preoperative diagnosis and the final margin status,[5] while Chadwick and Shorthouse showed no association between the preoperative diagnosis and the volume of excised tissue.[15] Similarly, in this study, no significant association was found between the preoperative diagnosis and the margin status or the volume of excised tissue. A possible explanation for this is that all procedures were performed with a diagnostic intent; thus, the attainment of clear margins was considered to be an added benefit rather than an achievement.

In this series, we also found that the pathological tissues comprised only 15.4% of the total volume of tissue excised. This means that we removed more normal breast tissue than was originally required, hence defeating the purpose of the procedure, as the amount of breast tissue excised imposed an inversely proportionate relationship with the cosmetic outcome.[19] In addition, the benefit of limited tissue excision is questionable as pathological studies have suggested that microscopic tumour sizes are 17%–26% larger than those reported under gross

observation.[20,21] Hence, the volume of tissue excision should rest on the decision of the operating surgeon based on his or her experience, skill and judgement.

In conclusion, in this study, one-third of women with uncertain non-palpable breast lesions undergoing HWLB were found to have malignancies, of which 16 had suspicious features on radiological assessment and/or FNCA/CNB preoperatively. These results show that all similar lesions should be excised by HWLB for a definitive diagnosis if there is any suspicion on preoperative assessment, as the prognosis is excellent in such cases.

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