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ORIGINAL ARTICLE

Wire localization of non-palpable breast lesions: out of date?

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SUMMARY. *Aims*. With the increasing use of screening mammography, more and more non-palpable lesions are found. As less invasive techniques like core needle biopsy are introduced, we evaluated our experience with the well-known standard procedure of surgical excision after wire localization.

Methods. We retrospectively evaluated the results of 479 wire localizations for non-palpable breast lesions between 1992 and 1999 in 465 patients. Feasibility and reliability of the procedure and the incidence of complications are reported.

Results. The mean age of these patients was 57 years (range 22–81 years). The mammographic finding with the highest rate of malignancy was density combined with architectural distortion (72%). The removal of the lesion was radiologically confirmed in 93%; if the lesion appeared to be not removed, after 3 months mammography was repeated, in 14 patients a second localization procedure was done and in 10 patients still a malignancy was found. In 79%, the excision after initial fine-wire localization was irradical. Twenty-five patients developed a haematoma and five patients had a wound infection. The overall malignancy rate was 50%. With a mean follow-up of 18 months in 11 patients with a diagnosis of benign disease after an adequate procedure, still a malignancy was found at the original excision site.

Conclusion. In selected cases, especially as a part of the therapeutic procedure in breast-conserving therapy, there will remain a place for wire localization and excision biopsy. However, we have to reconsider its place as a diagnostic procedure as the results of less invasive procedures are promising. © 2002 Published by Elsevier Science Ltd.

INTRODUCTION

With the worldwide introduction of breast cancer screening programmes, the detection and management of non-palpable breast disease has become an important issue. Most of these mammographic abnormalities prove to be benign, but 9–63% are found to be malignant.[1–5] This extreme variation is hardly explained by various authors, but has especially to do with the differences in levels of confidence handled by different screening radiologists in different countries.

Various techniques exist to achieve a diagnosis, for example surgical excision after wire localization and–more recently–stereotactic core needle biopsy. The results of stereotactic biopsy are promising and the procedure of wire localization and excision has several serious disadvantages.[6,7] We retrospectively evaluated our experiences with surgical excision after wire localization of non-palpable breast disease.

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MATERIALS AND METHODS

In the St. Elisabeth Hospital in Tilburg, The Netherlands, 465 patients with a mammographically detected breast lesion were analysed in the years 1992–1998. The mean age of these women was 57 years (range 22–81 years). Of these patients, 296 were referred via the national mammographic screening programme; this programme invites all women between 50 and 75 years of age for biannual mammographic screening. Referral patterns are listed in Table 1.

Radiographically as well as sonographically guided wire localization biopsies were performed. Medical records were reviewed for patient demographic, mam-

Table 1 Reasons for mammography/sonography in 465 patients with a breast lesion

National screening programme	296 (64%)
Palpable lesion*	69 (15%)
Follow-up after earlier breast carcinoma	38 (8%)
Family history of breast cancer	17 (4%)
Hormone suppletion	4 (1%)
Other	34 (7%)
Unknown	7 (1%)
Aspecific pain	11 (2.5%)

*The palpable lesion was the reason for mammography, but not the lesion that was removed after wire localization.

mographic/sonographic findings, various aspects of the wire localization procedure, pathologic characteristics and the definitive surgical procedure(s).

Wire localization

We used a breast lesion localization needle set (Cook Co., Copiague, USA) with an 18G needle in both 9 and 15 cm lengths: the first needle mentioned is used for a vertical approach and in sonographic-guided localizations; the second one is used for a horizontal approach. The needle contains an X-shaped hookwire, which gives good fixation, so reducing the possibility of migration, (Figs. 1–3).

Preferably and most of the times a mammographically guided wire localization was performed; only in cases where the suspicious breast lesion could not be visualized by mammography, a sonographically guided procedure was performed. All needle localizations were performed on the day of the operation.

After the exact position of the breast abnormality was determined, the needle containing the hooked wire was introduced percutaneously–after local anaesthesia with lidocaine 1%–at a site that was thought to guarantee the shortest distance between the skin and the lesion.

Neither dye, nor a fenestrated compression paddle or a perforated plate was used. After needle-placement views were obtained, and when the correct depth was

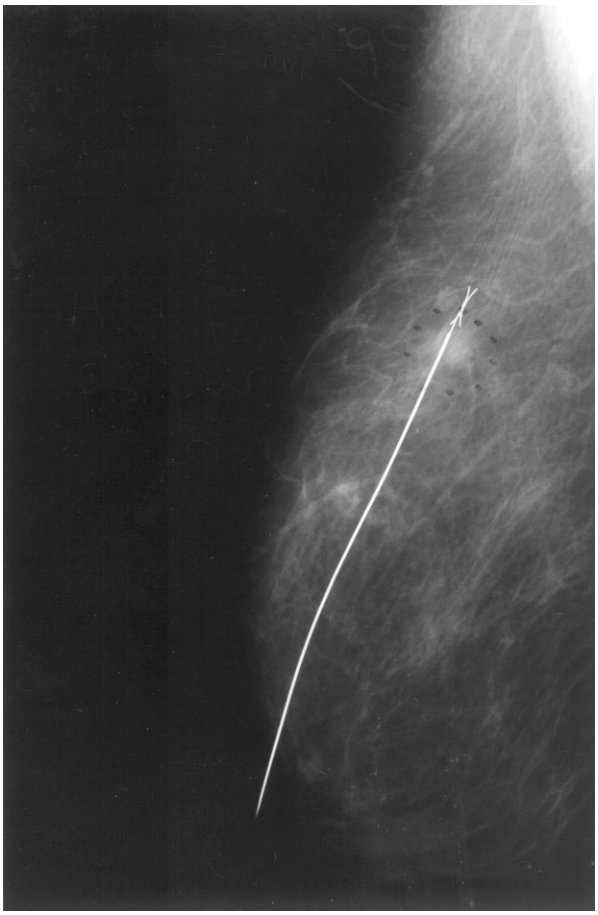

Fig. 1 Position of the X-shaped localization wire for a non-palpable breast lesion (marked).

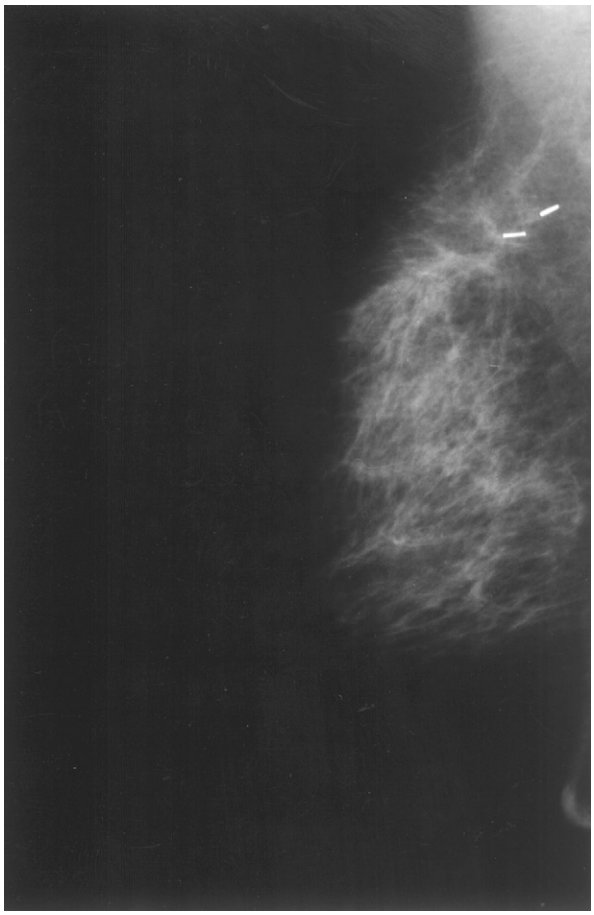

Fig. 2 Situation after excision of the non-palpable breast lesion (place marked by clips).

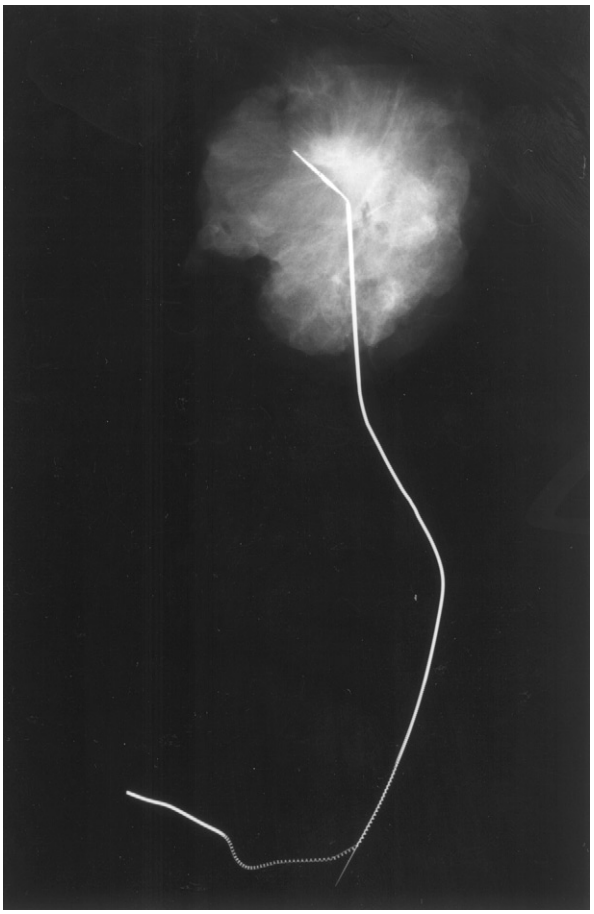

Fig. 3 Specimen radiography with hook wire in place.

confirmed (mammographically or sonographically), the needle was removed after stabilizing the wire. After wire placement, craniocaudal and lateral projections were made, labelled and sent with the patient–with the hooked wire in place–to the operating theatre. In selected, cases, two wires were used to localize the breast abnormality.

Surgical technique

All breast biopsies were performed under general anaesthesia, usually in day-care. In the operating room–before surgery–careful analysis of the wire's placement and direction was made. Skin incisions in natural skin folds were made (sometimes semicircular), preferably at the puncture site which was not excised. The distal end of the wire with surrounding tissue was removed with an appropriate correction made for the position of the wire in relation to the imaging finding, if necessary. The hooked wire was left in place in the excised specimen to help orient the radiologist and pathologist. The specimen was checked radiographically to confirm that an adequate tissue sample was obtained. Because many mammographically detected breast lesions require pathological examination of the whole specimen for an accurate diagnosis, frozen section was never performed. If the lesion was not found in the specimen (biopsy), re-excision was generally not performed during the same operation because additional biopsies without a landmark are more likely to miss the abnormality with the risk of a poor cosmetic result; in these cases, a new mammography or sonography was made after 3 months. If the lesion persisted indeed, it was eventually followed by the same procedure.

Histological examination

The excised tissue together with the detailed radiographs were sent to the pathologist. After fixation, the complete specimen was inked and sliced. New radiographs of these slices were made. Slices containing radiographical abnormalities were selected, stained (HE) and microscopically investigated.

RESULTS

In 465 patients, 479 wire localization procedures were performed, 399 radiologically and 80 sonographically guided. During the localization procedure, there appeared to be microcystic disease in 35 patients and no excision followed, so in 430 patients a biopsy was performed.

The overall malignancy rate was 50% (217/430). (Table 2).

The mammographic finding with the highest rate of malignancy was the combination of a density and a architectural disorder (72%). Mammographic and sonographic findings are listed in Table 3. There were 155 wire-guided biopsies performed for microcalcifications (M), 128 for densities (D), 51 for architectural

Table 2 General characteristics of 479 localization procedures in 465 patients

Localizations:	*n*
Stereotactic	399
Echographic-guided	80
Totals	479
Cystic disease	−35
Biopsies:	444
Malignancies	217
Invasive	183
Non-invasive	34
Benign disease	227

Table 3 Radiographic/sonographic findings in 430 patients with a non-palpable breast lesion

Microcalcifications	155 (36%)
Density	128 (30%)
Architectural distortion	51 (12%)
Combination	96 (22%)

distortions (A) and 96 for a combination (C) of these mammographic findings (Table 3).

A reason for re-operation–some days postoperatively–was a haematoma in 25 patients. A wound infection occurred in 5 patients. These patients received antibiotics, in 4/5 patients, a surgical drainage had to be performed.

In our study, biopsy failed in 36 patients (7%)–t.i. specimen radiographs did not confirm the removal of the lesions. In two patients, however, an adequate microscopical diagnosis was possible despite this inadequate localization procedure. In the remaining 34 patients–generally after 3 months–a new mammography/sonography was done; after revision of old and new radiographs, 14 patients were re-operated and no biopsies failed at that time. In 10 of these 14 patients malignancy was found.

The distance of the localization wire to the breast lesion varied from 0 to 80 mm. There was no correlation between the distance of the localization wire to the breast lesions and accurate inclusion of the lesion in the specimen nor with the radicality of the excision biopsy. In eight patients (2%), the localization wire luxated peroperatively; in three of these patients, the biopsy failed. In 45/217 (21%) patients–with infiltrating and/or non-invasive carcinoma–the initial fine-wire localization biopsy was diagnostic and therapeutic as well (Table 4).

Altogether 99/479 (21%) patients had invasive carcinoma, 84/479 (18%) patients had invasive carcinoma as well as non-invasive carcinoma and 34/479 (7%) patients had non-invasive carcinoma. Among these patients, 35 had previously operated breast cancer; in 6 patients, the carcinoma developed in the same breast. Twenty-two women (10%), who presented with a malignancy, were younger than 50 years.

In 40 patients a breast-conserving surgical procedure was done, in 120 cases a modified radical mastectomy was performed, and in 23 patients a simple mastectomy was performed (in 15 cases because of non-invasive carcinoma, in 5 patients because of a previous axillary lymph node dissection and in 3 patients who refused a lymph node dissection).

Axillary dissection was done in 161 out of the 183 patients with histological invasive carcinoma (22 patients did not have axillary dissection because they had axillary surgery before, or they refused it), 49 (27%) of them had axillary lymph node metastasis. With a mean follow-up of 18 months (range 1–97 months) in 11 of 227 patients (5%) with the former diagnosis 'benign disease' after an adequate localization and excision procedure, still a malignancy was found.

Table 4 Adverse events of breast biopsies after wire localization

	n	%
Biopsy failure	36/444	7
Irradical excision	172/217	79
Wire dislocation	8/444	2
Bleeding complication	25/444	5
Wound infection	5/444	1

DISCUSSION

With the increasing popularity of screening mammography, more and more non-palpable breast lesions are found. The purpose of this screening is to detect 'earlier' cancers, resulting in an improved diagnosis evidenced by a higher survival rate ($>90\%$) and less radical treatment (t.i. more breast-conserving therapy).[5] In the literature, the sensitivity of mammography is reported to be as high as 90%; however, its specificity is limited, and 65–90% of all breast biopsies are performed for benign lesions.[8,9] Several techniques for the preoperative localization of non-palpable breast lesions have been developed; the choice depends on lesion characteristics and the available equipment. Especially the data from image-guided core needle biopsy are promising.[10–15] Traditionally, however, the technique used to evaluate non-palpable breast lesions was needle localization breast biopsy (NLBB), under mammographic or ultrasonographic guidance. The use of this method has been the 'gold' standard for the last three decades.

As stated before, in the literature 9–63% of these non-palpable breast lesions are found to be malignant, often non-invasive and less frequently associated with lymph node involvement. [1–5,16–19] In our study, 183/430 (43%) patients had a malignancy and 34/430 (8%) had non-invasive breast lesions.

In the past years, several recommendations were made to improve the accuracy of breast sampling such as securing the hook into the breast tissue, orienting the limits of resection, sending the specimen for X-ray examination and inking the margins for the pathologist.[20] The method used in our hospital is described in the literature as well tolerated, readily accomplished, accurate, rapid and safe for the detection and localization of occult breast lesions.[21,22] However, in our opinion there are several disadvantages to the

procedure: a major disadvantage of NLBB is that at microscopical examination, surgical margins are frequently found to be irradical.[23] In our study, the initial fine-wire localization biopsy was both diagnostic and therapeutic (t.i. radical) in only 45 (21%) patients. This irradical percentage of 79% is in line with the data from the literature: positive surgical margins after wire localization biopsy range from 55% to 83%, while these margins are less frequently tumour involved if the excision was performed after stereotactic core needle biopsy, i.e., if the diagnosis malignancy was established already.[23–25] As a consequence, if wire localization is used as a diagnostic tool, definitive breast cancer therapy requires–most of the time–at least two surgical procedures. Although adequate data are lacking, it is reasonable to assume that there is a relationship between the percentage of positive surgical margins and the expertise of the performing surgeon. In Holland, so far excision biopsy is classified according to the Association of Surgeons of the Netherlands as a class I procedure: a relatively simple procedure often performed by young trainees. As a result of the data presented here, in our institution these excisions are nowadays only performed by, or under the surveillance of, a surgical oncologist.

Another serious disadvantage is that NLBB in most cases has to be performed under general anaesthesia, so patients have to stay in hospital for at least several hours. After an 'adequate' and specimen radiology-controlled excision in 5% of the patients with the diagnosis benign disease; still a malignancy is found at the original excision site after a relatively short follow-up of 18 months. Assuming that there were no microscopical failures, during the first surgical procedure the tumour must have been missed in these cases. A review of needle-localized breast biopsy found an overall miss rate of 0–18% (mean 2.6%) and a cancer miss rate (t.i. false-negative rate) of 0–8% (mean 2.0%).[26]

Although much less frequent and, in our opinion, of less importance are other adverse events of NLBB like needle displacement, haematoma and excision of too much tissue if the needle is not at the centre of the non-palpable breast lesion.

In the diagnostic pathway for non-palpable breast disease external markers, mammographic mapping, needle dye injection and stainless steel needle localization have been replaced by the use of the self-retaining wire. Regarding our results and the data from the literature, there is, however, a need for more accurate and less invasive diagnostic procedures. Needle core biopsy has been added to the pre-operative assessment of mammographically identified non-palpable breast lesions; MRI localization procedure and the advanced breast biopsy instrumentation (ABBI) system are newer methods.

Image-guided core needle breast biopsy is an excellent alternative to the traditional approach to non-palpable breast cancer. The advantages of this technique include lower costs and less invasiveness; besides it leaves no scar. Based on several studies, an image-guided core needle biopsy diagnosis of invasive carcinoma is accurate; the overall miss rate is 2–4% (mean 3.3%) and the false-negative rate is 2.9–6.7% (mean 4.4%).[27] As the experience with core biopsy evolves, more patients achieve definitive surgical therapy with a single procedure. However, needle localization and excision is still recommended if:

1. breast conservation is the therapy of choice after core biopsy revealed malignancy;
2. atypical hyperplasia or a radial scar is found after core biopsy–atypia goes along with a high prevalence of ductal carcinoma and a lesion consisting of a radial scar is required as a whole for definitive pathologic diagnosis;
3. an adequate core biopsy is technically difficult: a lesion <5 mm or a lesion too close to the chest wall or the nipple complex.

Recently, a vacuum-assisted biopsy device (Mammotome-11G) has been introduced. It is concluded that this is an accurate technique for non-palpable breast lesions smaller than 15 mm in size seen on ultrasound. This technique reduces the possibility of false negatives as well as the likelihood of epithelial displacement; at the same time it eliminates the need for multiple insertions.[28–30]

In conclusion, until 1998 we performed needle-localized breast biopsy for non-palpable breast disease both for diagnostic and therapeutic purposes. Problems encountered were the need for another wire localization (7% inadequate procedures), the need for at least two operative procedures in most cases where a malignancy was found, haematoma, wound infection, positive surgical margins (79% irradical excisional biopsies) and scar formation. Image-guided core needle breast biopsy is an alternative to the traditional approach to non-palpable breast cancer. The advantages of this technique include lower costs, less invasiveness and no scar. Based on several studies, an image-guided core needle biopsy diagnosis of invasive carcinoma is accurate. We expect stereotactic core biopsy to become the 'gold' standard. Only in selected cases like localization of core-biopsy-proven tumour, NLBB will remain the procedure of choice.

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