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Localization of Non-Palpable Breast Lesions

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Abstract

Eighty patients underwent localisation for non-palpable breast lesions. The indication for performing a localizing procedure before the excision biopsy were suspicious or grouped microcalcifications, stellate shadows with or without microcalcifications, rounded opacities larger than 1 cm or distorted breast parenchyma. The highest incidence of malignancy was found in patients with grouped microcalcifications. The procedure for localization of a non-palpable breast lesion is well-described and the various localizing needles were far also described and the advantages and disadvantages of the different needles were discussed. Our only complication was a vasovagal attack which was of no clinical significance.

Introduction

ONE out of eleven women of roughly 9% of women will get cancer of the breast. Cancer of the breast is the number two killer in women worldwide [1,2].

Clinical examination discovers approximately two-thirds of breast lesions, while one-third of the breast lesions are missed by clinical examination and are detected by mammography in the form of microcal-

cifications or disturbance in the architecture of the breast.

Because mammography is the single most accurate examination for the breast that medicine possesses, screening programs for women above 40 years are now done worldwide with reduced costs [3].

Two-thirds of the lesions seen on mammography are palpable and may thus be excised by the surgeon if they appear

suspicious, while one-third of the lesions that have highly suspicious characteristics on mammogram are not palpable. This presents a problem to the surgeon, who has great difficulty in localising an approximately 1 cm. large mass in large breasts or in localizing microcalcifications which could be seen by x-ray or mammography, but could not be seen by the naked eye. It is because of this reason that localization of non-palpable breast lesions is performed prior to excisional biopsy [4,5].

Excisional biopsy up till this moment is still much more accurate than fine needle biopsy or core biopsy for lesions of the breasts, and is still preferred by most surgeons [6].

We are describing the technique of localisation on 80 patients using the various localization needles. The Kopans, which is the oldest and the first one to be described, the Homer needle which is similar to the Kopans but has a curved guidewire, and finally the Hawkins I and II [7,8].

The purpose of this study is first, to mention the most common indications we encountered for performing the localization procedure, our experience with the different needle-wire localizers and the advantage and disadvantages of each system, the pitfalls that we have encountered, and finally the results of the pathology and our most common complications.

Material and Methods

Eighty patients underwent localization of non-palpable breast lesions in the period from the 15th of December 1991 to the 31st of December 1993 in Erfan Hospital, Jeddah, Saudi Arabia. Their ages ranged from 32 years to 64 years with the mean age of 54. Our indications for performing a localizing procedure followed by an excisional biopsy are tabulated in table (1).

The most common indication was the presence of a stellate shadow seen in both craniocaudal and mediolateral or oblique projections. The presence of microcalcification within the center of the stellate opacity increased the suspicion of a carcinoma.

The second most common indication was the presence of a somewhat rounded opacity on the pre-localization mammogram. All opacities larger than 1 cm. were localized and excised except if they were well-defined and contained a fatty center and were located in the upper and outer quadrant of the breast in the posterior one-third and most likely represented intramammary lymph nodes. They were only followed up in a six months' interval. Our suspicion of malignancy depended on the well-or ill-definition of the opacity and the presence of microcalcifications within.

Our third most common indication was the presence of microcalcifications. We considered microcalcifications suspicious

if they were more than 5 within an area of 1 cm² especially if they had a granular, dense, irregular or crystalline appearance. If they were rounded, of similar size and density, and not grouped but scattered throughout the breast parenchyma, they were not localized.

Our 4th indication for localization was a distortion of the breast parenchyma without any associated mass or microcalcification provided that the distortion is seen in more than one view and did not represent a pseudo tumor. The percentage of the different lesions are shown in table (1).

All localizations are performed by a hooked needle-wire assembly which was the Kopans by William Cook or the curved wire assembly by Homer or the Hawkins II and later, the Hawkins III by Meditech. We preferred the Hawkins II needle which consisted of a 20 gauge outer cannula, which has a fenestration approximately 1.5 cm from its tip. The cannula is loaded by a 0.012-inch spring-wire barb, which emerges from the slot in the cannula. A slide clamp is fixed to the

wire to prevent its dislodgement. Before employing this needle, its has to be checked outside the breast to make sure that it is well functioning.

Localisation of the lesion was as follows: Patients should not be premedicated because full cooperation is required. We used local anaesthesia injection in the first 30 patients, but with the introduction of the thinner needles we no longer injected any local anaesthesia.

The procedure should be explained to the patients before its performance in a non-threatening matter, as having a needle positioned into their breasts is extremely alarming to most females. One should also reassure the patients by informing them that the majority of lesions found in this way are benign, as most patients believe that the lesion they have is definitely malignant.

It is very important to perform the craniocaudal and mediolateral view prior to the procedure and to evaluate the lesion to be localized on these films because of two reasons:

Table (1): Indications of Localizing Procedure

Lesion	Number	%
Suspicious or grouped microcalcifications	29	36
Stellate shadow without microcalcifications	12	15
Stellate shadow with microcalcifications	14	17
Rounded opacity larger than 1 cm	16	21
Distorted breast parenchyma	9	11

The first reason is that in 10% of patients, the microcalcifications to be localized proved to be within the skin (dermal calcifications) or the breast lesion seen on the first mammograms could not be found on the prelocalisation mammogram. These patients were sent home with a note to their referring physician explaining why the procedure was not performed. These patients were not included in our study. Lesions that are seen only in one view but not in the second projection were also not localized in the beginning of the study, but with the increase in experience we also localized these lesions.

The second reason for performing prelocalisation craniocaudal and mediolateral views is that most patients had an oblique projection rather than a mediolateral projection which distorts the position of the lesion.

The next most important step is to choose the site of entry of the needle which is chosen by determining the shortest distance from the lesion till the skin. If a lesion is located in the superior quadrant, we chose an approach from the superior aspect of the breast. Lesions located in the inferior outer quadrant were approached from the lateral aspect of the breast while lesions located in the inferior inner quadrant were approached from the medial side of the breast.

We always place the needle parallel to the chest wall especially in small breasts

to prevent any pneumothorax. Localization in small breasts proved to be much easier than localization in large breasts.

Once we determine the site of entry, this site is marked on the skin of the patient and the distance from the site of entry till the lesion is determined from the prelocalisation films. The actual localizing procedure starts now and should be done as rapidly as possible, as the breasts should not move and remains compressed throughout the procedure, which may be quite painful (Fig. 1).

The breast is now compressed using a fenestrated compression device (Fig. 2), with the lesion placed in the window of the compression device. An exposure is taken and the film is rapidly processed and the lesion is localized on the film in the two planes using the numbers and letters, as seen in Fig. (2). The needle is now inserted over the lesion and advanced to pass through the lesion and a second radiogram is taken, again without moving the breast to make sure that the needle hub and shaft are now superimposed over the lesion (Fig. 2).

The compression is now released and the second view is performed, perpendicular to the first view. For the second view, we exchanged the compression device and used a spot compression device (Fig. 3). On that image, we can see how far the needle has transfixated the lesion and how much we have to withdraw the needle.

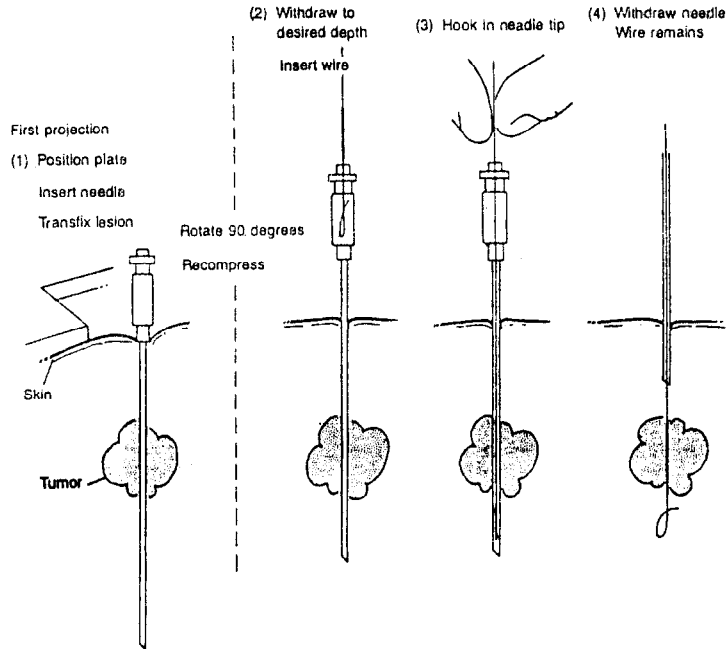


Fig. (1): Diagram showing localization procedure using a Kopan's needle. Drawing 1-4.

Once in the correct position, the needle is removed and the wire is left within the breasts being fixed by the hook (Fig. 1).

The compression is now released and a plaster is placed over the wire that sticks out from the breast and the patient is sent to the operating theatre.

Following the procedure, we always took the films to the operating theatre and discuss the case with the surgeon, who should dissect along the wire until he reached a notch in the wire (Fig. 3). It is at this level of the notch that he should start excising the tissue with a safety margin of approximately 2 cm.

The surgeon should understand that any wire can be pulled out of the breast if sufficient traction is placed on it, so the wire is used as a guide only and not as a traction.

The excised specimen is radiographed and examined by the radiologist to determine if all the pathological tissue has been excised, by comparing the specimen radiogram to the original mammogram (Fig. 4).

If all the pathological tissue has been removed, the surgeon is informed so that he can close the breast incision and the specimen together with the specimen radi-

ogram are sent to the pathology department.

The pathologist examines only that part of the specimen around the hook of the wire if the placement is correct. If the placement is not correct i.e. the hook of the wire does not lie within the pathological lesion, then a hypodermic needle is placed within the suspicious lesion and the pathologist examines the tissue surrounding the tip of the hypodermic needle only.

A short report is given to the patient with the specimen radiogram as a final documentation.

Results

A total of eighty localisations was performed during this 2-year period. The first fifteen localisations were performed by the surgeon, while the other 65 localisations were performed by the radiologist. All localisations were performed using the described techniques.

The first needle used was the simple Kopans. The Homer's needle was used next on ten patients. This was followed by the Hawkins II needle on fifty-five patients. Ten patients that came to the Radiology Department to perform a localising procedure were sent home, as the calcification proved to be dermal in location in six patients, while in the four other patients the lesion could only be visualised in one projection and not in the second. These cases were not included in the study.

The eighty localisations were per-

formed on seventy eight patients, two patients had two separate lesions localised in their two breasts, but at different times. In fifteen patients, which were done mainly at the beginning of the study, the needle needed to be repositioned because it was farther than 5 mm from the lesion. Repositioning of the needle and the wire was much more easier with the Hawkins II needle. There were sixty-one benign lesions and nineteen malignant lesions. In all cases, the surgeon excised the lesion with a surrounding 2 cm safety margin. This was not only regarded as a diagnostic excision, but also a curative excision, as the CA breasts below 2.5 cm are treated in our hospital by a local excision of the tumour which is followed by radiotherapy and chemotherapy.

Specimen radiography failed to confirm excision of the mammographic non-palpable abnormality in four patients. Two of these patients had demonstrated a rounded density on the prelocalisation mammograms and proved by pathology to be fibroadenomas, while the two other patients showed a distorted breast parenchyma and proved by pathology to be fibrocystic changes.

Discussion

Excision of a non-palpable breast lesion can cause great technical difficulties to the surgeon, since the geometry of the supine breast on the operating table differs greatly for the geometry image on upright compression mammograms especially

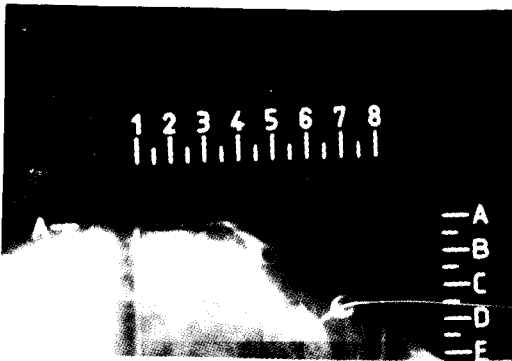


Fig. (2): The breast is compressed with a fenestrated compression plate. The suspicious lesion is localized at the level of D₆ and the needle containing the wire within is seen superimposed over the lesion.

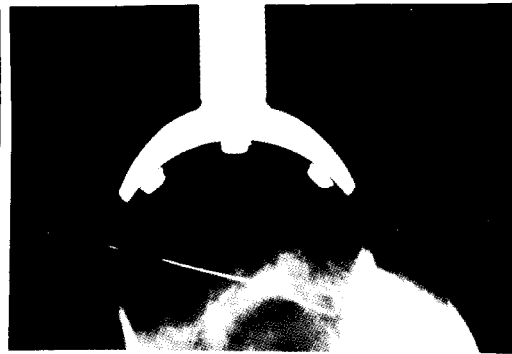


Fig. (3): The spot compression device has been substituted and the gantry has rotated 90° and the hook of the wire is seen within the suspicious microcalcification.

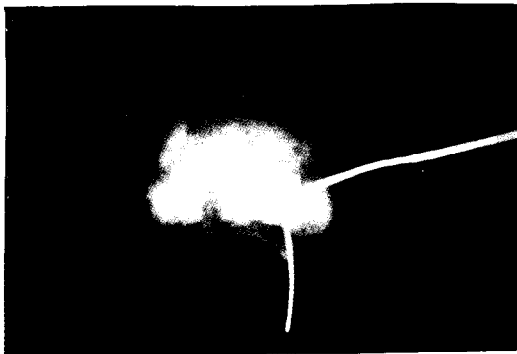


Fig. (4): Specimen radiogram showing the microcalcification and the hook of the wire within the microcalcification.

in large breasts. Therefore, coordinates taken from mammograms and used to reconstruct a map are very inaccurate. It is because of this reason that we have used this wire localisation technique to help surgeons localise non-palpable lesions or microcalcifications not identifiable by the naked eye.

In our experience, there was no need to use local anaesthesia, as the needle wire set used was a 20-G size that will cause the same amount of pain as the needle of the local anaesthesia. This also gave us an indication how cooperative a patient will be during the rest of the procedure. Cooperation of the patient is very important, as we have realized at the beginning of the study and we had to discontinue two procedures because of an anxious and uncooperative patient. This was also reported by Kopans et al [7].

Another very important point is that we should choose the shortest distance from the skin to the lesion, as a long skin to lesion distance may deflect the thin needles off their course and make localisation difficult. This problem has also been described by Homer et al [8], who also recommended to always use the shortest distance from the skin to the lesion even if that made the surgeon change his incision from the usual periareolar region to another site.

While inserting the needle, it was difficult for the radiologist to have the needle enter the breast and being parallel

to one border of the compression device and perpendicular to the second border of the compression device. To be able to achieve this, the technician looks from far away and advises the radiologist if the shaft of the needle is actually parallel and perpendicular to the borders of the compression device or the cassettes or not. This usually needed some experience and was considered by us to be the most difficult part of the procedure.

We always enter the skin parallel to the chest wall, so as not to produce a pneumothorax. This was also recommended by Proudfoot et al and Rosenberg et al [9, 10]. In none of our patients did we pierce the thoracic wall. We also made sure that the needle pierced through the lesion so that the hookwire would engage well into the lesion and will remain fixed. In only one patient, at the beginning of the study, where we did not pierce the needle, did the hookwire disengage from the lesion. This most commonly occurs when doing the postlocalisation mammogram and when the compression plates push the wire and open the hook resulting in migration of the wire.

Wire migration has been reported by many authors and usually occurs in fatty breasts which do not contain any fibrous tissue or parenchyma in which the hookwire can engage itself [11, 12].

The 90% success rate we had for the localisation and excision of non-palpable breast lesions is similar to the rates report-

ed by others [13, 14]. In all cases, the tip of the wire was either within the lesion or maximally 5 mm away from the lesion. If it was localised more than 5 mm away, a second wire was placed. In eight patients (10%), a second wire localisation was necessary. This occurred only with the Kopans and Homer needles, while the Hawkins needle had an intrinsic mechanism where the wire could be retracted even when it was unfolded within the breast.

At the end of the procedure, we always taped the external wire to the skin, but after using the Hawkins needle a plastic external clamp was delivered with the set allowing us to fix the needle with this plastic clamp and preventing any migration of the wire after the procedure when the patient is transferred from the radiology department to the operating theatre.

At the beginning of the study, the surgeon used to cut out a core around the needle as he travelled from the skin till the lesion, but after being more experienced with the procedure, the surgeon would follow the wire till 2 cm before its distal hook where a notch was incorporated in the wire. When reaching this notch, the surgeon would cut out a core around the hook only, thus reducing the amount of tissue removed which would improve the cosmetic outcome of the surgery.

Localizing non-palpable and suspicious breast lesions needs the close cooperation between the radiologist, surgeon

and pathologist.

The radiologist has to understand the different approaches that the surgeon may use and should always discuss each case with the surgeon before the procedure, using the latest mammogram to determine the site of skin entry and the route of entry.

After the localizing procedure, the radiologist should always go to the operating theatre and discuss with the surgeon how the wire was placed so that the surgeon knows how to follow the wire and how much to excise.

Performing the specimen radiography and comparing the specimen radiography with the prelocalization mammography is essential to make sure that the surgeon has removed all of the lesions.

Close cooperation with the pathologist is also very important especially if the hook of the wire is not within the lesion, but next to it. This is important as the pathologist does not have to examine all of the specimen but may examine only part of the specimen which is the most important part and save a lot of time and effort.

Previously, when a suspicious lesion was detected in the mammogram, which was non-palpable clinically, women had a choice of either doing a quadrantectomy or wait for six months or one year, to do a follow up mammogram. One choice was disfiguring for the patient, while the other

one created a lot of anxiety to the patient. Today, women have a choice and should no longer be subjected to a large breast biopsy or quadrantectomy for excision of a non-palpable breast lesion because of the introduction of this simple localization technique.

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