

Preoperative localization of nonpalpable breast nodules – which method to choose?

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SUMMARY

Received: 29.11.2007
Accepted: 11.09.2008
Subject: review paper

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BACKGROUND: Along with the introduction of screening mammography more and more breast cancers are non-palpable in examination. To perform breast conserving therapy (BCT) such tumors need to be localized correctly preoperatively.

METHOD: The study presents the most frequently used methods of non-palpable breast tumors localization such as: wire-guided localization (WGL), ultrasonographic localization and radioguided occult lesion localization (ROLL).

RESULTS: All presented methods allow preoperative marking of suspected non-palpable breast lesions with great precision in favour of ROLL.

CONCLUSIONS: ROLL technique is the best from among those currently used when considering comparative analyses. Additionally, it is the promising method in combination with simultaneous marking of the sentinel node.

KEY WORDS: breast cancer, wire-guided localization, ROLL

INTRODUCTION

Along with the introduction of screening mammography, measurements of breast tumours detected during examination have significantly decreased and about half of breast cancers in surgical practice are nonpalpable in examination [1]. Patients with such an early stage of breast cancer are qualified for breast conserving therapy (BCT), which allows the breast to be preserved. However, BCT creates many challenges for a surgeon where proper marking of suspected and at the same time nonpalpable changes in the breast comes to the fore. It is crucial to excise the tumour with a proper, “histologically clean” margin of healthy tissues

which minimizes the probability of breast cancer recurrence in women treated with conservative therapy. Correct preoperative localization of early breast cancer helps the surgeon to excise the whole lesion with the smallest volume of healthy gland necessary, which additionally improves the postoperative cosmetic effect. At present, the most frequently used methods of marking nonpalpable

pathological changes in the breast are: wire-guided localization controlled by mammography, computed tomography or magnetic resonance; intraoperative ultrasonography; and use of isotopic markers. The aim of this survey was to briefly present the above methods and indicate the advantages and disadvantages resulting from their use.

Wire-guided localization (WGL)

The method of needle localization in the case of breast lesions was first described by Silverstein in 1987.

It is performed in the case of nodules revealed in mammography, ultrasonography and magnetic resonance tomography. For marking purposes special needles are used that are “anchored” by means of special tips in the selected breast spot.

The most common method is marking a nonpalpable breast lesion under stereotactic mammography control. The procedure is most frequently performed before surgery by a radiologist. Usually two needles are placed in the breast, although a greater

number can be used in some cases in order to mark a larger pathological area, e.g. microcalcifications.

Needle locations are controlled during repeated mammographic examination and next the patient undergoes the surgical procedure. In order to confirm lesion excision a preparation X-ray is performed which additionally allows evaluation of the excision margins [2].

Undoubtedly, an advantage of this method is the possibility of excising pathological breast lesions that are only revealed by mammographic images such as microcalcification clusters, nodules, and impaired parenchymal architecture that are still undetectable in physical examination [3]. It requires from the radiologist great experience and precision in placing the needle, and from the surgeon experience and three-dimensional imagination – then such a procedure can be considered a success. In many published articles describing the mentioned procedure, the authors declare a 95% accuracy rate. The main disadvantages are: possibility of needle movement inside the breast and insufficient margins of excised preparation which requires repeated surgery.

It is also worth mentioning that a patient has to undergo an additional, invasive and unpleasant procedure of placing a needle in the breast the day before surgery. It may cause pain, bleeding, infection or even a pneumothorax. If surgery is scheduled on the same day, an additional organizational factor arises for the radiology department and operating room.

If a suspected breast lesion is also visible in ultrasonography, a needle is inserted under its control, which significantly facilitates the procedure and shortens the time required.

In the case of lesions visible only in magnetic resonance it is possible to mark them before the surgery if proper equipment is available and when indications for such a procedure are present [4]. Similarly to former methods a control X-ray is performed after inserting the needle to document its correct location. Surgical biopsy is performed through a periareolar incision towards the palpable tip of the needle with at least 1 cm margin of surrounding tissues. Postoperative mammographic control of

the specimen allows assessment of the excised lesion [3]. However, using magnetic resonance for preoperative localization of breast lesions is still an expensive and time-consuming procedure which can be used in selected cases and which is limited to centres with proper experience and equipment.

Ultrasonographic localization

Intraoperative use of an ultrasonographic (USG) probe allows the surgeon to resect under direct visual control a non-palpable, suspected breast lesion with preservation of proper surgical margins. The lesion is visualised before surgery by means of USG and the skin area above it is marked. Then, during the procedure with the use of a probe directly touching the wound, the tumour is excised with a proper margin of healthy tissues, visualised in USG. The preparation is ultrasonographically evaluated after the procedure in the operating room.

This procedure requires the presence of a radiologist in the operating room or alternatively an adequately trained surgeon [1]. It is also possible to use markers e.g. blue or needles that are inserted in the lesion under USG control and additionally make correct lesion excision easier [5].

Undoubtedly, the advantages of this method are: its non-invasive nature and the patient's consequent comfort, the possibility to visualise the lesion throughout the procedure and, connected with this, precision in excising a lesion with a proper margin, which significantly reduces the number of reoperations. Visual control of margins also allows a reduction of unnecessary resection of healthy tissues, which improves the cosmetic result of the procedure. A restriction of this method is the fact that only about half of non-palpable breast cancers are visible simultaneously in mammography and ultrasonography, which limits the number of patients for this method. It should be remembered that the pressure of the USG probe changes slightly the position of the lesion, which seems during USG examination to be closer to the skin than it really is. Lack of USG visualisation of microcalcifications means that ultrasonographic localization tends to be used in the case of invasive cancers rather than cancers in situ.

Radioguided occult lesion localization

This is the latest method that allows preoperative localization of nonpalpable breast nodules.

It was invented in the European Oncology Institute in Milan in 1996.

Radioguided occult lesion localization (ROLL) is based on placing an isotopic marker inside a non-palpable breast tumour under USG or mammographic control. The marker is a macroalbumin marked with technetium Tc 99m, which is injected in a suspected breast lesion under USG or mammographic control. Then control scintigraphy is performed and also mammographic imaging in the case of mammographic tumour localization. With the use of a manual gamma camera a suspected breast lesion is localized intraoperatively and excised with a proper margin of healthy tissues. After the procedure a control specimen X-ray is performed [6].

There are many advantages of this method: easy and precise lesion marking both under USG and mammographic control, quick and exact surgical removal, shorter time of surgery and anaesthesia in comparison to traditional methods of localization, and minimal discomfort for the patient. Only in rare cases was a suspected lesion imprecisely visualised, which was most often associated with the "learning curve". Due to the minimal dosage of radioactive agent used and its disintegration lasting several hours, the method is safe for patients and medical staff and does not require any particular radiological protection for the surgeon and pathologist [6]. Limitation of this procedure results mainly from access to the Nuclear Medicine Institute; therefore it is possible to use the method in selected centres additionally possessing proper equipment.

DISCUSSION

All methods presented above allow preoperative marking of suspected non-palpable breast lesions with great precision. Comparative analyses may help in choosing one of the localizing methods.

Lantsberg et al. emphasize the fact of diagnosing a relatively great amount of invasive cancers (34%) and DCIS (27%) when marking lesions with the use of needles under mammo-

graphic control [4]. The value of this method in the diagnostic process is significant but its importance decreases in the case of therapy, i.e. excising a lesion with a margin of healthy tissues.

Rahusen et al. emphasize that reoperations following wire-guided localization are performed in about 20% of patients. Their study compares this method to intraoperative ultrasonography and indicates superiority of intraoperative ultrasonography by claiming that excisions with a proper margin occurred in 55% versus 89% of cases, respectively [1].

Next, Kolpattil et al. combined in their study both methods mentioned above and came to the conclusion that needle localization supported during surgery by ultrasonographic imaging significantly improves precision of excising lesions with a proper therapeutic margin and makes the procedure easier and shorter [7].

The recently introduced ROLL method presents itself in comparative analyses even better. Luini et al. demonstrate ROLL's superiority compared to wire-guided localization by describing the method as fast, easy to perform and precise in excisions of non-palpable lesions marked with isotope and pointing at better centralization of lesions in excised preparation [8]. Rampaul et al. present in their comparative study less intense pain and less patient discomfort, apart from greater ease of ROLL for both the radiologist and surgeon [9]. Next Nadeem et al. in their study, apart from confirming all the above advantages of ROLL, stress higher frequency of "oncologically clean" margins in excised lesions and better cosmetic effect when using this technique [10].

CONCLUSIONS

Nonpalpable breast lesions have always constituted a challenge for the surgeon, especially in the era of screening mammography. The most important aspect is to use an optimal method of localization which allows one to resect the smallest gland volume with pathological change together with a proper margin of healthy tissues. ROLL technique is the best from among those currently used when considering comparative analyses. Additionally, combining this method with simultaneous marking of the sentinel node allows a surgeon

to perform conserving therapy in increasing numbers of women with early-stage breast cancer.

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