

BREAST BIOPSY

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Received 23. 07. 2013; accepted 16. 08. 2013

Abstract

The aim of the overview study was to describe of interventional methods in diagnosis of the breast diseases – fine needle aspiration cytology and core cut biopsy, vacuum assisted mammotomy under ultrasound and mammography control.

Keywords: breast, carcinoma, biopsy, ultrasound, mammography

1 Purpose

The recommendations of European Society of Mastology (EUSOMA) are to verify at least 70%, optimally 90% of malignant lesions in the breast by preoperative biopsy [1, 2]. Targeted sampling of tissue diagnostic process moves from a simple display of the plane definitive histological diagnosis, which can be achieved with significant reduction in the number of open reduction in unnecessary biopsies and breast surgery [3, 4].

2 Overview of the intervention methods

Correct diagnosis of the breast disease need to used non-invasive and invasive diagnostic modalities, which can reach a right diagnostic conclusion. Noninvasive methods are e.g. native mammography including special projections, mammosonografia and Color Dopler, MRI, CT, PET-CT. Among invasive methods belong e.g. ductography, pneumocystography, cyst aspiration, fine needle aspiration biopsy (FNAB), Core needle aspiration biopsy (CCB) under control of MG, USG, MRI, PET, preoperative MG, USG and MRI localization and vacuum biopsy - mammotomy (VAB).

Minimal intervention diagnostic procedures have become standard in the diagnosis of the all breast diseases. The preoperative biopsy is used to reduce the number of diagnostic surgical excision of a part of the full diagnosis, which leads to individual treatment planning [3, 5, 6].

Invasive methods can be divided according to the purpose of diagnostic and therapeutic under control of the performance of imaging modalities (MMG, ultrasound, CT, MRI).

2.1 Biopsy of breast lesions under mammography control - stereotactic biopsy

Mammography is the standard diagnostic modality for early detection of breast cancer. It is a highly effective method especially in detecting calcified early stages of breast cancer and the discovery of suspected opacity in adipose breast (Fig. 1).

2.2 Ultrasound – guided biopsy

The ultrasound is the second most important diagnostic modality in diagnostics of the diseases of the breast. Development and improvement of sonographic techniques allows nowadays not only differentiate cystic and solid lesions, but also the differentiation between benign and malignant features of solid focal lesions. The sensitivity of ultrasound ranges from

57 to 90%. Specificity reached 60 to 90% [7]. For women less than 35 years sonography is the method of choice when clinical findings are inconclusive (Fig.2).



Fig. 1 Biopsy system – stereotactic mammography unit

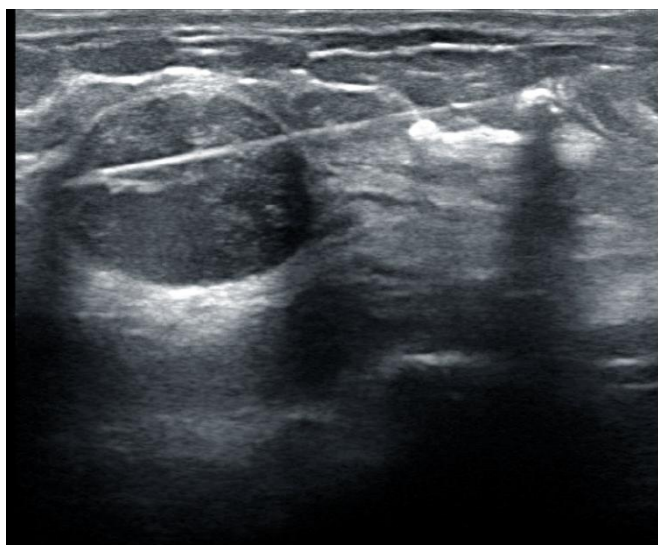


Fig. 2 Fibroadenoma – ultrasound guided biopsy

2.3 MRI – guided biopsy of breast lesions

Magnetic resonance imaging is accepted as a highly sensitive method for detecting small breast lesions that often are not differentiable, even back in mammographic images or ultrasound of. In this case, when we are not able to deposit or re-locate to mammography and sonography, the question arises histological verification of such lesions. It is natural that the developed method under control biopsy MRI. In principle, it is a method comparable to stereotactic biopsy. Its implementation is not complicated - both patients in the gantry position of magnetic resonance and also the principle of the device itself. The performance is not possible using conventional biopsy arsenal. Centers dedicated to the diagnosis of mammary, with special non-magnetic arsenal, which was developed in order to receive material from

lesions that are visible only at biopsy and localization, interstitial laser photocoagulation, radio frequency ablation, cryotherapy, photodynamic therapy, or brachytherapy [3].

The requirement is of course a special arsenal free ferromagnetic material, or the principles of the above methods of intervention are the same as in other organ systems.

2.4 Hands free breast biopsy

In previous chapters we dealt with the intervention of various methods of control instrumentation. We must not forget that it is possible to implement intervention procedures and "free-hand", without control devices (mammography, sonography, computed tomography, magnetic resonance imaging, and positron emission tomography). These are practices that reach into the background just for the availability burdensome techniques. Nevertheless, the findings clearly palpable, large lesions and the collections. In these cases we may make a thick needle biopsy (core) or fine needle (aspiration) and palpation. But clearly eliminates the possibility of control by surgery. This sampling was carried out at workplaces cytology or biopsy units, often for surgical or gynecological outpatient clinics or in oncology.

3 Material, methods

The thickness of used needles in principle there are two types of performances, fine needle aspiration biopsy (FNAB) and fine needle aspiration cytology (FNAC) with collection of material for cytological examination of slides [8]. We use a thick needle into 18 - 20G, 22G and 24G rather, (Fig. 3) in fact most venipuncture needle or needles for intramuscular or subcutaneous use also. The second major method to the thickness of the core needle biopsy (CNB), cut core biopsy (CCB) with a collection of cylindrical ingots tissue kept in fixative. In this case we use the needle 11 to 16 G. A kind of modern industry core-cut biopsy is vacuum biopsy – mammotomy (Vacuum assisted biopsy, VAB), obtained samples with a larger diameter connecting the vacuum and rotating blade inside the sampling needle usually thick needles from 8 G to 11 G [7].

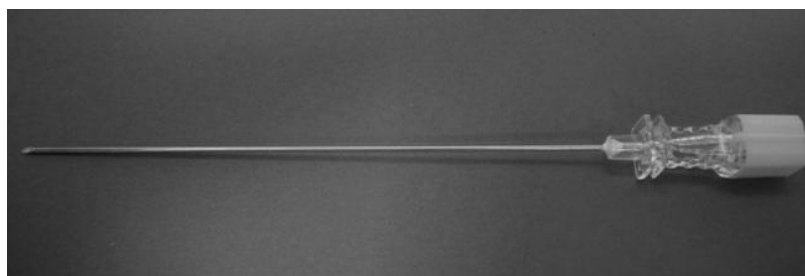


Fig. 3 Fine needle for FNAC, 20 G

3.1. FNAB - Fine Needle Aspiration Biopsy

FNAB was carried out in particular:

- differentiation of cystic and solid lesions,
- simplex or for the diagnosis of atypical cysts with the possibility of concomitant cyst (aspiration and any subsequent drops, air, alcohol, etc..),
- in dealing with post-operative complications - suction seroma and hematoma at a puncture abscess collections with the possibility of antibiotic drops,
- bearing the pectoral muscle fascia with impending iatrogenic pneumothorax,
- lesion in the differential diagnosis of mucinous carcinoma or gelatinous when the bearing is displayed as hypoechogenic, cystic bearing,
- if it is the LU and lesions in the axillary area, where it is possible to use biopsy gun,

- if it is a focal lesions that cannot be displayed with sonography and technically diagnosed with "core-cut" biopsy in stereotaxii (e.g., a lesion cannot be displayed and the ultrasound stereotaxii his position is not accessible to sampling by "core-cut" needle in the lower quadrants interface - is close to the detection plate and could be damaged).

3.2 Core - "core-cut" biopsy (CNB, CCB)

Core-cut biopsy has become a global priority in mammodiagnostics. It is important for definitive diagnostics and confirmation of breast cancer before the actual treatment (whether surgical or neoadjuvant chemotherapy). Under stereotactic control is mainly used for large or sonographically hidden deposits and also in case microcalcification and small changes of the breast structure and architectonics breast changes, if not available vacuum biopsy. Under ultrasonographic control is nowadays increasingly used mainly to show lesions in real time, at different levels and the possibility to follow the sampling procedure the needle to the lesion or the lesion itself [3, 9].

The sampling used special needle with a diameter of 14G, 18G, currently on breast puncture considered optimal diameter 14G (Fig. 4).

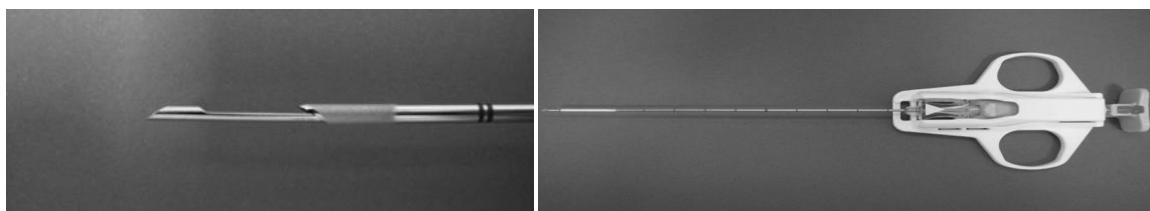


Fig.4 Semi - automatic core cut biopsy needle system...

In addition to the puncture needle for biopsy using the coaxial cannula that also has two parts. Internal, ending in a sharp point part and an outer portion that remains after ejecting sheet in the breast as a coaxial cable for re-introduction of needle puncture alone. Coaxial system must be rough for 11 G from needle puncture. Biopsy "core-cut" devices are divided into two basic groups [10, 11]:

- Semi-automatic biopsy needle - after drawing a special spring mechanism, the automatic sampling portion extends into the bearing itself and then when you press the shutter to capture there and cut a pad of tissue. This order sets are mostly single-monoblock [5, 12].
- Automatic biopsy guns, so. "Biopsy gun" - working on a similar principle as a semi-automatic biopsy needle after drawing a special spring mechanism is manually inserted needle to collector / bearing, the stroke itself sampling (sampling of the protrusion and cut the pad of tissue) is automatically controlled in a single step (one-step), as well as puncture needle penetration force. Sterile "core-cut" needle of different diameters (14G-18G), as appropriate exchange in itself delegates bioptic Sampling under the control of stereotaxy are made on the above principles of stereotactic biopsy The lesion is on the basis of comparative images captured at position + / -15 st. auto-oriented evaluation system to determine a definite possibility within reach lesions in mammography.

CNB is indicated for:

- histological verification of deposits with a high probability of malignancy (bearings, which show even a sign of malignancy),
- determination of preoperative histological diagnosis,
- for primary malignant tumors to neoadjuvant treatment of cancer (for determination of hormone receptors and Her-2/neu oncogene),

- probably benign lesions with low suspicions of malignancy, confirmation of benignity,
- multiple suspected lesions in the same / different breast quadrants (for evidence of multifocal / multicentric lobular carcinoma),
- clinically detected large masses (for staging),
- under scrutiny for microcalcifications on mammography, radial scar and very small tumors observable only mammography.

The advantage is especially definitive histologic diagnosis of tumor invasiveness assessment, examination of prognostic factors for better planning of treatment of primary breast cancer and reduces the number of operations. The disadvantage is the financial cost of instrumentation with instruments readily a higher number of complications that accompany the FNAB and CCB, such as. Bleeding from the injection site (for the use of coarse sampling of needles), pronounced local tenderness, nausea, vasovagal reaction, pneumothorax, and infection. The question of saturation of malignant cells into the puncture channel is still open and debated issue [13].

3.3 Vacuum biopsy - (VAB - Vacuum assisted biopsy)

Efforts to improve the diagnosis of diseases of the mammary gland biopsy yielded vacuum, which is done using a special needle sampling. The connection method vacuum that draws the tissue sampling of the needle and bring the sample to obtain tissue rolls with a diameter of 8G or even 11G with rotating blade inside the sampling needle, provides an excellent diagnostic method in which the volume of tissue removed nearly identical with the collection of surgical excision (Fig. 5).

The main difference compared to sampling with core-cut biopsy needle is stationary position by repeated sampling. The samples are by vacuum mammotomy moves out of the cannon, and it is not necessary to choose a needle once again strike the lesion. This is achieved by injection of a withdrawal of large quantities of samples of relatively large volume.

VAB under stereotactic targeting is indicated:

- to verify the histological origin of the suspected microcalcification,
- histological examination of the suspect bearings which do not contain microcalc, but the ultrasound is not accessible.

VAB under ultrasound control is indicated:

- if for reasons of size and anatomical bearing deposit is safer, particularly for smaller bearings with greater mobility, which tends to stall before rapidly moving needle biopsy using a gun,
- if it is not possible to accurately determine the boundaries of bearings as well as space for core biopsy, thus there is the fear of false negativity,
- the diagnosis of recurrent breast cancer, in both of the latter cases, reap the benefits of obtaining a relatively large sample volume and number,

In all cases, the procedures, there is accompanied by excessive bleeding or other more serious complications and the patients they bear quite well.



Fig. 5 Vacuum assisted mamotomy (biopsy), the first VAB system in Slovak republic

3.4 Galactography

This is a contrast, examination of the intervention serving to display the main and segmental branches of the duct (ductal tree) using injected diluted contrast medium. Allows you to identify and characterize intraductal process in patients with pathological secretion.

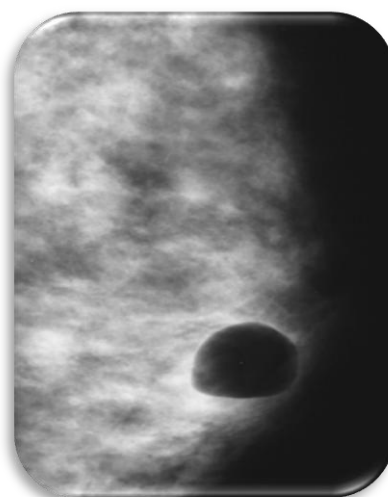


Fig. 6 Pneumocystography

The main indication are unilateral spontaneous secretion, according to some authors, this method is only indicated in a bloody secretion but also in spontaneous pathological secretion from the duct of one (serous, watery). Conversely milk secretion, which often double or even from multiple ducts, is not considered pathological [9-11].

3.5. Cyst aspiration followed by instillation of a negative contrast (air) – pneumocystography

Puncture of the cyst is a performance baseline, which is a fundamental intervention in mammology performance. Solitary cyst or clusters of cysts may not be a reason for surgical excision, which leads to unnecessary iatrogenic damage, traumatization and postoperative deformation of the breast.

The combination of mammography and ultrasonography to evaluate the basic characteristics of the cyst size, wall thickness, structure and content of the cysts in the thyroid area. In particular, ultrasound is the method of choice in the differential diagnosis and reveals intracystic mass, corresponding to intracystic papilloma, papilocarcinoma (Fig. 6). This finding, as well as the bloody cyst puncture, is an indication for biopsy [6, 14].

4 Conclusion

This overview shows that there is a wide range of investigative modalities of intervention procedure in mammology. With a suitably chosen combination of intervention and imaging technique can reduce the number of surgical diagnostic excision and arriving at a correct diagnostic conclusion with individual treatment planning. An increasing importance especially in the successful diagnosis of breast cancer is still small and nonpalpable lesions.

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*Review: Jan Daneš
Miron Šramka*