

Vacuum biopsy of the breast Experience of St-Jan Hospital in Brugge

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Background. Mammotome is a percutaneous biopsy technique with a large needle, assisted by vacuum aspiration. The single insertion technique allows to collect multiple large tissue samples, which gives a more reliable histological result. The technique can be used under stereotactic, MRI or ultrasound guidance. The technique is used under local anesthesia, on an outpatient basis.

Conclusions. Although it is essentially a diagnostic technique, it has a therapeutic potential in some cases. Recently, the technique has been FDA approved for the removal of benign nodular lesions. Worldwide, over 2 million procedures have already been performed. It has the potential to replace surgical open biopsy, with a similar accuracy and at a lower cost, and it is less invasive.

Key words: breast, vacuum biopsy, mamomat, stereotactic guidance, MRI, ultrasound

Technique and procedure

The Mammotome needle comes in 3 sizes (14, 11 and 8 G) and has a double aspiration system. The tip is either blunted or bladed; the latter facilitates the insertion between tissue planes. An advantage of the system is that a single insertion allows retrieval of multiple (theoretically unlimited) samples.¹

Once the needle correctly positioned, the needle opens, tissue is aspirated in the biopsy window, and a cylinder is cut by a rotating knife. By retracting the inner part of the needle, the tissue sample is retrieved, while the needle stays in accurate position.

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The average weight of the cores is higher than a standard biopsy: 300 mg (8G), 100 mg (11G) or 35mg (14G) compared to 17mg for a 14G core biopsy.

By retrieving several samples, it is possible to remove completely a nodular lesion up to 2.5-3 cm; the 8G needle is best suited for these larger nodules.

The disposable needle is mounted on a handheld device, that is connected to a computer controlled unit by mechanical and electrical cables, and 2 vacuum lines. The different functions of the device are commanded by footswitches, and a screen allows to have visual control over the procedure.

The biopsy is done under local anaesthesia and requires a small skin incision of 4-5mm. The precise application of anaesthesia deeper around the lesion facilitates the insertion and accurate placement of the large needle. The

needle is placed under the lesion that has to be biopsied, so that we have a good vision on the lesion and the needle; in some cases a lateral placement is required to avoid skin aspiration; the advantage of ultrasound guidance is the possibility to monitor in real time, and to have longitudinal or transverse imaging. In case of bleeding, the vacuum allows to aspirate the blood.^{2,3}

After retracting the needle, manual local compression is applied to prevent haematoma formation. The incision is carefully closed with Dermabond® in order to have minimal scar.

The average procedure time is 30-40min.

Indications

The main indication of Mammotome is biopsy of clusters of microcalcifications, which is usually done under *stereotactic* guidance. This method has a largely proven reliability and should replace surgical open biopsy.

The most convenient and most comfortable way to do this procedure is on a prone table. We use the Fischer table for our procedures. The patient is lying comfortably in a prone position, without seeing the procedure itself, which is more relaxing. The biopsy can be performed from almost any direction, 360° around the breast, and there is the possibility of frontal and lateral approach, so that virtually any lesion in the breast can be reached with the Mammotome needle. The table is equipped with a digital spot Mammography, which speeds up the procedure, since we have nearly instant visualisation.

Under *MRI* guidance, the technique has indications in the diagnosis of suspicious enhancing lesions, which has no clear expression on mammography or ultrasound. The procedure is lengthier than the US or Mammography guided one, and requires special equipment.

The ultrasound guided procedure is still some matter of discussion, but should also re-

place surgical biopsy for nodular lesion, and replace even surgery for complete removal of certain types of benign lesions.⁴

In our experience, the main indications are:⁵

Probably benign or indeterminate nodular lesions

Most frequent indications are palpable or non palpable nodular lesions or areas of tissue changes (Birads 4 and 3). We always try to remove the lesion completely so that there is no uncertainty on later control images.⁶ In our experience, the psychological impact of the complete removal is very important in reassuring the patient.

Very small suspicious lesion

Lesions <5mm can sometimes be difficult to biopsy with standard core biopsy; Mammotome allows a more certain histological result.

Lesions in difficult location

The absence of a forward throw of the needle reduces the risk of touching sensitive structures; we recommend the use of Mammotome in lesions close to the nipple, the thoracic wall, the skin or the axillary region.

Areas of localised attenuation

Most of the time, these are caused by areas of fibrosis, but localised attenuation can be the only sign of an invasive lobular carcinoma. A large sampling is recommended in these cases.

Isolated, complex fibrocystic areas

Only a large histological sampling allows a correct histological differentiation⁷ between fibrocystic changes, atypia and in situ carcinoma; in our experience, all of these tissue changes are sometimes present in the same area.

Papillomas

Small solitary papillomas can be accurately diagnosed and removed using Mammotome. In our experience and according to recent literature,⁸ clinical manifestations also disappear after complete removal.

Clusters of microcalcifications

Many clusters are visible on ultrasound. In difficult locations, where stereotactic procedure is hazardous, like close to the nipple, to the skin, or the axillary region, ultrasound guidance offers a reliable and secure alternative because of the real time monitoring.⁹

Very hard lesions, with inconclusive previous biopsy or FNAC

Due to the vacuum aspiration and the rotating cutter, even in the hardest lesions, where adequate sampling with core fails, good histological results are obtained with Mammotome.

Removal of benign lesions

Breast lesions, certainly when they are palpable, cause a lot of uncertainty and anxiety to the patient; inconclusive reports aggravate these conditions; a strong family history of cancer is also an aggravating factor. Because we always have to consider the attitude of the patient in the presence of a breast lesion, frequently the decision is made to surgically remove a lesion. Mammotome can be a better and less expensive alternative.^{6,10} Recently, FDA approved the use of the device for this purpose.

Lesions up to 2.5-3 cm can be completely removed with minimal or no scarring. The technique is very well supported by the patients.

Discussed indications: radial scar, large intracystic lesions

Small radial scars, without associated nodular centre on ultrasound, are less frequently associated with malignancy than previously thought. Although a Mammotome biopsy can establish a correct diagnosis, the biggest inconvenience is that the pathologist misses the integrity of the lesion. This is also the case for larger papillary intracystic lesions.

Results

We use Mammotome for nearly 5 years now and have performed around 1300 procedures; this represents about 30% of our breast biopsies. The majority of the biopsies are done with core needle, most 16 or 18G; FNAC is rarely used for solid lesions because of the limited information.

About 48% of the Mammotome procedures are done under stereotactic guidance, 45% under ultrasound, and 7% under MRI (this relatively high percentage is explained by the fact that we are the only centre in the country that is equipped for MRI-guided procedures).

In the mammographic cases, 29% malignancies and 7% of atypical ductal hyperplasia were found; 64% of the cases were benign, which eliminated the need for short term follow-up. Of the malignant cases 88.7% were in situ carcinomas! We only had 2 false negative results in the beginning, mainly due to inexperience.

The ultrasound cases showed give a lower number of malignant cases, which is normal, due to the type of indications. We had 16% malignancies, 4% atypia and 80% benign lesions. If we do not take in account the fibroadenomas removed "on request" (as an alternative for surgery), and if we consider papillomas as "positive" cases, we had 64% benign and 36% of positive biopsies.

The MRI-guided procedures resulted in 32% malignant, 2% of atypia and 66% of benign cases.

Conclusions

Overall, Mammotome is a very reliable sampling technique,¹¹ with very few complications, is relatively easy to use, and well supported by the patients. Compared to surgical biopsy, the cost is 2 to 3 times lower, even without counting the additional "social" cost.¹² Because it is less invasive, it can be used more easily, thus reducing the cost of repetitive controls or more expensive additional exams, and above all it reduces the time between detection and diagnosis, which is very important in reassuring the patient; it can also have a prognostic impact since tumours can be diagnosed in an earlier stage; delayed diagnosis, with potential medico-legal impact, can also be avoided.

The technique can at this moment not be considered as therapeutic in case of malignancy.

In our hospital, the use of Mammotome radically changed the approach of breast pathology. Detection of lesions is done by (full field digital) Mammography frequently combined with high resolution ultrasound; MRI is done only in limited cases. In the presence of an abnormality, no control exams are done, but we try to provide an histological proof, most of the time immediately following the diagnostic imaging. We usually have a definitive histological report within 24 to 48 hours. This gives high patient satisfaction and considerably reduces patient anxiety.

Ultrasound guided core biopsy is the most frequently used procedure; Mammotome is reserved for more difficult lesions and for microcalcifications. Surgical open biopsy has virtually been eliminated in our hospital.

There is practically no more surgery for benign lesions. In case of malignancy, a one step therapeutic operation can be planned, with a fully informed patient.

Due to the high number of small lesions and in situ lesions, breast conserving surgery and sentinel node procedure are done in a majority of cases.

All cases are discussed in a multi-disciplinary team, which meets weekly.

The use of Mammotome is in our experience an important addition in our daily practice.

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