POLSKI
PRZEGLĄD CHIRURGICZNY
2012, 84, 5, 242–246
10.2478/v10035-012-0040-1

MAMMOTOME BIOPSY UNDER ULTRASOUND CONROL IN THE DIAGNOSTICS AND TREATMENT OF NODULAR BREAST LESIONS – OWN EXPERIENCE

WOJCIECH KIBIL, DIANA HODOROWICZ-ZANIEWSKA, JAN KULIG

1st Chair of General, Oncological, and Gastrointestinal Surgery, Jagiellonian University Medical College in Cracow
Kierownik: prof. dr hab. *J. Kulig*

Mammotome biopsy is an effective, minimally invasive, novel technique used in the verification of breast lesions.

The aim of the study was to assess the value of ultrasound-guided vacuum-assisted core needle biopsy (mammotome biopsy) in the diagnostics and treatment of nodular breast lesions, considering own data.

Material and methods. Analysis comprised 1183 mammotome biopsies under ultrasound control performed in 1177 female patients during the period between 2000 and 2010, at the Regional Clinic for Early Diagnostics and Treatment of Breast Lesions, I Chair and Department of General Surgery, Jagiellonian University, Collegium Medicum.

Results. The average patient age amounted to 41.7 years. The size of the investigated lesions ranged between 4 and 65 mm (mean – 12 mm). The histopathological examination result was as follows: fibrocystic lesions (n=285), adenofibroma (n=477), adenosis sclerosans (n=188), hyperplasia without atypy (n=58), phyllode tumor (n=2), papilloma (n=14), hamartoma (n=1), atypical hyperplasia (n=25), *in situ* ductal carcinoma (n=4), in situ lobular carcinoma (n=5), infiltrating ductal carcinoma (n=114), infiltrating lobular carcinoma (n=4), non-diagnostic result (n=6). The histopathological diagnosis was obtained in 99.5% of cases. Patients diagnosed with atypical hyperplasia or cancer were qualified for surgery, according to accepted standards. The presence of a hematoma was the most common complication after the biopsy, observed in 16.5% of patients.

Conclusions. The obtained results confirmed the high value of ultrasound-guided biopsies in the diagnostics of nodular breast lesions. The method is safe, minimally invasive, with few complications, providing a good cosmetic effect. In case of benign lesions with a diameter of less than 15 mm the mammotome biopsy enables to completely excise the lesions, being an alternative to open surgical biopsies. The mammotome biopsy should become the method of choice considering the diagnostics of nodular breast lesions.

Key words*:* mammotome biospy, ultrasound-guided biopsy, nodular breast lesions

Vacuum-assisted core needle biopsy (mammotome biospy) is a minimally invasive, novel technique used in the diagnostics and treatment of focal breast lesions. The first biopsy was performed on August 5, 1995 in Denver, USA. Since 1996, the above-mentioned has been used in Europe and in Poland – 1999 (1).

The examination consists in the collection of a few to several breast parenchyma samples by means of a rotating needle connected to a vacuum generating device. The obtained material is automatically aspirated without the need to remove the needle. Depending on the character of the bioptate lesions the examination can be performed under ultrasound or mammography control (stereotactic biopsy), and even magnetic resonance (2).

Due to the numerous advantages, mammotome biopsy has become a commonly used procedure in the diagnostics of nodular breast lesions (3, 4). The most important include safety, good patient tolerance and minimal invasiveness. The above-mentioned biopsy

does not require patient hospitalization, leaving a small scar without the need for sutures, and does not deform the breast.

The duration of the procedure is relatively short and the patient can quickly return to active work. As shown by numerous studies mammotome biospy is primarily a diagnostic method. The above-mentioned biopsy is indicated in case of the presence of nodular breast lesions requiring histopathological verification (5). In selected cases, its therapeutic value should also be underlined. Due to the fragmentation of the material and inability to precisely determine the margin of removed tissues it should not be performed when suspecting malignant lesions. In case of the benign nature of breast lesions mammotome biopsy is an interesting, minimally invasive alternative to open surgical biopsies.

The patient does not require special preparation except for blood group and coagulation parameters. The following mammotome biopsy complications are possible: skin ecchymosis, hematomas at the site of the biopsy, pain, and skin and pectoral muscle damage. Literature data also mentioned isolated cases of pneumothorax and infectious complications. The limitation of the method may include the high cost of equipment and inexperience of the physician performing the biopsy.

The aim of the study was to assess the value of ultrasound-guided vacuum-assisted core needle biopsy (mammotome biopsy) in the diagnostics and treatment of focal breast lesions, considering own data.

MATERIAL AND METHODS

Analysis comprised 1183 mammotome biopsies under ultrasound control performed in 1177 female patients during the period between 2000 and 2010, at the Regional Clinic for Early Diagnostics and Treatment of Breast Lesions, 1st Chair and Department of General Surgery, Jagiellonian University, Collegium Medicum. All patients had a previously performed breast ultrasound, and those over the age of 40 years, mammography. An ultrasound-guided vacuum-assisted needle biopsy system was used, equipped with a special knife used for the sampling of breast parenchyma in the form of rolls of 20x3 mm in size. 10G (Encor) and 11G (Mammotome) diameter needles were used. Before the biopsy, blood group and coagulation parameter examinations were evaluated. The procedure was performed under local 1% lidocaine solution anesthesia. The duration of the procedure ranged between 10 and 20 minutes. After the biopsy a routine pressure dressing was placed for a period of 24 hours. All histopathological samples were performed at the Department of Pathology, Jagiellonian University, Collegium Medicum.

Patients with ultrasonographically confirmed focal breast lesions (hypoechogenic solid lesions, distortion of breast parenchyma, or complex cysts) were qualified for the biopsy, belonging to group IVa –V, according to BI-RADS classification, and in selected cases to group BIRADS III (family history of breast lesions, fear of the patient). In case of lesions with low ultrasonographic risk of malignancy and size < 15 mm, the procedure was aimed at their complete excision. In case of large lesions or those suspected of malignancy the intention of the biopsy was to obtain histopathological verification necessary to qualify for surgery, plan optimal treatment, including induction systemic therapy. When planning conservative treatment preceded by induction chemotherapy, and in case of suspicious lesions, less than 10mm in size, a titanium-gel marker was placed routinely.

All patients that did not consent to the biopsy, allergic to the local anesthetic, and those with active chest skin infections were disqualified from the procedure.

RESULTS

The average patient age amounted to 41.7 years (ranging between 18 and 92 years). The size of the biopsy lesions ranged between 4 and 65 mm (average – 12 mm). Parameters such as location of the lesion, clinical evaluation, ultrasound size and histopathological results were presented in tab. 1.

Diagnosis was confirmed in 99.5% of cases. In case of a non-diagnostic or false-negative result (0.48%), due to the lack of correlation between the ultrasound image and histopathology, patients were qualified for open surgical biopsies. Four patients were diagnosed with adenofibromas and 2 with fibrocystic lesions.

Table 1. Clinical and morphological features of the bioptate lesions

Clinical and morphological features of the bioptate lesions	Number of patients	Percentage of patients
Right breast	5678	48
Left breast	4495	52
Upper external quadrant	497	42
Upper internal quadrant	225	19
Lower external quadrant	367	31
Lower internal quadrant	94	8
Size of the lesion < 15 mm	923	78
(longest usg dimension) > 15 mm	260	22
Non-palpable lesion	1053	89
Palpable lesion	130	11
Histopathological diagnosis:		
fibrocystic lesions	285	23,7
adenofibroma	477	39,5
adenosis sclerosans	188	15,9
hyperplasia without atypy	58	4,9
papilloma	14	1,2
phyllode tumor	2	0,16
hamartoma	1	0,8
atypical hyperplasia	25	2,1
ductal carcinoma in situ (DCIS)	4	0,32
lobular carcinoma in situ (LCIS)	5	0,43
infiltrating ductal carcinoma	114	9,6
infiltrating lobular carcinoma	4	0,32
non-diagnostic result	6	0,48

All patients were subject to routine ultrasound examinations the day after the biopsy. 16.5% were diagnosed with a hematoma at the site of the biopsy puncture, its size ranging between 11 and 38 mm (average – 26 mm). In one case the hematoma required surgical intervention. 19% of patients were diagnosed with skin ecchymosis without hematoma development. Only one patient required emergency surgical intervention of the hematoma. Patients with a histopathologically diagnosed benign lesion were subject to periodic clinical and ultrasonographic control, 3 months and one year after the biopsy, refraining from open surgical biopsy for further verification.

Recurrence or features of malignancy were not observed. In 93.4% of cases with a lesion < 15 mm, the above-mentioned was completely removed, and during control imaging examinations residual lesions were not observed. Patients with diagnosed intraductal atypical hyperplasia, preinvasive or invasive carcinoma were qualified for surgery, according to standard therapeutic guidelines (tab. 2).

Table 2. Histopathological examination result of the surgical biopsy specimen in case of patients with a diagnosed biopsy specimen of atypical hyperplasia or carcinoma

Histopathological result of the mammotome biopsy	Number of patients	Histopathological result of the surgical sample	Number of patients
Atypical hyperplasia	25	adenosis sclerosans	11
		hyperplasia without atypy	9
		atypical hyperplasia	3
		ductal carcinoma in situ	2
Ductal carcinoma in situ	4	ductal carcinoma in situ	1
		infiltrating ductal carcinoma	3
Lobular carcinoma in situ	5	lobular carcinoma in situ	5
Infiltrating ductal carcinoma	114	infiltrating ductal carcinoma	114
Infiltrating lobular carcinoma	4	infiltrating lobular carcinoma	4

DISCUSSION

Breast carcinoma in Poland is the most common malignant tumor in female patients, and the second most common cause of death, due to malignant neoplasms. The growing awareness of patients, fear of cancer, progress in imaging diagnostics, and relatively high availability of ultrasound examinations require effective verification of nodular breast lesions. Differential diagnostics of small, non-palpable lesions suspected of malignancy is especially difficult. Until recently, the golden standard in such cases was open surgical biopsy. However, the possible complications, the duration of the procedure, costs, possible scarring, and breast deformations tend to seek less invasive and cheaper methods. Mammotome biopsy eliminates or greatly reduces these defects (6, 7, 8). The above-mentioned is efficient, minimally invasive, relatively inexpensive, providing a good cosmetic effect, with few complications (9-13). The above-mentioned procedure gradually supplants the widely used thus far, fine-needle aspiration biopsy, whose main disadvantage is the high percentage of non-diagnostic (4 – 35.4%) and false negative results (2.6 – 20%) (6, 14, 15, 16). During mammotome biopsy a tissue sample is collected for histopathological verification, which determines the value of obtained results (2, 7). In case of benign lesions further verification by means of open surgical biopsy is not necessary (5, 6, 16, 17). The Authors of the study confirmed that the above-mentioned is completely sufficient. In case of benign lesions and those smaller than 15 mm, mammotome biopsy also has a therapeutic efect. In more than 90% of cases the lesions may be completely removed (18), which is a good alternative to open surgical biopsy enabling to avoid surgical intervention.

In case of lesions suspected of malignancy mammotome biopsy enables to diagnose cancer with the determination of the receptor status (6), which allows too undertake appropriate therapeutic decisions. The most common complication of vacuum-assisted core biopsy is a hematoma (6), occasionally requiring emergency surgical intervention. The best prevention of bleeding from the surgical biopsy site seems to be a pressure dressing applied during the initial 24 hours, also preventing pain which may be associated with bleeding and the growing hematoma inside the breast.

CONCLUSIONS

The obtained results confirmed the high value of mammotome biopsy in the diagnostics of focal breast lesions. The method is effective, safe, burdened with a low rate of complications. In most cases it perfectly replaces the less effective fine-needle aspiration biopsy and less invasive open surgical biopsy. It should therefore be the method of choice in the diagnostics of nodular breast lesions (3, 6, 13).

REFERENCES

1. *Povoski SP, Jimenez RE*: A comprehensive evaluation of the 8-gauge vacuum-assisted Mammotome system for ultrasound-guided diagnostic biopsy and selective excision of breast lesions. *World J Surg Oncol* 2007; 5: 83.
2. *He Q, Fan X, Guan Y* et al.: Percutaneous excisional biopsy of impalpable breast lesions under ultrasound visualization. *Breast* 2008; 17: 666-70.
3. *Burak WE, Agnese DM, Povoski SP*: Advances in the surgical management of early stage invasive breast cancer. *Curr Probl Surg* 2004; 41: 877–936.
4. *Mathew J, Crawford DJ, Lwin M* et al.: Ultrasound-guided, vacuum-assisted excision in the diagnosis and treatment of clinically benign breast lesions. *Ann R Coll Surg Engl* 2007; 89: 494-96.
5. *Heywang-Köbrunner SH, Heinig A, Hellerhoff K* et al.: Use of ultrasound-guided percutaneous vacuum-assisted breast biopsy for selected difficult indications. *Breast J* 2009; 15: 348-56.
6. *Nakano S, Sakamoto H, Ohtsuka M* et al.: Evaluation and indications of ultrasound-guided vacuum-assisted core needle breast biopsy. *Breast Cancer* 2007; 14: 292-96.
7. *Nakano S, Ohtsuka M, Muraki K* et al.: A: Role and significance of ultrasound-guided vacuum-assisted core needle biopsy (Mammotome biopsy) for non-palpable lesions. *Jpn J Breast Cancer* 2004; 19: 96-97.
8. *Parker SH, Klaus AJ, McWey* et al.: Sonographycally guided directional vacuum-assisted breast

biopsy using handheld device. *AJR Am J Roentgenol* 2001; 177: 405-08.
9. *Simon JR, Kalbhen CL, Cooper* et al.: Accuracy and complication rates of US-guided vacuum-assisted core breast biopsy: initial results. *Radiology* 2000; 215: 694-97.
10. *Costantini R, Sardellone A, Marino C* et al.: Vacuum-assisted core biopsy (Mammotome) for the diagnosis of non-palpable breast lesions: four-year experience in an Italian center. *Tumori* 2005; 91: 351-54.
11. *Wang ZL, Liu G, Huang Y* et al.: Percutaneous excisional biopsy of clinically benign breast lesions with vacuum-assisted system: Comparison of three devices. *Eur J Radiol* 2012; 81: 725-30.
12. *Fine RE, Whitworth PW, Kim JA* et al.: Low-risk palpable breast masses removed using a vacuum-assisted hand-held device. *Am J Surg* 2003; 186: 362-67.
13. *Fine RE, Boyd BA, Whitworth PW* et al.: Percutaneous removal of benign breast masses using a vacuum-assisted hand-held device with ultrasound guidance. *Am J Surg* 2002; 184: 332-36.
14. *Manfrin E, Falsirollo F, Remo A* et al.: Cancer size, histotype, and cellular grade may limit the success of fine-needle aspiration cytology for screen-detected breast carcinoma. *Cancer* 2009; 117: 491-99.
15. *Pisano ED, Fajardo LL, Caudry DJ* et al.: Fine-needle aspiration biopsy of nonpalpable breast lesions in a multicenter clinical trial: results from the radiologic diagnostic oncology group V. *Radiology* 2001; 219: 785-92.
16. *Chen SC, Yang HR, Hwang TL* et al.: Intraoperative ultrasonographically guided excisional biopsy or vacuum-assisted core needle biopsy for nonpalpable breast lesions. *Ann Surg* 2003; 238: 738-42.
17. *Noël JC, Buxant F, Engohan-Aloghe C*: Immediate surgical resection of residual microcalcifications after a diagnosis of pure flat epithelial atypia on core biopsy: a word of caution. *Surg Oncol* 2010; 19: 243-46.
18. *Plantade R, Hammou JC, Gerard F* et al.: Ultrasound-guided vacuum-assisted biopsy: review of 382 cases. *J Radiol* 2005; 86: 1003-15.

Received: 2.04.2012 r.
Adress correspondence: 31-501 Kraków, ul. Kopernika 40