

Clinical analysis of 137 cases of ultrasound-guided positioning for resection of non-palpable breast masses

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Summary

Objective: The aim of this study was to evaluate the clinical value of ultrasound-guided resection of non-palpable breast masses. **Materials and Methods:** One hundred thirty-seven cases of non palpable breast mass patients who underwent surgical treatment from June 2007 to June 2012 were enrolled in this study. All patients were found with breast masses in mammography or ultrasound, and underwent preoperative routine ultrasound-guided wire positioning. **Results:** One hundred fifty-eight lesions underwent ultrasound positioning accurate resection, of which 34 cases (21.5%) were malignant, including 26 cases (16.5%) of intraductal carcinoma, four cases (2.5%) of infiltrating ductal carcinoma, and three cases (1.9%) of invasive lobular carcinoma. Thirteen patients underwent modified radical mastectomy, and 21 cases (61.8%) underwent breast conservation operation. All patients were followed up for six to 53 months, only one patient had pulmonary metastasis after two years, and there was no local recurrence. **Conclusion:** Resection of non-palpable breast masses with preoperative ultrasound-guided positioning has advantages of accurate positioning and simple operation and is of great significance for early diagnosis and treatment of breast cancer.

Key words: Breast disease; Ultrasonography; Non-palpable mass; Positioning.

Introduction

In recent years, with the popularization of breast screening technology and improvement of awareness of cancer prevention, the detection rate of non-palpable breast lesions is markedly increased. It is found that about 15-30% of non-palpable breast lesions are postoperatively confirmed as malignant lesions [1, 2]. As these lesions are non-palpable and non-detectable, they often require a variety of imaging technologies for positioning, followed by accurate resection. Clinically, ultrasonography has been widely used for breast cancer screening and diagnosis [3], which can locate non-palpable breast lesions. The ultrasound-guided positioning assisted non-palpable breast lesion resection can improve the pathologic diagnosis rate and resection rate, with advantage of short operation time and low operation difficulty [4, 5]. At present, the positioning of breast masses is often performed by preoperative ultrasonography, and there are also cases using X-ray positioning [6]. The ultrasonic positioning methods include ultrasound-guided implantation of positioning needle, injection of coloring agent dye, and body surface marking positioning. The most widely used and most convenient method is the body surface marking positioning [7], but this method is easily affected by the experience of ultrasound doctors. During positioning, due to adiposity of patient or hastiness of ultrasound doctors, the marking position may be not consistent with the surgical position [8]. After improvement, the

positioning method can be applied to patient by experienced sonographer, and the accuracy rate can be increased to 83% [9]. This study observed 138 patients who were treated by resection of non-palpable breast mass with ultrasound-guided positioning. The objective was to investigate the clinical application value of ultrasound-guided resection of non-palpable breast mass.

Materials and Methods

Subjects

This study was conducted from June 2007 to June 2012, in Department of Thyroid and Breast Surgery of the First People's Hospital of Lianyungang City. All patients with clinical non-palpable breast masses were found with mammography or ultrasound examination, and consented for operation treatment, which consisted in preoperative routine ultrasonography guided wire localization. This group included 137 patients, for a total of 158 lesions: unilateral single lesion in 116 cases, unilateral or bilateral multiple lesions in 21 cases. The patients were females, aged 21-78 years, and the median age was 46 years. This study was conducted in accordance with the declaration of Helsinki. This study was conducted with approval from the Ethics Committee of the first people's hospital of Lianyungang city. Written informed consent was obtained from all participants.

Treatment

The instruments included a color Doppler ultrasound diagnostic apparatus, and 7.5-12.5 MHz broadband linear array probe. The positioning needle used a dedicated breast localization needle (20G×5 cm, and location was performed at one day before operation or on

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Table 1. — *Pathological examination results.*

Lesion	n	Percentage (%)
Intraductal carcinoma	26	16.5
Infiltrating ductal carcinoma	4	2.5
Invasive lobular carcinoma	3	1.9
Lobular carcinoma in situ	1	0.6
Total	34	21.5

the operation day. Patients were kept in supine position with the ipsilateral arm raised above the head and with operational area sterilized and draped. An ultrasonic assessment was performed again before the procedure. When the probe reached the lesions, the lesion size and the distance between the center of the lesion and the body surface were measured. After fixing the probe, the needle pinpoint was underwent local anesthesia, and the 20-gauge positioning needle was inserted at an angle of 45 degrees along the puncture guide line. Under real-time ultrasound guidance, the needle was inserted vertically inside the lesions, while taking care not to penetrate the lesion to the offside [1-5]. After confirming the tip located within the lesions, the guide wire was fixed at the same time, while gently and slowly exiting the positioning needle sheath; the positioning guide wire tail was reflexed, and which was fixed by covering sterile gauze. An arc incision was made in the site of positioning needle, the skin and subcutaneous tissue were cut along the positioning needle guide direction, after touching the mass, the breast lobule in which the tumor localized, was completely resected. The integrity of the wire was checked when it was taken out. A frozen section of the resected specimen was examined intraoperatively for pathological confirmation. If the pathological results were benign, the operation was ended, and if rapid pathology showed malignancy, a corresponding expanding operation was performed after patients and their family members agreed [6-9].

Results

Pathological examination results

One hundred fifty-eight cases of non-palpable breast masses underwent complete operation resection, and there was no wire breakage or residue, hematoma, pneumothorax, intercostal nerve injury or other complications. Thirty-four cases (21.5%) of breast carcinoma were postoperatively pathologically detected, including 26 cases (16.5%) of intraductal carcinoma, four cases (2.5%) of infiltrating ductal carcinoma, three cases (1.9%) of invasive lobular carcinoma, and one case (0.6%) of lobular carcinoma in situ (Table 1).

Surgery method and prognosis

Thirteen patients underwent modified radical mastectomy and 21 cases (61.8%) underwent breast conservation surgery. All patients were followed up for six to 53 months. Only one patient had pulmonary metastasis after two years and there was no local recurrence (Table 2).

Discussion

The incidence of breast cancer has showed a gradual rising trend in recent years, which has become the head of the

Table 2. — *Surgical method and prognosis.*

Index	n	Percentage (%)
Surgical method	Modified radical mastectomy	13 38.2
	Breast conservation	21 61.8
Prognosis	Pulmonary metastasis	1 2.94
	Local recurrence	0 0

feminine malignant tumor in developed countries in Europe and America and parts of Chinese cities, and is a serious threat to women's health and quality of life. Therefore, for breast cancer and especially for the non-palpable breast lesions, early diagnosis, accurate positioning, and complete resection operation, have become the focus of breast disease diagnosis and treatment [10-13].

Currently, the positioning methods of breast lesions mainly include preoperative X-ray, ultrasound or MRI-guided wire localization, intraoperative ultrasound localization, preoperative breast imaging monitoring with radioactive seeds injection into breast, intraoperative Y detector to find the lesion, and ultrasonography coloring positioning [14]. These methods have different degrees of effect on the positioning, but also have some shortages. The intraoperative ultrasound positioning needs ultrasound doctors to assist surgeons to find lesions, which is more cumbersome and time-consuming. The radioactive seeds breast injection method needs the assistance of nuclear medicine, which is not possessed by all hospitals. The radioactive seeds have a different degree of damage to the medical staff and patients. MRI guidance has high costs. X-ray guidance will lead to position not consistent with the intraoperative posture, and also has radioactive damage. The coloring positioning includes large amount of intraoperative tissue resection [15, 16]. Breast tumor resection with preoperative X-ray or ultrasound-guided wire localization has the advantages of simple operation, accurate localization, and so on, and has found a very high value in clinical application.

Ultrasonography has the advantage of non-invasive, real-time dynamic display, is simple, with quick repeatability, and has become one of the more commonly used methods for the diagnosis of breast tumor. Compared with X-ray-guided wire positioning, ultrasound positioning has the following advantages as follows: (1) ultrasound can timely display the needle path, direction, and the relationship between the positioning needle and the lesion, which is convenient for the operator to adjust the needle direction, while the X-ray can only localize before or after positioning, and cannot indicate the relationship between the positioning needle and the lesion in the process; (2) during ultrasonic positioning, the patients are in the supine position, which is the same as operation posture, and the breast is not oppressed, avoiding the shift of the relative location of metal

wire and the pathological lesion. The ultrasonic location can prevent patients from multi X-ray irradiation [17]. However, the ultrasound localization has its limitations. The clustered microcalcification detection rate of ultrasound is significantly lower than that of X-ray, therefore X-ray-guided positioning is generally used for this kind of disease.

It is reported that about 1-2% cases of ultrasound or X-ray stereotactic operation will cause a variety of complications, including wire breakage or residue, hematoma, pneumothorax, intercostal nerve injury [18-20]. Compared with X-ray localization, due to relatively simple operation, the complication rate of ultrasound positioning is low. The present department carries out ultrasound positioning, and developed a strict standard operating procedures and enforcement, therefore the patients have no significant complication.

In this study, all 158 lesions underwent ultrasound positioning accurate resection. No wire breakage or residue, hematoma, pneumothorax, intercostal nerve injury, and other complications occurred. Thirty-four cases (21.5%) were diagnosed as malignant, including 26 cases (16.5%) of intraductal carcinoma, four cases (2.5%) of infiltrating ductal carcinoma, three cases (1.9%) of invasive lobular carcinoma, and one case (0.6%) of lobular carcinoma in situ; 61.8% patients had the opportunity of breast conservation, and the postoperative prognosis of malignant patients is satisfactory.

In conclusion, with the close cooperation with ultrasound doctor and surgeon, non-palpable breast masses can be accurately resected with preoperative ultrasound-guided wire positioning. This method is simple, safe and reliable, and has clinical application value.

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