RESEARCH ON THE VALUE OF ULTRASOUND GUIDED CORE NEEDLE BIOPSY IN BREAST CANCER DIAGNOSIS

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ABSTRACT

Diagnostic ultrasound guided core needle biopsy on 42 patients with suspected breast tumors before surgery has showed that this method is safe, low-cost, less complicated and very reliable with the sensitivity of 92.3%, the specificity of 100%, the accuracy of 92.9% compared to the gold standard of histopathology after surgery. Core needle biopsy with ultrasound guidance has become a superior method compared to other diagnostic methods, and provided accurate diagnosis useful for the treatments to avoid unnecessary surgical intervention.

I. BACKGROUND

Breast cancer is one of the most common cancers among women in many countries of the world. In Vietnam, the study of cancer in recent years has showed that breast cancer had the highest frequency of all female cancers and tends to increase gradually every year. According to the latest statistics, breast cancer incidence in Hanoi is 32 per 100,000 inhabitants [7]. There have been more and more advances in the diagnosis and treatment of breast cancer. Methods of diagnosis of breast cancer before treatment have been studied in order to improve the effectiveness in the screening, detection, prevention and early treatment.

In the past, to have the histopathological diagnosis for a breast cancer, the tumor must be partially or totally removed for opened biopsy before performing a second surgery to dissect the entire breast and lymph nodes. This caused inconveniences for both patients and doctors.

Core needle biopsy performed under ultrasound guidance has proved to be a safe and accurate method for assessing a lesion of breast cancers [16]. This result can be compared with histopathological diagnosis of surgical excisional biopsy [13]. This result helped to make a more practical plan for treatment and prognosis for breast cancer surgery .

As a result, we made a research with the purposes as follows :

1. Study of clinical and para-clinical characteristics of the breast cancer.

2. Evaluate the diagnostic value of core needle biopsy under ultrasound guidance for breast cancers in HUE Central Hospital.

II. SUBJECTS AND METHODS

2.1. Subjects: 42 female patients who were suspected breast cancers on physical examination and treated at HUE Central Hospital from April to June 2013/2014. The patients should have following conditions:

- Have a breast tumor/tumors, size of 0.5 cm to 5 cm.
- Ultrasound showed a tumor with the size > 0.5 cm > (BI-RADS ≥ 3).

1. Hue Central Hospital

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- Mammography (BI-RADS ≥ 3).
- Fine needle aspiration shows a suspected cancer.
- The result of histopathology of core biopsy of breast tumor.
- Result of histopathology biopsy of breast tumor after surgery.
- Patients agree to participate in the research.

2.2. Methodology

Cross- section method .

Study materials: Ultrasound with the special probe for breast : ATARES, SIEMENS, Germany. Using frequency converters 7.5-10 MHz. Mammography Machines, HOLOGIC, American brand, produced in 2010. Core biopsy gun America's BARD and barrel needle with the size 14 g,10cm long

2.3. Data processing:

Using software SSPS and Medcalc 11.5.

III. RESULTS

3.1. Clinical characteristics of breast cancer

Table 1. Patient distribution by age group

Age	n	(%)
< 40	7	16.6
40 - 49	12	28.6
50 - 59	16	38.2
≥ 60	7	16.6
total	42	100.0
50.5 ± 10.5		

Table 2. Family History

Family history	N	%	P
Normal	38	90.5	p < 0.01
Mother, sister suffering from breast cancer	4	9.5	
Total	**42**	**100.0**	

Table 3. Clinical Symptoms

Clinical Symptoms	n	%	P
Breast tumors	33	78.6	p <0.01
Breast pain	3	7.1	
Nipple Discharge	2	4.8	
Breast Deformation	4	9.5	
Total	**42**	**100.0**	

Table 4. Distribution of Tumor location

Location	n	%
Right breast	22	52.4
Left breast	20	47.6
Total	**42**	**100.0**

Table 5. Area of tumors

Location	n	%
1/4 upper outer quadrant	25	59.6
1/4 Upper inner quadrant	4	9.5
1/4 Lower outer quadrant	3	7.2
1/4 Lower inner quadrant	6	14.2
Center	4	9.5
Total	**42**	**100.0**

3.2. Paraclinical characteristics of breast cancer

Table 6. Result of Mammography

Mammography – Histopathology Correlation		Histopathological Diagnosis		Total
		Cancer	Benign	
Mammography	Cancer	34	0	34
	Benign	5	3	8
Total		**39**	**3**	**42**

Table 7. Result of Ultrasonography Diagnosis

Breast Ultrasonography Histopathology Correlation		Histopathological Diagnosis		Total
		Cancer	Benign	
Breast ultrasonography	Cancer	35	0	35
	Benign	4	3	7
Total		**39**	**3**	**42**

Table 8. Result of Cytology Diagnosis

Cytology -Histopathology Correlation		Histopathological Diagnosis		Total
		Cancer	Benign	
Cytology	Cancer	33	0	33
	Benign	6	3	9
Total		**39**	**3**	**42**

Table 9. Result of Histopathology after Surgery

Histopathological Classification	n	%
Fibroadenoma	3	7.1
Ductal Carcinoma In Situ	1	2.4
Invasive ductal carcinoma, NOS	22	52.4
Lobular Carcinoma In Situ	1	2.4
Invasive Lobular Carcinoma	7	16.7
Adenoid Cystic Carcinoma	6	14.3
Other Carcinomas	2	4.7
Total	**42**	**100.0**

3.3. The value of diagnosis by core biopsy under ultrasound guidance

Table 10. Value of the diagnosis by core biopsy compared with Histopathology

Core needle biopsy – Histopathology Correlation		Histo-pathological Diagnosis		Total
		Cancer	Benign	
Core needle biopsy	Cancer	36	0	36
	Benign	3	3	6
Total		**39**	**3**	**42**

IV. DISCUSSION

4.1. Clinical Characteristics of Breast Cancer

Age groups: Patients with the most common age group was 40-59 , accounting for 66.8% , average age of patients was 50.5 ± 10.5. This result is consistent with Nguyen Dieu Linh, Nguyen Ba Duc (2011) age group of 40-60 yrs, accounting for 75.7% rate [9]. The analysis of Dang Van Chinh showed that the age group 40-54 is a risk factor of breast cancer, the relative risk RR = 1.9. So, the women aged 40-54 are at risk of breast cancer which is 1.9 times higher than other age groups [3].

Family history: In our study , there were 4 patients whose mother and sister had breast cancer, accounting for 9.5%. This result is lower than D N.Boy's research on family factors,which accounted for 15% of breast cancer cases [2], but was much higher than Nguyen Huu Kien's study (5.6%) [8], or Dang Van Chinh's (7.7%) [3]. Nevertheless, the results showed that the family is a risk factor for hereditary breast cancer pathology.

Clinical symptoms: The result of research showed that the reason of hospitalization and the first clinical symptom is mainly for tumor found in the breast which accounted for the highest rate :78.6% . Meanwhile, we found 2 cases with

nipple discharge which is consistent with Nguyen Dieu Linh and Nguyen Ba Duc's research, 4.8%. According to N.Boy.D, the nipple discharge is a primary symptom of breast cancer. According to WHO, this is one of 7 warning signs of breast cancer.

Locations and the tumor areas: Our result showed that the ratio of tumors in the right breast was 52.4% and in the left breast was 47.6%, consistent with Truong Thi Hien: 52.4% for right breast and 47.6% for left breast [5].

The tumors are Perdominantly in the 1/4 upper outer quadrant, accounting for 59.6%, equivalent to the research of Truong thi Hien of which the tumors in the 1/4 upper outer quadrant was the highest, 57.4% (5) and Dang van Chinh's, 52.4%.

According to the research of Dahnert, the rate of cancers located in the ¼ upper outer quadrant of the breast is the highest, 54%, and in ¼ lower inner quadrant is 7% .(12)

4.2. Para-clinical Characteristics of Breast Cancers

Breast Ultrasonography: Ultrasonography showed 35 cases with cancers, accounting for 83.4%, 7 non-suspicious cases, accounting for 16.7%.

The value of breast ultrasonography : sensitivity 89.8%, specificity 100%, accuracy of 90.5%. Our results were equivalent to those of Do Doan Thuan's, Nguyen Duy Hue's , 89.5% sensitivity, 86.5% specificity [11

Mammography: Mammography images showed 34 cancer cases, accounting for 81%, there were 8 cases with normal breast tumors, accounting for 19% . This result is equivalent to that of Dang van Chinh of which the cancer images are 86.4% and benign images are 13.6% .

The diagnostic value of screening mammography: sensitivity : 87.2%, specificity 100%, accuracy: 88.1%. This result is equivalent to Nguyen Huu Kien (2012), with 88.2% sensitivity, 85% specificity, 87.3% accuracy, [8]. According to the announcement of Chang, the sensitivity of mammography in the diagnosis of breast cancer is 86.6%, specificity 86.7%, accuracy: 86.6% [14]. According to Truong Thi Hien (1998), the method of mammography in the diagnosis of breast cancer has the sesitivity of 85.7%, 88.9% specificity, and 87.7% accuracy [5]

Cytologic Diagnosis : The result of our research showed that there were 33 patients with cytologic diagnosis of breat cancer with the rate of 78.6%, there were 9 patients with benign breast tumors, accounting for 21.4%. This result is the same as that of Dang van Chinh of which the breast cancers accounted for 78.6%, suspected cancer 15.6% and benign 5.8% [3]

Value of Cytologic Diagnosis : 84.7% sensitivity, 100% specificity, 85.8% accuracy, this result is equivalent to Nguyen Manh Hung's: (1992) 88% sensitivity, specificity 91.7% [6]. According to Nguyen Huu Kien of which the sensitivity is 88.2%, and accuracy is 85.9%

Histopathological Diagnosis of the post-operative tumors :

42 suspected cancer patients were operated. 39 patients were revealed to have cancers by histopathological diagnosis in which there were 22 patients suffering from Infiltrating Ductal Carcinoma, accounting for the highest rate: 52.4%. This result is lower than that of Do Doan Thuan, Nguyen Duy Hue whose results showed 79.5% of Infiltrating Ductal Carcinoma . 5 patients suffering from ductal carcinoma (?), accounting for 4.9%, mucinous carcinoma accounting for 1.9%. According to Armando E.Giuliano, the infiltrating ductal carcinoma accounted for 60 -70%, Medullary carcinoma: 5 - 8%, mucinous carcinoma: below 5% . This difference can be explained by our small sample size . However, infiltrating ductal carcinoma occupied the highest rate of all cancer types and is in agreement with the other reported results.

4.3. Diagnostic value of breast cancer by core biopsy under ultrasound guidance :

In our research, there were 42 patients diagnosed of cancer by core biopsy with ultrasound guidance in which: 36 cancer cases, accounting for 85.7%, 6 benign breast tumor, accounting for 14.3% and 3 false negative cases .

The diagnostic value of core biopsy : Sensitivity: 92.3%, specificity : 100%, positive predictive value: 100%, negative predictive value : 100%, accuracy: 92.9% . This result is the same with Dang van Chinh's of which the sensitivity is 92.3%, specificity: 100%, accuracy : 94.6% and Nguyen Van Thi's of which the sensitivity is 95.8%, specificity : 100%, accuracy: 97.5%.

Comparing with other diagnostic methods conducted on the same patients, the research showed that the value of the diagnosis by core biopsy under ultrasound guidance had the high accuracy of 93%. This demonstrates that core biopsy not only allows the positive prediction of 100%, but also confirms both benign or malignant lesions, the type of histopathogy, and it can be analysed by immunohistochemistry in breast cancer cases . All the advantages of core biopsy aid the physicians to determine the proper strategy for effective treatment at the beginning.

On the other hand, core biopsy under the guidance of ultrasonography has additional value in the diagnosis of breast cancer compared to other methods. That is : high accuracy, the time to have the result of the histopathology is 2 - 2.5 days . This helps the physicians have the basis to decide the best method of treatment, whether performing a modified radical mastectomy or a breast preserving surgery, including intraoperative radiation therapy. The cost can be reduced to 70% compared to having the biopsy of the tumor after surgery.

V. CONCLUSIONS

5.1. Clinical, para-clinical characteristics of pathology of breast cancer

- The most common age of breast cancers is from 50 – 59, accounted for 38.2%.
- The patients themselves revealed the lumps in their breasts , accounted for 78.6%.
- Location of the breast tumor: left breast: 47.6%, right breast: 52.4%. The tumors in the 1/4 upper outer quadrant of the breast have the highest rate : 59.6%
- Breast Ultrasound: sensitivity 89.8%, specificity 100%, positive predictive value: 100%, the negative predictive value of 42.9%, an accuracy of 90.5%.
- Mammography: sensitivity: 87.2% , specificity 100%, positive predictive value is 100%, the negative predictive value is 37.5%, accuracy : 88.1%.
- Diagnostic cytology: sensitivity 84.7%, specificity 100%, positive predictive value is 100%, the negative predictive value is 33.4%, an accuracy of 85.8%.

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