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The Ultrasound-Guided Biopsy in Breast Cancer

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Abstract: Ultrasonography is a widely used imaging technique that has many clinical applications. The early staging of the metastatic carcinoma is one of these widely uses. FNA and core biopsies have exceedingly replaced the surgical biopsy. The ultrasound-guided biopsy has shown great and more accurate results for breast cancer detection more than the use of one method alone. In this study, we aimed to determine the role of ultrasound-guided biopsy in breast cancer. The procedure was performed on 32consecutive patients that were enrolled at Shaukat Khanum hospital in this Cross-sectional comparative analytical study. Ultrasound-guided core and FNA-guided biopsies were performed for all 32 patients. The accuracy of breast lumps biopsy with ultrasound guidance biopsy was more accurated as compare to non ultrasound. Out of 32 patients 1(3.1%). was diagnosedwith acute inflammation, 16(50.0%). for breast metastatic carcinoma, 2(6.3%). for chronic inflammation, 1(3.1%). for ductal epithelial carcinoma, 1(3.1%). for fibrocystic, 1(3.1%). for the fibroepithelial lesion, 1(3.1%). for lymphocytic yield, 7(21.9%). were normal results and 1(3.1%). for stromal fibrosis. In conclusion**,** an Ultrasound-guided biopsy is highly accurate, and more effective and feasible method than the ultrasound examination alone and excisional surgery. Recently US-guided biopsy procedure is widely used for the diagnosis of lumps in breast cancer patient.

Keywords: Breast cancer, Ultrasonography, fine needle aspiration biopsy, core biopsy, and vacuum-assisted biopsy.

INTRODUCTION

The breast cancer is the most common disease of the women [1]. Throughout worldwide breast cancer has a significant health risk for females. Every year, 1000,000 million women are diagnosed with breast cancer. Breast cancer is the most typical carcinoma of female and it is estimated and over 1.38 million women are diagnosed with a breast cancer regarding to 2008 globocan of WHO (world health organization). Cancer is a family of diseases and breast cancer is a member disease of it. Breast tissues are created from milk-producing glands that refer to as lobules and the ducts that connect the lobules to the nipple. The remaining parts of the breast are consisting of lymphatic, connective and fatty tissues[2]. In Asia, Islamic Republic of Pakistan has the highest number of breast cancer. Young women are also found at progressive stages of breast cancer that has a negative effect on prognosis. In village areas and civilian women are developing a huge number of breast cancers each year because it is a heredity disease that transfers from mother to daughter. At some level of life, one to nine Pakistani ladies has become a patient of breast cancer[3].

The breasts are located between the 2nd and 6th ribs in the anterior chest wall. The shape of female's breast is hemispherically connected with an axillary tail having fats and a different number of glandular tissues. Both breasts are infused by the fascia of the chest wall which divided by anterior and posterior layers to cover it. The fascia forms septa named as Cooper's ligaments that joined the breast to the skin from the front side. The nipple appears from the anterior surface of the breast. It is enclosed by the pigmented areola and it is located differently from female to others. However, it is mostly located in the 4thintercostals space[4]. Some characteristic of the breast such as the size, contour, and density are differing from one to other[5[.

There are different blood supply arteries for the breast; this including the perforating branches of the internal thoracic artery and intercostals arteries. Also, there is one artery which supplies the gland called axillaries artery getting supply from lateral thoracic and thoracoacromial branches.

The veins supplement of the female's breast has the same branches and same name of those of the arteries. The lymphatic drainage of the mammary gland is very important due to the changes of cancer in the gland and prevalence of malignant cells by the side of lymph nodes and lymph vessels. The lateral parts of the breast supply to the anterior axillaries or pectoral group of nodes that been closed to the pectoralis major muscles. And the medial parts supply the intercostals spaces and enter the internal thoracic group of nodes that been closed to thoracic cavity over the course of the internal thoracic artery[5].

There are two different types of estrogen receptors present, alpha (α). and beta (β). (ERα and ERβ respectively). Different tissues indicate these receptors with breast, ovaries and the endometrium expressing ERα, but the kidneys, brain, lungs and several other organs expressing ERβ[6]. The function of ERβ in carcinogenesis unchanged controversial while, a clear contribution of ERα protein has been set. Both ER subtypes carry a DNA binding domain and exist within the nucleus and the cytoplasm. Once estrogen exists the cell, it bounds the ER and therefore the complicated migrates into the nucleus and result in the assembly of transcription proteins that induce variation within the cell. Therefore, due to estrogen's proliferative properties, its cellular stimulation will have negative consequences in patients expressing massive quantities of those receptors intracellular[7].

A biopsy is a test that removes tissue or fluid from the suspicious area. The taken cells are diagnosed under a microscope in the lab to check the presence of breast cancer. The ultrasound is must be used during the biopsy procedure that can help the doctor to detect the up normal area easily without any hesitation. The chances of biopsy failure are very rare always there is a good and clear result of diagnosed breast cancer. The benefit of biopsy is that the patient should receive a definitive diagnosis of whether she or he has any kind of cancer rather it is benign or malignant[8].

In the biopsy, the radiologists use several types of the needle to take cytology for diagnoses such as core needle and FNA. Core biopsy can be defined as a procedure that removes a little quantity from the suspicious tissue by a core (hallow). Needle [9]. The radiologists used to use 14, 16, 18 gauge needle for a core biopsy[10, 11].

Nowadays the technology of core needle to some extent replaced the same kind of care in diagnosis and treatment of breast cancer such as surgical biopsy. And the core needle preferably becomes the diagnostic standard in several foundations. There are several merits distinguish the core biopsy over the other methods. The accuracy of core biopsy helps in suitable surgical planning and to avoid the surgery for benign cancer. The excision of core biopsy is much accurate than surgical biopsy. Also, the core biopsy is cost-effective as compared with the surgical which may need more operations, and the suitability of this method increases the utilization of core biopsy as a routine model in surgical pathology. The radiologist ought to give the pathologist condensed imaging properties for cancer biopsied[12].

The other usable sort of biopsies is fine needle aspiration (FNA) is the first procedure used for diagnosis of breast disease[13]FNA biopsy is the process of taking a sample for examination by a fine needle connected to a syringe [14]. The radiologists used to use 20 gauge needles for FNA biopsy purpose[15]. some references mentioned that the proper size 23-25 gauge with 1 or 1.5 inches needle. FNA is indicated widely for the malignant tumor palpable or deep-seated organs. It is also used to assure a reactive, benign situation and a recurrence of cancer. As compared to other methods such as surgical method, FNA is the simple, safe and quick procedure. This method shows more accuracy over surgical method too. In addition, the sensitivity and specificity of FNA are relatively high as parallel to some other method. The complications due to FNA are less common or it might cause mild complications such as a pain, bleeding, faintness, and hematoma[16]. Both previous two techniques are most significant to diagnose the severity of cancer, especially in breast cancer. FNA sometimes used in lieu of core method and vice versa. But the FNA is safer than core due to the cut of skin in core biopsy procedure (incision[17].

FNA needs the guidance of ultrasound and mammography and local anesthesia is needed to make the core biopsy procedure.

There are some more methods can be utilized to diagnosis breast cancer such as vacuum-assisted biopsy, incisional biopsy, excisional biopsy and bite biopsy. The VAB is new technique created after FNA and core needle biopsy. It is commonly utilized in diagnosis and screening of the early breast cancer, as it can cut the small breast lesion and give continuous, enough samples for the diagnosis by one procedure resulting in higher accuracy and specificity so it is a good substitution to surgical biopsy. VAB procedure is safe too, by using a double –lumen layer the VAB is achieved so the sample never touches with the biopsy channel which minimizes the risk of blood metastasis. The lesion should be divided to splits in VAB to obtain it. Additionally, the VAB is linked to postoperative pain bleeding, skin bruising, and hematoma.

Excisional breast biopsy (EBB) is also another preferred method for breast diseases, but it is more efficient for palpable masses. However, in the impalpable lesion, there is a need for preoperative localization and the chances to remove the normal tissues will be increased[13].

MATERIALS AND METHODS

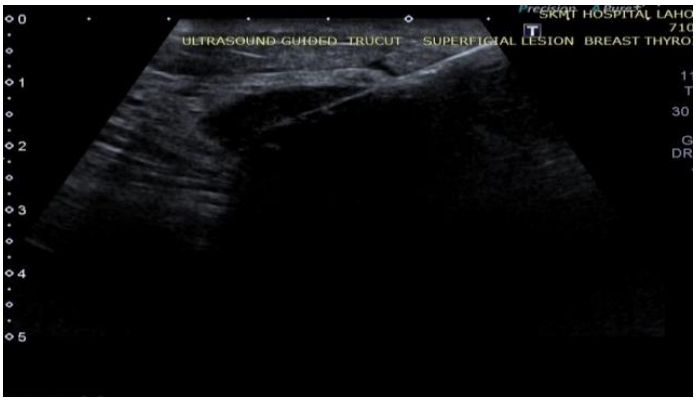
The Cross-sectional comparative analytical study was conducted for 32 patients who were selected randomly at Memorial Cancer Hospital and Research Centre (SKMCH&RC)., radiology department. The study continued for 4 months and the sample size was included adult patient's age of above 18 years female suffering from cancer for four months.

Toshiba (Xario) with the superficial transducer, frequency range 7.5-12 MHZ was used for the study

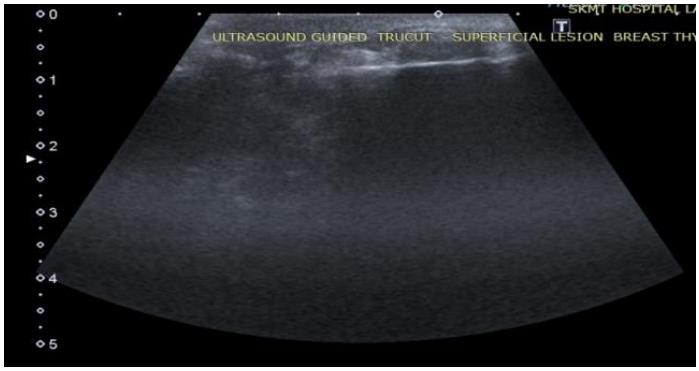
The patient was rolled slightly to 'spread' the breast evenly. Elevate the side being scanned with a wedge under the shoulder. The arm was in neutral position. The transducer was placed mid-way the coronal and sagittal. One end of the transducer was on the nipple while the other was directed towards the breast. Breast is scanned and described as a clock-face. We began at 12 o'clock in a sagittal plane with the toe of the probe at the nipple. Then we Scanned by rotating the probe around the nipple. Depending on breast size, a second pass further from the nipple may be required. FNA and core biopsies were used for ultrasound guidance in breast cancer using 20 gauge needles. And core biopsy needle's size was 14, 16, 18 gauge. The time of each procedure has been required from 30 to 35 minutes. Data has been estimated and analyzed with SPSS version 24.The quantitative data (Age, gender, blood pressure). Was given by descriptive statistic's form, mean ±S. D; however qualitative data was given by percentage, frequency and bar charts or pie charts. Collected data had saved in Microsoft office. Correlation of different variables was made by Pearson's correlation. Receiver Operator Curve (ROC). Been made for breast cancer. Logistic regression was used to determine the possible cause of breast cancer.

RESULTS

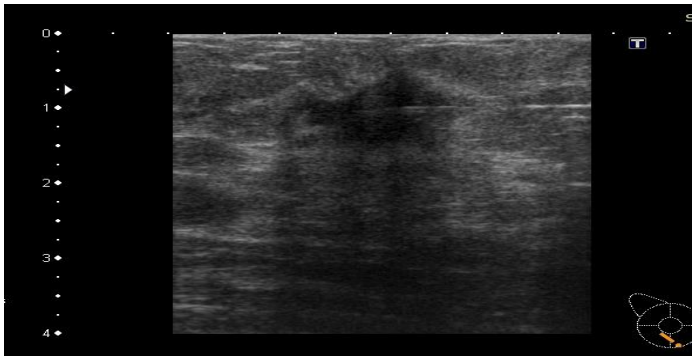
Thirty-two individuals were selected with mean age 48.4 ±12.5-year (21-83) years. (Table 1). Thirty-two patients were enrolled in this research of breast cancer biopsy under ultrasound guidance. Out of them 1(3.1%). was diagnosed with acute inflammation, 16(50.0%). for breast metastatic carcinoma, 2(6.3%). for chronic inflammation, 1(3.1%). for ductal epithelial carcinoma, 1(3.1%). for fibrocystic, 1(3.1%). for the fibroepitheliallesion, 1(3.1%). for lymphocytic yield, 7(21.9%). were normal results and 1(3.1%). for stromal fibrosis. (Table 2).. Out of the 32 patients, the side of breast involvement in cancer was 13(40.6%). in the left side and 19(59.4%).on the right side of the breast (Graph 1).



Metastatic carcinoma in left breast



Lump in the right breast



Invasive ductal carcinoma in right breast

TABLES AND GRAPHS

Table-1: Descriptive Statistics

	Number	Range	Minimum	Maximum	Mean	Std. Deviation
Age	32	62.00	21.00	83.00	48.4375	12.51048

Table-2: Biopsy results

	Frequency	Percent
Acute inflammation	1	3.1
Breast metastatic carcinoma	16	50.0
Chronic inflammation	2	6.3
Ductal Epithelial carcinoma	1	3.1
Fibrocystic	1	3.1
Fibro epithelial lesion	1	3.1
Ductal hyperplasia	1	3.1
Lymphocytic yield	1	3.1
Normal	7	21.9
Stromal fibrosis	1	3.1
Total	32	100.0

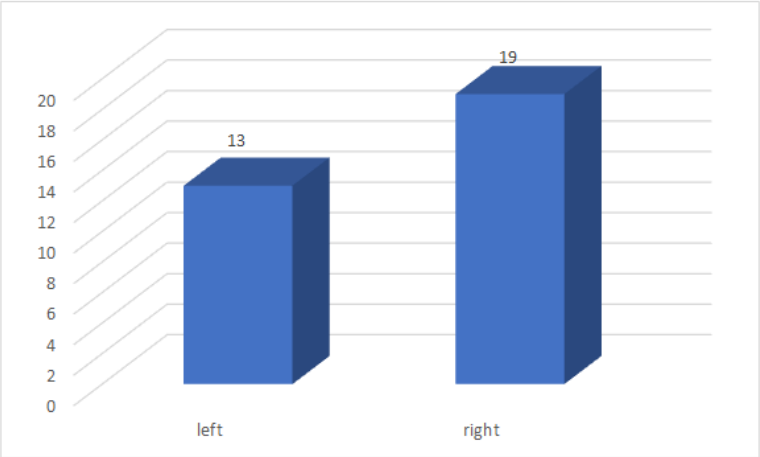


Fig-1: Side of breast involvement in cancer

DISCUSSION

Breast cancer is widely common disease in female over the world[18]. About one million of the breast cancer has new cases appear annually and it is the second life-threatening disease amongst femalesespecially those women aged between 40 to 49 years[19]. In Pakistan 1 out of 9 females is diagnosed with breast cancer every year[20] The developing of imaging techniques contributed to reducing the mortality rate among women. The first technology used in screening of breast cancer was the beginning of the twentieth century[1]. Nowadays other methods such as US and MRI have good contributions in the detection of breast cancer. The combination of imaging methods is better than imaging by a single method[22]. Since multidisciplinary treatment centers are found, the

management of breast cancer is developed and this creates a goodrelationship between the diagnosis and therapy too. And the advanced imaging methods became substitutional methods in breast cancer besides the clinical diagnosis and therapy[23]. The biopsy procedure is significant in the examination of breast cancer and for the pathological examination of the disease. There are different procedures used for biopsies such as FNA, core biopsy and surgical biopsy. Ultrasound is used in the procedures for guidance especially in early stages of breast cancer (stage I). Core biopsy is showing more accuracy, specificity, and sensitivity in results as compared to other methods. The US and MRI is more sensitive in invasive cancer than other imaging techniques[24].

Thirty-two individuals were selected with mean age 48.4 ±12.5-year (21-83) years. (Table 1).Out of 32 patients 1(3.1%). was diagnosed with acute inflammation, 16(50.0%) for breast metastatic carcinoma, 2(6.3%) for chronic inflammation, 1(3.1%) for Ductal epithelial carcinoma, 1(3.1%). for fibrocystic, 1(3.1%). for fibroepithelial lesion, 1(3.1%). for lymphocytic yield, 7(21.9%). were normal results and 1(3.1%). for Stromal fibrosis. (Table 2). Out of the 32 patients, the side of breast involvement in cancer were 13(40.6%). in the left side and 19(59.4%) on the right side of the breast (Graph 3).

CONCLUSION

It was concluded from this study and that ultrasound-guided biopsy is better and more accurate than the ultrasound imaging alone and non-ultrasound guided biopsy like a surgical or excisional biopsy.

RECOMMENDATION

A sample size of this research was comparatively small and was not compared with non-ultrasound guided biopsy. It is recommended that further studies should be done to compare with the result of the non-ultrasound biopsy.

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