Sonographic overview of the side of breast involved in the malignancy.

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Abstract
Background:
Breast malignancy is a heterogeneous sickness including an assortment of elements, which are morphologically and clinically unmistakable, follow complex sub-atomic and auxiliary changes in the extracellular framework and cell design of living tissue. Breast malignancy is the most well-known site-explicit disease in ladies and is the main source of death from malignancy for ladies matured 20–59 years. It represents 26% of all recently analyzed malignancies in females and is answerable for 15% of the death concerned with disease in ladies. The rate of breast cancer exceeds to 45,000 cases analyzed per annum in the UK.
Objective(s):
To show Sonographic overview of the side of breast involved in the malignancy.
Methodology:
The procedures were performed on 32 consecutive patients who enrolled at Shaukat Khanum hospital in a Cross-sectional descriptive study. Ultrasound showed 13 patients of breast cancer were showed in the left side, where 19 patients were showed in the right side of breast.
Results:
Thirty-two individuals were taken with mean age 48.4 ±12.5-year (21-83) years. Out of the 32 patients the side of breast involvement in cancer were 13(40.6%) in the left side and 19(59.4%) in the right side of breast
Conclusion(s):
The outcome of his study and previous study work showed that breast cancer has more chances to occur in the right breast as compare to right one, as shown in his study more than 50 % cancer was occurred in the right side.
Key word: *Breast cancer, ultrasonography, side of breast, accuracy, overview of breast.*

I.   Introduction:

Breast malignancy is a heterogeneous sickness including an assortment of elements, which are morphologically and clinically unmistakable[1].Malignancy commencement and movement follow complex sub-atomic and auxiliary changes in the extracellular framework and cell design of living tissue. In any case, it remains inadequately saw how the change from wellbeing to threat changes the mechanical properties of cells inside the tumor microenvironment. [2]. Breast malignancy is the most well-known site-explicit disease in ladies and is the main source of death from malignancy for ladies matured 20–59 years. It represents 26% of all recently analyzed malignancies in females and is answerable for 15% of the death concerned with disease in ladies[3]. It is the most widely recognized female disease with in excess of 45,000 cases analyzed per annum in the UK [4]. Early recognition of intrusive breast disease has an extensive effect on the result for the patient breast sonography is an ordinarily acknowledged and solid demonstrative technique for ladies with clinically or radiologically dubious breast lesions. It has been performed for over fifty years. In any case, the current reference standard in breast malignancy screening is mammography. Extra breast sonography is normally applied at whatever point a dubious or hazy discovering present on the mammogram. Breast sonography is known to be an exact procedure with high affectability and particularity in the assessment of breast lesions. Moreover, it has demonstrated to be particularly supportive in young ladies with thick breasts. [5].The breast is located between the second and sixth ribs of the front chest wall. The shape of the female breast is

hemispherical and is connected to the underarm tail, which has fat and a large amount of glandular tissue. Both breasts are injected by the chest wall fascia, covered by the front and back walls. The fascia forms the septum, called the Cooper's ligament, which connects the breast to the skin from the front. The nipple appears on the front surface of the breast. It is surrounded by colored areola, and its location is different from the female. However, it is mainly located in the fourth intercostal space. 4 Certain characteristics of breasts, such as size, contour, and density, are different from each other[6].The blood supply artery of the breast is different. This includes perforated branches of the internal thoracic artery and the intercostal artery. In addition, there is an artery supplying the gland, called the axillary artery, derived from the lateral thoracic and thoracic thoracoacromaial branches. The intravenous supplement for the female breast has the same branch and the same name as the artery. The lymphatic drainage of the breast is very important due to the changes in adenocarcinoma and the prevalence of malignant cells on the side of the lymph nodes and lymph vessels. The outer part of the breast flows to the anterior armpit or thymus group near the pectoralis major muscle. The medial part flows into the intercostal space and enters the group of intrathoracic nodules, which seal the chest cavity during the course of the internal thoracic artery[7]

Ultra-sonography image includes included shape (oval, round, unpredictable), edge (circumscribed or not-circumscribed) , direction (parallel, not-parallel), injury limit (sudden interface or echogenic radiance), reverberation design (hypoechoic, complex, hyperechoic), back view (improvement, no change, weakening), calcifications (yes or no), and vascularity (avascular, inconsistent, hypovascular, hypervascular)[1].

Breast sonography are likely to show negative outcomes when assessing breast related lesions. Breast malignant growth may reproduce a favorable benign due to some overlapping in the sonographic qualities of harmful and considerate cycles. While the outcome of a false positive outcome is the exhibition of a superfluous insignificantly intrusive biopsy, false negative outcomes have more genuine ramifications. A false negative outcome in an assessment of a sore infers a deferred determination of threat with a conceivably more terrible clinical result for the patient.[5]Although BI-RADS has established a role in breast imaging and interdisciplinary communication (such as medical oncologists, surgical oncologists, and physicians), as new therapies and genomics-based tests continue to develop, we need to be able to Get as much information as possible from clinical imaging measurements. The BI-RADS classification of ultrasound examination results have sufficient positive predictive value and can be used as a predictor of malignant tumors. Along parallel trajectories, the correlation between cross-sectional imaging and molecular profiling has established a potential replacement role as imaging biomarkers in a variety of diseases including breast cancer[8]. US inspections can find more malignant masses with lower specificity, leading to a large number of unnecessary biopsies. The US elastography technology shows high specificity and can be used as an auxiliary method of B-mode ultrasound to improve the accuracy of distinguishing benign and malignant breast masses. Ultrasound elastography is an extension of clinical palpation based on the fact that malignant lesions are harder than benign lesions. Using elastography, the stiffness (or stiffness) of the tissue can be measured and converted into an image.[9]US Elastography (USE) is a non-invasive imaging method and a supplementary method of US, which can detect tissue elasticity by applying external stress. Since malignant tissue is harder than benign tissue, using USE to estimate tissue stiffness can help distinguish benign and malignant lesions.[10]

By searching the literature controversy was seen in the involvement of the side of breast in the malignant masses. To confirm establish either left or right side of the breast is prone to develop breast cancer.

II.   Materials And Methods:

The study was Cross-sectional comparative analytical study was conducted for 32 patients who were chosenrandomly at Memorial Cancer Hospital and Research Centre (SKMCH&RC).Radiology department. The study wascontinued for four months and the sample size was included agedpatients above 18 years women suffering from cancer for four months. **Protocols:**Toshiba (Xario) with the superficial transducer, frequency range 7.5-15 MHZ has been used for the study.The patient was rotated 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 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. After that we Scanned by rotating the probe around the nipple. Depending in the size of the breast, it may necessary to walk from the nipple again. FNA and core biopsies were been used in detecting 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 35Minutes. **Data analysis:** SPSS version 23 was used for data analysis. Quantitative variables (mention quantitative variables) were presented with mean±SD and qualitative variables (mention qualitative variables) was presented with frequency and percentage. A cross tabulation method was construed to calculate the diagnostic accuracy parameters (sensitivity, Specificity, Positive predictive value, Negative Predictive value and diagnostic accuracy).

III. Results:

Thirty-two individuals were accepted in this research, with mean age 48.4 ±12.5-year (min:21, max: 83), years. 32 patients were enrolled in this study 13 cases were in the left breast while 19 cases were shown in the right side of breast as shown in table 1 and graph 1. The results demonstrated that out of the 32 registered patients, the masses were found to be atthe leftside of breast in thirteen cases (40.6%) as shown in figure 3and 4,while the rest, 19(59.4%) were found to be at the right side of breast as shown in figure 1 and 2.The sensitivity, Specificity, positive predictive value and negative predictive value were calculated with the help of two-by-two contingency table. Sensitivity for ultrasound is 94 % and specificity is 93% respectively. Positive predictive value for shear wave elastography is 81.82% and negative predictive value 81%.

IV. Discussion:

Breast cancer is among the foremost common causes of cancer deaths these days, coming on fifth, after lung, stomach, liver and colon cancers. it's the foremost common explanation for cancer death in female. Only in 2005, 519 000 deaths were recorded due to carcinoma. this mean that one in each a hundred deaths worldwide and virtually one in each fifteen cancer deaths were because of carcinoma. Refinement of high-frequency technology, significantly with 7.5–13 megacycle per second probes, has brought out a completely new side in USG breast imaging.[11]while in 2018 the rate of breast cancer cases were increased to 2.1 million per year as compare to previous years.[12] The investigation of the solid breast lesion starting from research lab tests to imaging and histopathology. every of those investigations are having their own price, advantages and drawbacks and are not universally obtainable.[13]Amongst all the diagnostic imaging modalities ultrasound is noninvasive, comparatively cheap, accurate, without delay obtainable, no radiation is used, wide accepted, tolerable by the patient, interactive, real-time, dynamic and might find blood flow.[14]However, US imaging segmentation consider an open andwide problem due to several US artifacts founded in the process of imaging, including high speckle noise, low contrast, blurry boundaries, low signal-to-noise ratio and intensity inhomogeneity.[15]Solid breast lesion might be benign or malignant however readily be pulpable by the medical practitioner physical examination or by the patient herself. Major part of the breast lesions are measure benign in nature, however the patient become anxiety because of the actual fact that there should a chance or potential for malignancy.[16]Benign solid breast lesions are usually seen in both side of breast slippery with light push by the MD throughout physical examination or by the patient herself. solely some benign solid breast lesions will increase the danger of developing malignancy within the future, it's so counseled to own an everyday follow-up examination to understand concerning its standing.[17]Palpable breast lesion can be demonstrated in the form of cyclic and noncyclic pain, swelling, uniformity change, lumps or masses, itching, burning sensation, nipple discharge, and skin color changes.[18]Accroding to researchers, they said that breast cancer has lower chances to be occur in female who is having baby before 20 years. Epidemiological investigations said also women who is having more children they are less likely to develop breast cancer as compare with women who is having 1 or 2 kids.[19]There are many causes of solid breast starting from physical changes, because of age or variation in endocrine throughout menstrual cycle or pregnancy to the memory gland infection and encompassing tissue. a number of the foremost common causes of pulpable breast lesion are listed as; mastitis (an infection in breast tissue that the effected mostly the women who is breast feeding), adenoma, fibrocystic breasts (lumpy or rope-like breast tissue), breast cysts, injury or trauma to the breast, intraductal benign tumor (a benign, wart-like growth in an exceedingly milk duct), tumor (a slow-growing, soggy mass that is sometimes harmless), milk cyst (galactocele) — a milk-filled cyst that is sometimes harmless, and carcinoma.[20, 21]Ultrasound (US) has been demonstrated to be useful in distinguishing DCIS in patients with dense breasts and in DCIS introducing without microcalcifications. Mechanical advances in US have improved the capacity not exclusively to characterize mammographic injuries and imbalances yet additionally to recognize calcifications, obvious as intralesional or intraductal hyperechoic foci.[22]serevl studies were conducted regarding the side of breast cancer, one of those studies was published in 2019 said that the rate of breast cancer was higher in the right side of breast as compare to left, Singh et al, found 54.84% of the lesions in right breast while 45.16% in left breast. Sharma R et al, also found the benign lesions more commonly seen right breast.However in present study also showed 50.27% of lump were present in right breast and 46.92% in left breast.[23]in previous studies showed that the sensitivity and specificity of ultrasound in breast cancer is high as compare to mammography alone which showed low sensitivity and specificity. therefor ultrasonography should be used along with mammography for detection of breast cancer.[24] In 2015, Yuanming Xiao 200 patients were enrolled in his study, showed the sensitivity and specificity of ABVS (Automated Breast Volume Scanner) proportional to biopsy was 28.95% and 100%, respectively, while the sensitivity and specificity for ultrasound proportional to biopsy was 43.06% and 98.36%, respectively. that means ultrasound play good roles in detection breast cancer rather it is in the right or left.[25]

The study was conducted to show the most occurrences side of breast cancer right or left, through measuring of sensitivity, specificity, positive and negative predictive values of both. 32 patients were

conveniently enrolled in the study from **Shaukat Khanum Memorial cancer hospital & Research center and General hospital**. the patients suffering from masses in their breast and diagnosed by mammography or ultrasound with biopsy have been included however, non-cooperative patients were excluded. the radiology departmental protocol was followed as standard procedure in diagnosis of masses in the breast.

The period of research took approximately 4 months. Toshiba (Xario) US machine was used for the scan. The data of the research was collected from questionnaire given to patients involved personal information: gender, age, complaints and history. imaging and biopsy data were recorded too. out of 32participates, 32with mean age 48.4 ±12.5-year (min:21, max: 83), years.the procedure was performed to investigate presence, location, size and echogenicity of masses. The mass location was left in 13 patients while 19 patients were shown in the right. Echogenicity is explained as the ability of tissues to reflect sound waves which can locate the masses by color coding and compression.[26]The result in this study showed Echogenicity of masses either it is hyperechoic or hypoechoic. 12 patients showed hyperechoic masses, and 12 patients were hypoechoic respectively. So as seen in this study and previous studies right breast is more occurrences for cancer as compare to left one.

V.   Conclusion:

The outcome of this study as well as previous studies proved that breast cancer has more chances to occur in the right breast as compare to left one with utilizing of ultrasound, as shown in this study approximately 60 % cancer was occurred in the right side.

Declaration:
Ethical approval:
The rules and regulations set by the ethical committee of the University of Lahore were followed while conducting the research and the rights of the research participants were respected.
• Written informed consent attached was taken from all the participants.
• All information and data collection were kept confidential.
• Participants were remained anonymous throughout the study.
• The subjects were informed that there are no disadvantages or risks on the procedure of the study.
• They were also be informed that they will be free to withdraw at any time during the process of the study.
• Data was kept in under key and lock while keeping keys in hand. In laptop, it was kept under a password.

Consent of publication
The authors declare that the consent of publication is available on demands.
Availability of supporting data
The authors declare that the data supporting the findings of this study available within the article.
Competing interest
The authors declare that they have no competing interests.

Authors' contribution:
Corresponding and first Author name: **Abdalmalek Ismail** I had written the thesis and made the article for publication.
 Dr. Raham Bacha was my supervisor revised my thesis and article for publication.
 Dr. Waqas Ahmad helped me in data collection from SKT hospital.
Dr. Ahmad Idris helped in data collection from general hospital and title of my research.

Recommendation:

My recommendation from this study is we should use the ultrasound elastography instead of using biopsy which is expensive and invasive as compare to elastography which is a new technique able to detect breast masses at any side of the breast.

Limitation:

The limitations of this study are relatively small Number of patients and single-center study. Another limitation is the lack of some rare breast cancer groups, such as papillary, tubular, metaplastic, medullary, and secretory cancer.
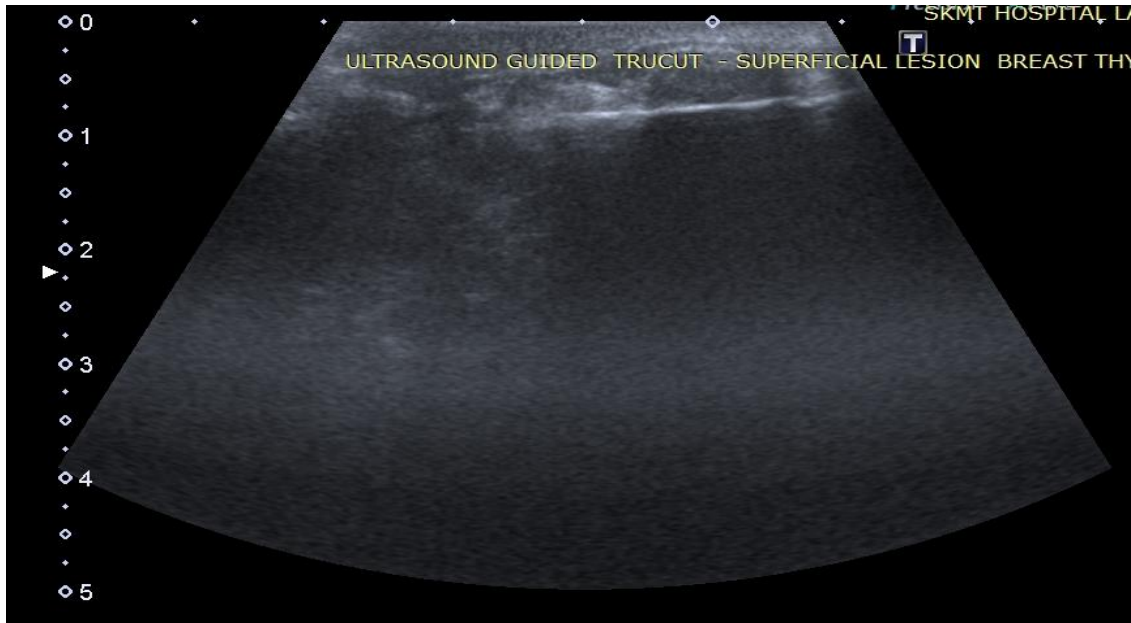
Figures:

Figure 1: detecting lump in the right breast by using TRUCUT biopsy.

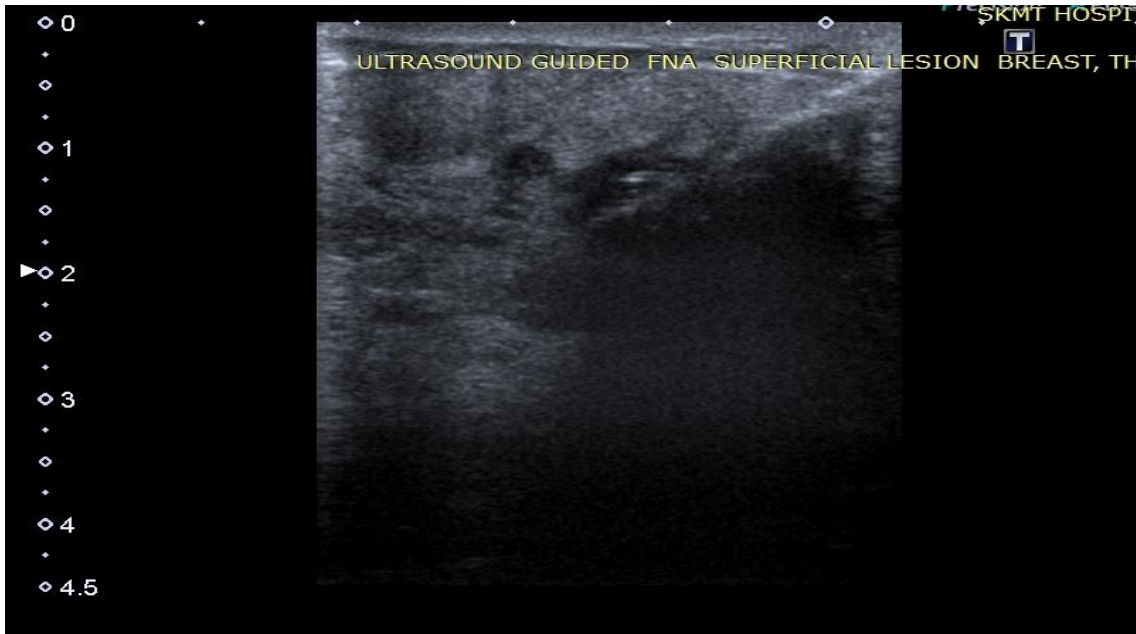*Figure 2: metastatic carcinoma in the right breast.*

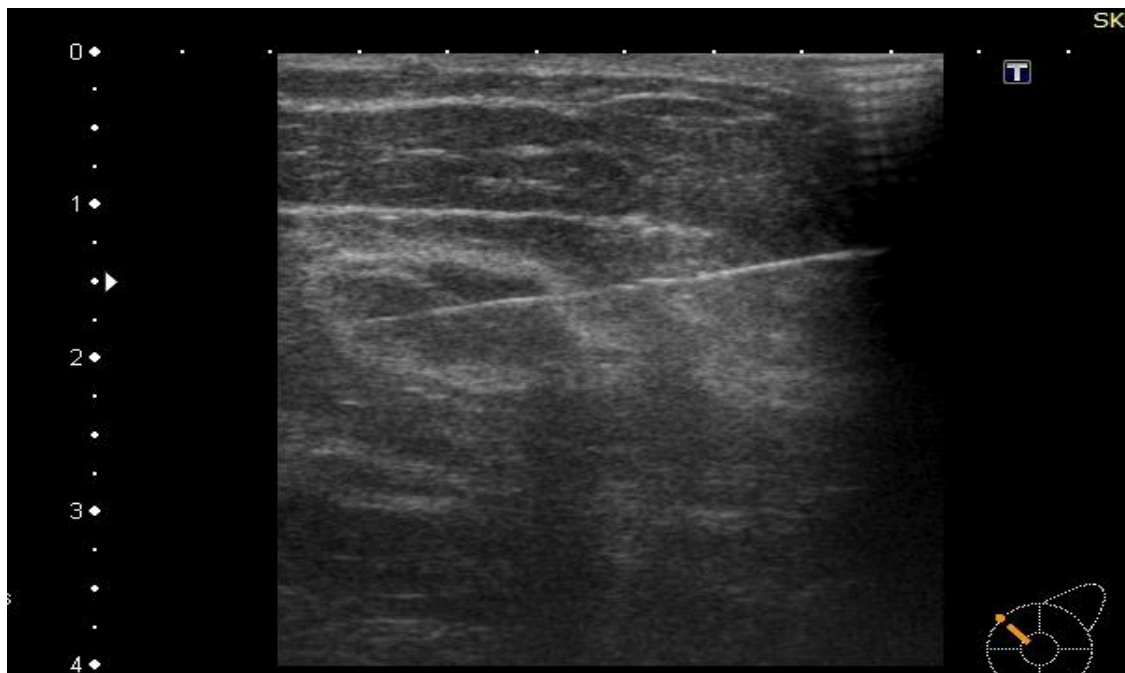Figure 3: detecting invasive ductal carcinoma grade III in the left breast by using trucut biopsy.
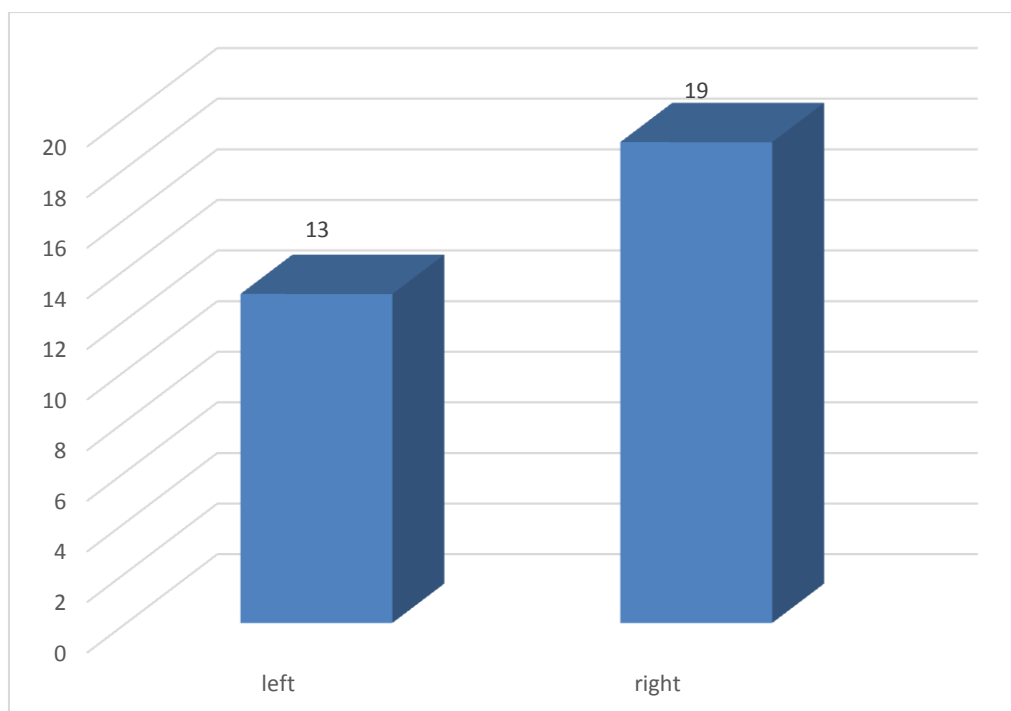

Figure 3: ductal hyperplasia in the left breast.

(Table 1 and graph 1)

Table 1: Side of breast involvement in cancer		
	Frequency	Percent
Left	13	40.6
Right	19	59.4
Total	32	100.0

Graph 1: Side of breast involvement in cancer

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