

Variation of Tumour Size Measurements Between Radiology and Pathology

Hiyam Al Haddad*

Breast Division, Department of Surgery, King Fahd Hospital of the university, Imam Abdulrahman Bin Faisal University, Dammam, Kingdom of Saudi Arabia

*Corresponding author

Hiyam Al Haddad, Consultant Breast surgeon, King Fahd hospital of the University, P.O. Box 40206 Al-Khobar 31952, Kingdom of Saudi Arabia, E-mail: dr_hiyam@yahoo.com

Submitted: 09 Apr 2018; Accepted: 16 Apr 2018; Published: 30 Apr 2018

Abstract

The aim of this study is to determine the accuracy of the preoperative measurement of tumour size, by imaging modalities and whether they deviate from the postoperative pathological measurement in breast cancer.

Material and methods: retrospective study done at King Fahad Hospital of University. For two years 2014-2015 all breast cancer patients included studied by reviewing US which was reported by two radiologists and gross size reports by five pathologists. The correlation of ultrasound, with pathology was studied.

Results: 118 cases were collected from January 2014 to December 2015 with diagnosis of breast carcinoma. 36 patients were excluded from the study. Finally, a total of 82 were included in the analysis. Invasive ductal carcinoma (IDC) found in 57 patients (69.5%), 44 patients (53.7%) underwent breast conserving surgeries. 46 patient (56.1%) found to be either over or underestimated by US or Pathology.

Conclusion: Despite the importance of accuracy of tumour size in management planning this study reflect marked discrepancy in sizes. More collaboration between radiologist and pathologist will yield accurate measurement, which will impact positively on outcome.

Introduction

Tumour size is one of the most important factors in the planning breast cancer management. Clinical examination, imaging and pathological evaluation are the reliable triple assessment in breast cancer. Ultrasonography is the most accurate predictor of tumour size in breast cancer among other imaging techniques.

The majority of National comprehensive cancer network (NCCN) staging system (TNM) classification is focused on the T status [1]. Tumour size may influence patients' T status, thus having an impact on subsequent surgical and oncological management [2]. Therefore, the accuracy of pre-surgical measurement of tumour size in breast cancer becomes crucial. Mammography has always been considered the gold standard for diagnosis, but in recent years high resolution US and MRI have been strongly incorporated. High definition US is a not expensive and it is also a simple technique, but it is operator dependent. These imaging techniques inform about the size of the lesion in order to choose the best treatment for the patient, always taking into account that the size of the lesion is given in the final pathologic examination.

Material & Methods

This 2 years retrospective review was undertaken at King Fahd hospital of the university Al Khobar Between January 2014-December 2015. All patients diagnosed with breast cancer were

included. The mean age and histological type of tumour were recorded. Exclusion criteria covered Ductal carcinoma in situ (DCIS), all patients who had imaging or surgery outside our institution and those who received Neo adjuvant chemotherapy without accurate ultrasound prior to surgery.

All ultrasonography for this study had been performed at King Fahd hospital of University, using XARIO-XG series number 99K11X4860, TOSHIBA, and reviewed by two consultant radiologists. The standard protocol for sono-graphic evaluation of lesion size was to record the largest diameter in both the radial and anti-radial planes to the nearest millimetre.

Surgical pathology was reviewed by five pathologists. Breast specimens were processed according to a standard protocol. Each breast excision or mastectomy specimen was serially sectioned and fixed in formalin overnight. The tumour was then measured in three dimensions, to the nearest millimetre, and submitted for microscopic evaluation. In general, the gross measurement of the tumour was used for staging

Results

A total was 118 cases. Seven cases of DCIS and twenty-nine either imaging or pathology outside our institution were excluded. Total of 82 cases were included in the analysis. The mean age of the

patients was 52 years.

Histological types were invasive ductal carcinoma (IDC) in 57 patients (69.5%), invasive ductal + ductal carcinoma in situ (IDC+DCIS) in 13 patients (15.9%) invasive lobular carcinoma (ILC) in 4 (4.9%), and other carcinomas in 4 cases (4.9%).

38 (46.3%) underwent mastectomy while 44 (53.7%) underwent breast conserving surgery

36 Patients (43.9%) found to have concordant US & pathology size, while 46 patients (56.1%) were with dis-concordant results Table .1, Fig 2

Table 1: Comparison of number of tumors underestimated, concordant, or overestimated by US by more than 0.5 cm when compared with pathology

Tumors	No. (%)	Underestimated by US	Concordance with US	Overestimated by US
Overall	82 (100)	30 (36.6)	36 (43.9)	16 (19.5)
IDC	57 (72)	23 (76.6)	21 (58.3)	13 (81.2)
IDC+DCIS	14 (17)	6 (20)	6 (16.6)	2 (12.5)
ILC	4 (4.8)	0 (0)	4 (11.1)	0 (0)
ILCS+DCIS	1 (1.2)	0 (0)	0 (0)	1 (6.2)
Tubular	1 (1.2)	1 (3.3)	0 (0)	0 (0)
IDC+ILC	2 (2.4)	0 (0)	2 (5.5)	0 (0)

21 Patient underwent BCS (58.3%) while 15 (41.6%) had mastectomy Fig. 1 Majority of patient with concordance had IDC as pathology type, 21 (58%) Fig. 3

31 patients (67.4%) Underestimated by US Vs 15 (32.6%) Overestimated by US. Fig.4

Majority of patient with size difference more than 0.5 cm had IDC as pathology type, 36 (78%) Fig. 5

23 patients treated with mastectomy (50%) & same number underwent BCS (50%) Fig. 6

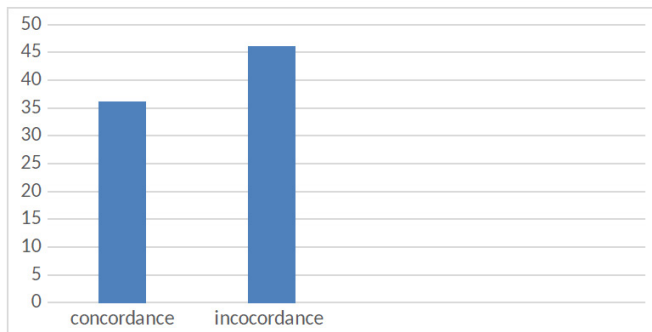


Figure 1: 36 patients with concordance vs 46 patients either over or under estimated by US (total no. of patients 82)

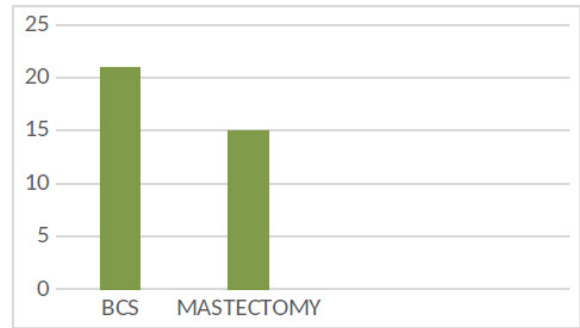


Figure 2: Surgery in-patient with concordance with US (36 patients)

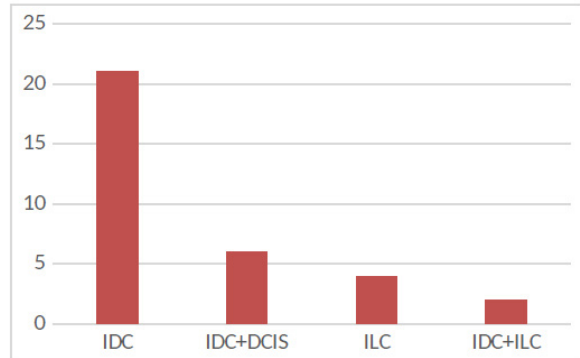


Figure 3: Pathology type in-patient with concordance with US (36 patients)

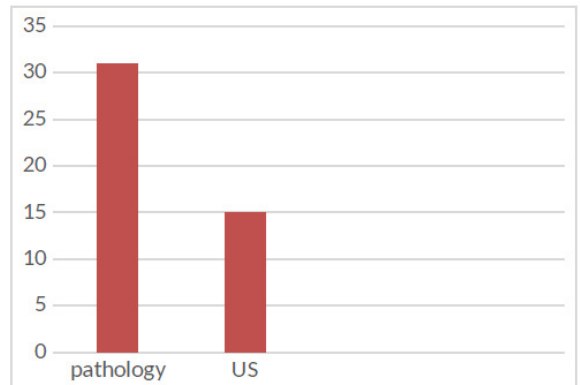


Figure 4: Patient with difference > 0.5 cm (46 patients)

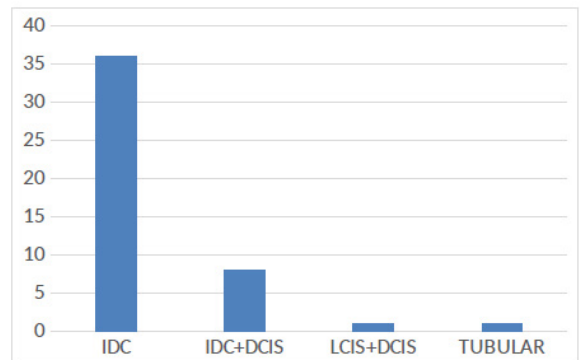


Figure 5: Pathology type in-patient with difference > 0.5 cm (46 patient)

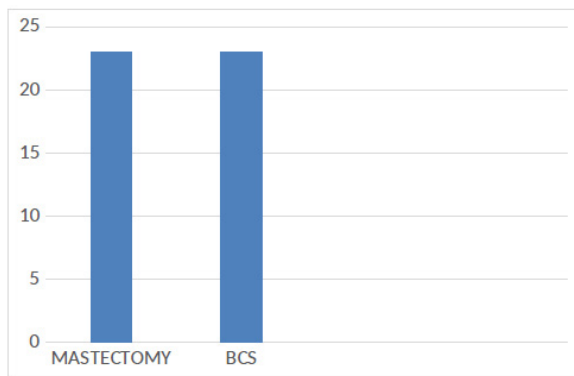


Figure 6: Mastectomy vs BCS in Patient with size Difference more than 0.5 cm (46 patients)

Discussion

The accuracy of preoperative tumour measurement is of great importance in providing patients with wider breast surgical options. The eligibility for conserving surgery (BCT) attracts patients to present with earlier disease.

Accurate measurement of a primary invasive breast cancer is crucial for staging and patient management and is traditionally obtained by the pathologist from the surgical resection specimen. Although pathologic measurement is regarded as the gold standard, circumstances exist where it is not available or markedly altered prior to surgical excision. Neoadjuvant chemotherapy is now commonly employed, and the measurement of the tumour in the subsequent resection often does not accurately represent the pre-treatment size. The clinician may rely on the breast imaging measurement of the tumour for staging and treatment planning, and the pathologist may need to use the imaging measurements to confirm the pathologic impression. This requires an understanding of the relationship between the imaging measurement and the pathology standard [3].

Furthermore, the application of BCT might be decreased by the inaccuracy of imaging modalities. Many authors have examined the correlation of tumour size obtained by pathology and radiology, using imaging modalities such as mammography, ultrasonography, and magnetic resonance imaging. These studies indicate that although magnetic Resonance imaging is accurate at predicting pathologic tumour size, ultrasonography is more widely available, relatively faster and less expensive. For these reasons, ultrasound appears to be the most useful imaging modality for preoperative tumour assessment. Several studies indicate that ultrasonography is a viable method for determining tumour size, but that actual tumour size is underestimated [4].

Moreover, Cortadellas et.al concludes that ultrasonography is the best predictor of tumour size in breast cancer, when compared with clinical examination, mammography, and MRI, in a retrospective study just published in February 2017 [5].

Understanding the limitations and being familiar with the US images of DCIS are helpful in second-look US examination and to improve the competence of early breast cancer detection [6].

When determining tumour size, it is reasonable to hypothesize that histologic subtype may affect measurement. The two most commonly encountered histologic subtypes, invasive ductal carcinoma and

invasive lobular carcinoma, have different patterns of invasion. While invasive lobular carcinoma tends to have a diffuse, infiltrative, poorly circumscribed growth pattern, invasive ductal carcinoma is generally circumscribed and more likely to be associated with fibrosis. The growth pattern of tumours with a mixture of ductal and lobular morphology may vary. Based on these differences, it is probable that tumours with differing histologic subtypes would have different radiographic appearances [4,6-8].

This current study has revealed alarming results displaying marked discrepancy of imaging and pathological measurements of tumour size in nearly half of the patients.

This could be explained by more than one person performing the US or pathologist who handling the surgical specimen. These differences could have implications in the treatment of patients with breast cancer.

It is necessary to individualize each case, since depending on the biology of the tumour and other factors the estimation of tumour size by US can vary, and we must take into account all methods of pre-surgical study, using clinical examination, Mammography, US and MRI as complementary tests, knowing the strengths and weaknesses of each test, in order to plan the best treatment for the patient.

Many studies demonstrated that tumour size on ultrasound differed significantly from that on histopathology [9,10].

Conclusion

Despite the importance of accuracy of tumour size in management planning and application of BCT, this study reflects marked discrepancy in sizes. More collaboration between radiologist and pathologist will yield accurate measurement which will impact positively on outcome.

Acknowledgement

Special thanks to Professor Maha S A Abdel hadi, Consultant general and breast surgeon for her support and advice.

References

1. Egner JR (2010) AJCC cancer staging manual. JAMA: the journal of the American Medical Association 304: 1726-1727.
2. Downes KJ, Glatt BS, Kanchwala SK, Mick R, Fraker DL, et al. (2005) Skin sparing mastectomy and immediate reconstruction is an acceptable treatment option for patients with high-risk breast carcinoma. Cancer 103: 906-913.
3. Bobbi Pritt, Takamaru Ashikaga, Robert G Oppenheimer & Donald (2004) Influence of breast cancer histology on the relationship between ultrasound and pathology tumour size measurements. Modern Pathology 17: 905-910.
4. Boetes C, Mus RD, Holland R, Barentsz JO, Strijk SP, et al. (1995) Breast tumours: comparative accuracy of MR imaging relative to mammography and US for determining extent. Radiology 197: 743-747.
5. Cortadellas T, Argacha P, Acosta J, Rabasa J, Peiró R, Gomez M, et al. (2017) Estimation of tumour size in breast cancer comparing clinical examination, mammography, ultrasound and MRI-correlation with the pathological analysis of the surgical specimen. Gland Surg 1-6.
6. Huay-Ben Pan (2016) The Role of Breast Ultrasound in Early

-
- Cancer Detection. Journal of Medical Ultrasound 24: 138-141.
7. Hieken TJ, Harrison J, Herreros J, Velasco JM (2000) Correlating sonography, mammography, and pathology in the assessment of breast cancer size. Am J Surg 182: 351-354.
 8. Skaane P, Skjorten F (1999) Ultrasonographic evaluation of invasive lobular carcinoma. Acta Radiol 40: 369-375.
 9. Wanyonyi David Toyis (2014) Prediction of breast tumour size by ultrasound: a comparison with pathology. AKU library.
 10. Yi-Zhou Jiang, Chen Xia, Wen-Ting Peng, Ke-Da Yu, Zhi-Gang Zhuang, et al. (2014) Preoperative Measurement of Breast Cancer Overestimates Tumour Size Compared to Pathological Measurement January29, 2014.

Copyright: ©2018 Hiyam Al Haddad. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.