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Original Article

Diagnostic utility of tru-cut biopsy in the assesment of breast lesions

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Abstract

Aim: This report aims to assess the diagnostic utility of Tru-Cut biopsy in the diagnosis of breast mass in patients admitted to our breast unit in our clinic.

Material and Methods: Between March 2013 and June 2018, In Ortadogu Private Hospital, Adana, 13.660 participants visited the breast unit and 472 participants of them aged 22-91 years experienced Tru-Cut biopsy(TCB) because of clinical doubt and/ or BI-RADS (Breast Imaging Reporting and Data System) III– V categorization. TCB specimens were compared with the histopathological reports of follow-up procedures including surgical procedures. When the pathology document was not compatible with clinical / image uncertainties, a biopsy was performed as a diagnostic method to exclude carcinoma.

Results: The histopathological diagnosis of the TCB specimens showed that 237 cases (50.2%) were benign lesions, 219 (46.4%) were malignant lesions and 16 (3.4%) of them were disconcordance. Of the patients who underwent Tru-Cut biopsy, 256 (54.2%) had palpable and 216(45.8%) had nonpalpable lesions. Pathological results were not compatible with clinical / imaging suspicion in 3.4% of cases. TCB exhibited a sensitivity of 95.4%, 100% specificity, PPV of 100%, NPV of 96.1%, and diagnostic accuracy of 97.8%. There were no cases with false positivity.

Conclusion: This study shows that Tru-Cut biopsy can safely be applied as a component of triple evaluation of suspected breast lesions. Multidisciplinary teamwork is crucial to implement the Tru-Cut biopsy, which replaces the present surgical approach to treat breast lesion and prevent from diagnostic inaccuracies.

Keywords: Tru-Cut Biopsy; Breast Carcinoma; Disconcordance.

INTRODUCTION

Breast cancer still represents the leading tumor among women and the incidence of the disease is rising all over the world (1,2). To ensure an accurate diagnosis, the combination of a good clinical eye, high-quality imaging, and appropriate pathological techniques is important. For several years, fine needle aspiration cytology (FNAC) was the most practiced method for the pathological diagnosis of breast masses (3-5).

The emergence of the Tru-Cut biopsy (TCB) in the recent years has led a plenty of surgeons to switch to TCB because it supplies enough tissue for pathologists to establish a correct histological assesments. It is the first preferred procedure for the diagnosis of breast lesions prior to operation (6).

Tru-Cut biopsy is considerably less invasive compared to excisional biopsy. Removed tissue volume, the effect on breast distortion and mammography was very low. If the pathology is benign in non-palpable lesions, operation is skipped.In malignant lesions, carcinoma operation could be performed in one seance (7,8).

TCB can ensure all the information essential to guide the design of an suitable theraphatic strategy for the handling of patients with breast mass of both the surgeon and the oncologist. This report aims to assess the diagnostic utility of TCB in the diagnosis of breast mass in patients admitted to our breast unit in our clinic.

MATERIAL and METHODS

Between March 2013 and June 2018, In Ortadogu Private Hospital, Adana, 13.660 participants visited he breast unit and 472 participants of them aged 22-91 years experienced Tru-Cut biopsy because of clinical doubt

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and/ or BI-RADS (Breast Imaging Reporting and Data System) III– V categorization. Medical Ethics Committee of Çukurova University Medical Faculty approved this study.

TCB was made employing a Tru-Cut gun with an 18-gauge needle. After complete localization and immobilization of the lesion under full aseptic technique, a 0.5% bupivacaine hydrochloride infiltrating anesthesia was performed and a skin incision was performed. A biopsy specimen was taken with 4 consecutive insertions of the needle in the core of the lesion. After immediate immersion of the specimen in a fixative, its quantity and quality were judged and it was sent to the histopathology department. The histopathological reports of the TCB specimens were compared with the histopathological reports of follow-up procedures including surgical procedures like mastectomy, excision biopsy, or wide local excision.

When the pathology document was not compatible with clinical / image uncertainties, a biopsy was performed as a diagnostic method to exclude carcinoma. The pathology document was available within 48-72 hours (98% of cases). In cancer and equivalent lesions requiring open biopsy, the outcome was quickly given to the operators who would then notify the patient.

Each TCB diagnosis was compared with the histopathological outcomes and classified as follows: true positive (TP) when positive TCB outcome for malignity is confirmed in the histological assay of the sample after surgery; false positive (FP) when positive TCB outcome for malignity is not confirmed in the histological assay of the sample after surgery; true negative (TN) when negative TCB outcome for malignity is obtained and no cancer in the histological assay of the sample after surgery is found; and false negative (FN) when negative TCB outcome for malignity is provided but a cancer is detected in the histological assay of the sample after surgery.

Statistical analysis

Descriptive statistics were given as counts and percentages for categorical variables, median (min-max) and/or mean ± standard deviation for continuous variables. To evaluate the diagnostic performance of Tru Cut biopsy sensitivity, specificity, PPV (positive predictive value) and NPV (negative predictive value), LR+ (positive likelihood ratio), LR- (negative likelihood ratio) and ratio of total correct predictions were calculated with their 95% confidence intervals. $p<0.05$ was considered as statistically significant and SPSS 23.0 for Windows were used for all statistical analyses.

RESULTS

Four-hundred and seventy-two TCB procedures were performed between March 2013 and June 2018. The mean age of patients was 46.2 years old (range: 22 to 91 years).

The histopathological diagnosis of the TCB specimen showed that 237 cases (50.2%) were benign lesions, 219 (46.4%) were malignant lesions and 16 (3.4%) of them were disconcordance (Table 1 and 2).

Table 1. Patient's characterstics (n=472)

	n	%
Age	46.2 (mean)	22-91 (range)
Symptoms		
Mastalgia	198	41.9
Lump	250	53.0
Breast tenderness	4	0.8
Bloody nipple discharge	5	1.0
Routine screening	20	4.2
Palpable	256	54.2
Non-palpable	216	45.8
Size		
< 1 cm	37	7.8
1 – 2 cm	104	22.0
2 – 5 cm	297	62.9
> 5 cm	34	7.3
Sonographic findings		
Cyst (complicated or thick wall cyst)	28	5.9
Inflamation	12	2.5
Solid mass probably benign	53	11.3
Solid mass probably malign	191	11.3
BI-RADS		40.4
3	338	71.6
4	134	28.4
Site		
Right	268	56.8
Left	204	23.2
Family history	57	12.1

Table 2. Tru-Cut biopsy histological findings (n=472)

	n	%
Inflamation	12	2.5
Fatty necrosis	16	3.4
Cyst	17	3.6
Invasive ductal carcinoma	183	38.8
Fibroadenoma	92	19.5
Ductal carcinoma insitu	22	4.7
Atypical ductal hyperplasia	2	0.4
Intraductal papillary lesions	8	1.7
Invasive lobuler carcinoma	14	3.0
Tubuler adenoma	4	0.8
Phyllodes tumor	5	1.1
Moderate ductal hyperplasia	11	2.3
Severe ductal hyperplasia	4	0.8
Lobuler hyperplasia	9	1.9
Sclerosing adenosis	4	0.8

The symptoms of patients who underwent Tru-Cut biopsy were as follows; mastalgia was 198 (41.9%), lump 250 (53.0%), breast tenderness 4 (0.8%), bloody nipple discharge 5 (1.0%) and routine screening 20 (4.2%).Of the patients who underwent Tru-Cut biopsy, 256 (54.2%) had palpable and 216 (45.8%) had nonpalpable lesion. Tumor sizes were 37 (7.8%) smaller than 1 cm, 104 (22.0%) between 1-2 cm, 297 (62.9%) between 2-5 cm, 34 (7.3%) greater than 5 cm respectively. All patients were BI-RADS 3 (338, 71.6%) and BI-RADS 4 (134, 28.4%) (Table 1).

Pathological results were not compatible with clinical / imaging suspicion in 3.4% of cases. All these cases, except one, were not palpable. Pathology report mandating excisional biopsy including disconcordance in 54 (11.4%) patients was performed to prevent from diagnostic uncertainity (10 added cancer 2.1%; total carcinomas 48.5%) (Table 3).

Percentage of carcinoma discovered in patients with Tru-Cut biopsy was shown in Table 4. The age range of patients detected cancer was 40-59 years of age.

TCB exhibited a sensitivity of 95.4%, 100% specificity, PPV of 100%, NPV of 96.1%, and diagnostic accuracy of 97.8%. There were no cases with false positivity (Table 5).

Ultrasound guided breast biopsy is a relatively rapid procedure and is both safe and easy to use. Complications at our center were minimal: no complication was observed in 97.7% of cases, ecchymosis was present in 1.4% of cases, and disappeared within a few days. Haematoma was detected in 0.9% of patients and subsided spontaneously, no superimposed infection was observed.

Table 3. Pathology report mandating excisional biopsy

	Number	Intraepithelial ductal neoplasia	IDC	Intraepithelial lobuler neoplasia	ILC	PP	NP
Disconcordance	16	1	4	0	0	1	15
Atypical ductal hyperplasia	2	0	0	0	0	0	2
Moderate ductal hyperplasia	11	1	1	0	0	0	11
Severe ductal hyperplasia	4	0	1	0	0	0	4
Lobuler hyperplasia	9	0	0	0	1	0	9
Sclerosing adenosis	4	0	0	0	0	0	4
Intraductal papillary lesion	8	1	0	0	0	0	8
Total	54	3	6	0	1	1	53

IDC, invasive ductal carcinoma; ILC, invasive lobuler carcinoma; PP, palpable; NP, nonpalpable

Table 4. Percentage of detected cancers in patients with Tru-Cut biopsy

Age	Total number of Tru-Cut biopsies	Number of detected cancers (IDC,ILC,DCIS)	Percentage of cancer (%)
20-29	3	1	33.3
30-39	104	42	40.4
40-49	197	94	47.8
50-59	91	38	41.8
60-69	33	28	84.8
>70	24	16	66.6
Total	472	219	46.4

IDC, invasive ductal carcinoma;ILC, invasive lobuler carcinoma;DCIS, ductal carcinoma in situ

Table 5. Comparison of studies conducted to determine the utility of TCB in the diagnosis of breast lesions

Authors	Year (N)	Sensitivity	Specificity	PPV	NPV	Diagnostic Accuracy
Altıntas and Bayrak	2019 (472)	95.4%	100%	100%	96.1	97.8%
Husain and Rikabi (12)	2011 (275)	98.1%	100%	100%	98.9%	99.3%
Lacambra et al (14)	2011 (464)	96%	99%	99%	94%	-
Ahmed et al (15)	2010 (80)	94.64%	91.3%	-	-	94.87%
Bdour et al (13)	2009 (175)	97%	100%	-	-	-
Brunner et al (16)	2009 (120)	95%	100%	100%	90%	-
Kulkarni et al (17)	2009 (819)	97.7%	94.2%	93.1%	98.1%	95.5%

DISCUSSION

Although early diagnosis of breast cancer with a national screening schedule is expensive, it is not really possible for many developing countries, but accurate and rapid assessment of breast lesions for the diagnosis and treatment of breast cancer is a task for all health regimes, nonetheless of their income (9-11).

The outcomes of this retrospective study show that TCB is a proper, confident and secure procedure to diagnose carcinoma in participants with breast lesions.

The present research provided a high sensitivity of 95.4% with 100% specificity, and a PPV, NPV, and diagnostic accuracy of 100%, 96.1%, and 98.9%, respectively. Rikabi A et al. conducted a study including 275 patients who umderwent a Tru-Cut biopsy and they found a high sensitivity of 95.1% with 100% specificity, and a PPV, NPV, and diagnostic accuracy of 100%, 97.2%, and 98.2%, respectively (12). In present study, TCB biopsy revealed no false positive cases. This means that TCB provides a breast cancer diagnosis with a high degree of confidence. Compared to several studies that were conducted on the diagnostic benefit of TCB in the diagnosis of breast masses (12-17) the current findings have surpassed those previously reported with regards to diagnostic accuracy (DA) (Table 5).

In our clinic, all Tru-Cut biopsies were performed by experienced radiologist In this case, we highly recommend that all Tru-Cut biopsies be given to radiologists who may be useful for both the patient and the success ratio. When only the Tru-Cut biopsy was not clear, the operator applied a excisional simple or guided wire biopsy as a diagnostic method. The operator also played a important role in the final judgement (monitoring or surgery alone) for diagnostic and treatment planning and subsequent steps (18-20).

There are some limitations in Tru-Cut biopsy that may result in a diagnostic inaccuracy. In order to accomplish these inaccuracies, multidisciplinary teamwork is essential with strict cooperation among radiologist, surgeon and pathologist (9,18).

In hyperplasia (moderate up to severe) with or without atypia, lobular, sclerosing and papillary lesions, it is crucial to do open biopsy to exclude carcinoma. From 36 cases (7.6%) with such findings four (11.1%) had carcinoma after excisional biopsy (Table 3).

A study has presented 13-50 % carcinoma in patients who had papillary lesions diagnosed by Tru-Cut biopsy (18). In the current research one carcinoma was detected in eight cases (12.5%) of papillary lesions after open biopsy. Of 15 intraepithelial lesions in our cases, 3 (20%) had invasive ductal cancer on open biopsy.The ratio is twenty four percent in several researhes (8,18,21,22).

There were no false positive cases. Severe epithelial, atypical hyperplasia, and lobular intraepithelial lesions might be incorrectly determined as intraepithelial ductal neoplasia (18,23,24).

When the pathological document was not inconclusive with suspected clinical and image findings (16 participants or 3.3% of cases), excisional biopsy showed carcinoma in 5 participants (31.2%; five carcinomas in a total of 472 Tru-Cut biopsies:1.0%). False-negative samples are considerably less than the assigned (10%) and minimum (15%) recommended thresholds given by EUSOMA[25] and of 1-2% in the Parker review study (24). In the present study except for one sample, all false negatives were nonpalpable. Thus the false negative ratio of nonpalpable lesions in our cases is 2.3%. In a study conducted by Joulaee A et al. in 764 samples, the disconcordance rate was found to be 1.8%, the false negative rate of all Tru-Cut biopsy and the nonpalpable lesions were 0.78%, 2.3% respectively.

In this study, we emphasize the importance of Tru-Cut biopsy in the evaluation of suspected breast lesions.

CONCLUSION

This study shows that Tru-Cut biopsy can safely be applied as a component of triple evaluation of suspected breast lesions.The diagnosis of benign changes by TCB would reassure the patient about the absence of malignancy and these cases can be followed-up in outpatient clinics.

In addition to those with diagnostic significance in patients with malignant lesions, TCB furthermore renders excisional biopsy and frozen section unnecessary. Multidisciplinary teamwork is crucial to implement the Tru-Cut biopsy, which replaces the present surgical approach to treat breast lesion and prevent from diagnostic inaccuracies.

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