

Triple assessment in the diagnosis of breast cancer in Kashmir

Masooda Jan · Javeed Ahmad Mattoo · Nazir Ahmad Salroo · Shahnawaz Ahangar

Received: 10 September 2009 / Accepted: 24 October 2009
© Association of Surgeons of India 2010

Abstract

Background Although the diagnosis of breast cancer is suggested on clinical examination, the degree of suspicion is variable. Currently a combination of three tests, i.e. clinical examination, radiological imaging (mammography, ultrasonography) and pathology called as triple assessment test is used to accurately diagnose all palpable breast lumps. Together they give sensitivity of 99%. The triple assessment is taken as positive if any of the three components is positive and negative only if all of its components are negative for malignancy.

Materials and methods This study was conducted in the Department of Surgery, Government Medical College, Srinagar, Kashmir over a period of 3 years from June 2005 to May 2008. A total of 200 patients with a breast lump were selected irrespective of age. A detailed history, focused clinical examination, radiological imaging and fine-needle aspiration cytology (FNAC) were used as diagnostic tools for screening of the patients. The aim of this study was to evaluate accuracy of triple assessment in the preoperative diagnosis of patients with breast carcinoma.

Results The sensitivity and specificity of all the modalities used in triple assessment when combined together was

100% and 99.3%, respectively. The concordance for the triple assessment was 99.3%, positive predictive value was 93.3%, negative predictive value was 100%, sensitivity was 100% and specificity was 99.3%. p value was significant (0.000).

Conclusion We conclude that triple assessment is a very useful diagnostic tool to evaluate patients with breast lumps and to detect patients with breast cancers with an overall accuracy of 99.3%.

Keywords Clinical examination · Mammography · Ultrasonography · Fine-needle aspiration cytology · Carcinoma

Introduction

Breast problems can present themselves in a number of ways like breast pain, nipple discharge, cystic lesions and more commonly a lump. A lump in the breast is of great concern to the patients and is also a challenge to the diagnostic acumen and judgement of the surgeon. Presence of a three-dimensional or space occupying lesion in the breast is the most reliable sign of both benign and malignant disease. However, some non-neoplastic lesions of the breast like traumatic fat necrosis, acute and chronic breast abscess, fibroadenosis, breast cysts, etc. also produce space-occupying lumps in the general sense of the word which have a psychological impact on the patient. Of these malignant breast disease is the most dreaded one, feared not only by the patients but also by the surgeons as well. Cases of breast cancer have been recorded in medical writings for more than 5,000 years. In documents from the ancient times, they appear with perhaps greater frequency than any

M. Jan¹ · J. A. Mattoo² · N. A. Salroo¹ · S. Ahangar¹
¹Department of General Surgery,
Government Medical College, Srinagar, Kashmir, India
²SKIMS, Soura, Srinagar, Kashmir, India

M. Jan (✉)
E-mail: dr_masooda@yahoo.co.in

other form of cancer. The first written evidence suggestive of breast cancer is from ancient Egypt and is found in the Edwin Smith Surgical Papyrus, dating back from 3000 to 2500 BC [1, 2].

A lump in the breast is experienced by the patient with the phobia of cancer. The disease poses a threat to the woman's sense of bodily integrity and her conceptions of body image and sexuality. It is not uncommon for women with breast cancer to report that they feel betrayed by their bodies. For some this translates into feeling unsafe in this world - strange, alone, odd, suddenly unlike everyone around them. Some women develop panic-like syndromes in the body - constriction in the chest, difficulty in breathing, a heightened startle response, a sense of dissociation from the body. These symptoms usually diminish as the woman adjusts to the diagnosis and mobilises to receive treatment, but the immediate impact on her relationship with the body can be profound. In order to manage the threats, we need to make use of protective behaviours' that will lower our risk of being victimised by these threats, thereby giving us a sense of security and furthering our emotional well-being.

The aim of our study was to study the role of triple assessment in the diagnosis of breast cancer and sensitivity and specificity of triple assessment with regards to histopathology.

Materials and methods

This study was conducted in the postgraduate Department of Surgery, Government Medical College, Srinagar, Kashmir over a period of 3 years from June 2005 to May 2008 attending the surgical OPD of SMHS Hospital, Srinagar. Women with a breast lump or suspicious change in the breast texture were included in the study. A detailed patient's history, focused clinical examination and radiological imaging (mammography, USG) and fine-needle aspiration cytology (FNAC) were used as diagnostic tools for screening of the patients for a possible malignant disease at its inception (early stage).

A total of 200 patients with a breast lump were selected irrespective of age. Informed consent was taken for physical examination and investigations giving due respect to maintain the patients privacy and keep her comfortable.

Mammography: The standard examination for women undergoing mammography consists of a lateral oblique and a craniocaudal view of each breast. The lateral oblique view is usually combined with tube angled at 45 degrees to the horizontal, tube angulations from 30 to 60 degrees may be needed depending on the build of the woman. The criteria for the adequate positioning of the woman for this view, the nipple should be seen in profile, the anterior surface of pectoralis major should be visible, the breast should be lifted sufficiently and compression applies so that the breast tissue is spread evenly between the compression plate and

the film holder. There should be no skin folds superimposed on the breast. To achieve a satisfactory position the radiographer should enable the patient to be as relaxed as possible. The standard craniocaudal view is obtained with a vertical X-ray beam and the nipple should be in profile. The craniocaudal projection demonstrates the subareolar, medial and lateral portions of the breast. As reported by various radiologist the mammographic findings are different in malignant and benign breast disorder. Irregular borders, micro-calcifications, speculated density, loss of architecture and skin retraction suggests malignant disorder, while as well circumscribed mass with regular borders is suggestive of benign disorders.

Ultrasonography: Breast ultrasonography (USG) was performed using high frequency transducer of 7–12 MHz HD/-1500 ATL. The patient was placed in a supine or oblique position, with ipsilateral arm above the head. The breast was scanned in either a transverse or sagittal or radial and antiradial planes. The retroareolar area was evaluated by angling the transducer in multiple planes to avoid the shadowy artifact produced by the nipple.

Fine-needle aspiration cytology: In our patients FNAC of the breast lumps was done with 22 gauge needle, mounted on a 20 ml syringe. The mass was immobilised between the index and middle finger of the non-dominant hand. The needle was inserted into the breast lump and the piston of the syringe was retracted to create suction. Needle was moved back and forth inside mass using rapid excursion. The material was expelled onto a glass slide, fixed by air drying and stained with Giemsa, haematoxylin and eosin. Slides were examined by the pathologist and the cytological diagnoses of the breast masses were given.

Results and observations

This study was conducted in the postgraduate Department of Surgery, Government Medical College, Srinagar, Kashmir over a period of 3 years from June 2005 to May 2008 attending the surgical OPD of our hospital and various observations were made. Most of our patients were in the age group of 30–39 years, constituting 41.5% of the

Table 1 Age and demographic distribution of the studied cases (n = 200)

Age (year)	n	%
<20	15	7.5
20–29	49	24.5
30–39	83	41.5
40–49	31	15.5
≥50	22	11.0
Rural	150	75
Urban	50	25

studied cases (Table 1). Patients <20 years constituted only 7.5% of total cases. One hundred and seventy-two (86%) patients were having age of menarche >12 years. 28 (14%) patients had age of menarche One hundred and seventy-seven 12 years. One hundred seventy seven (88.5%) patients were premenopausal and 23 (11.5%) patients were postmenopausal. 18 of postmenopausal patients had age of menopause <50 years and rest of postmenopausal women had menopause >50 years (Table 2). Of the studied patients 139 (69.5%) were married and the rest were unmarried. Of the married patients 131 (94.2%) were multiparous and 8 (5.8%) were nulliparous (Table 2).

Table 2 Menstrual profile and obstetric status of patients

Age (year) of menarche	≤12	28	14.0
Menstruation atatus	Premenopausal	177	88.5
	Postmenopausal	23	11.5
Age (year) of menopause	<50	18	78.3
	≥50	5	21.7
Marital status	Married	139	69.5
	Unmarried	61	30.5
Parity	Nulliparous	8	5.8
	Multiparous	131	94.2

Table 3 Clinical features of patients (n = 200)

Clinical feature	No. of patients	Percentage
Swelling (lump)	193	96.5
Swelling and pain	6	3.0
Swelling and retraction	1	0.5
Retracted nipple	3	1.5
Nipple discharge	3	1.5
Redness of skin	2	1.0
Swelling	3	1.5
Puckering with nodules	1	0.5
Palpable axillary lymph nodes	6	3.0
Family history of carcinoma breast	5	2.5

Table 4 Side and quadrant of the affected breast in the studied patients

Characteristics		n	%
Side involved	Left	80	40.0
	Right	117	58.5
	Bilateral	3	1.5
Quadrant	Central	22	11.0
	Upper outer	96	48.0
	Upper inner	34	17.0
	Lower outer	23	11.5
	Lower inner	25	12.5

Breast swelling alone was the most common presenting symptom, seen in 193 (96.5%) patients. Swelling and retractions was the least common presenting symptom, seen in 1 (0.5%) patient (Table 3). Family history of breast cancer was present in 5 (2.5%) patients only (Table 3). Right side of the breast was the most common side involved (58.5%). Bilateral disease was present in only 3 (1.5%) patients. Upper and outer quadrant was the most common quadrant involved in the studied patients (48%), whereas central zone of breast was least involved (11%) in the studied patients (Table 4).

Puckering of skin with nodules was seen on inspection of breasts in 1 patient with redness of skin in 2 patients. Retracted nipple in 3, nipple discharge in 3 and swelling in 3 patients (Table 3). In 98 (49%) patients breast lumps measured 2–5 cm and in 84 (42%) patient's size was <2 cm. Breast masses >5 cm were seen in 18 patients only. Axillary lymph nodes were palpable in 6 (3%) patients (Table 3).

All the 200 patients were subjected to USG of the breast. Out of 200 patients, 121 (60.5%) patients had fibroadenoma, 6 (3%) had well defined solid masses, 4 (2%) had solid mass with irregular margins with fibro-adenosis in 47 (23.5%) patients. Rests of patients were diagnosed as galactocele, breast abscess, lactational change and breast cyst (Table 5). Only married females (139) were subjected to mammography. Mammographic findings were well circumscribed mass with regular margins in 126 (90.6%) patients, density lesion with microcalcification in 3 (2.2%) cases, density lesion with irregular margins and spiculations in 7 (5.0%) cases and density lesion with microcalcification, irregular margins and spiculation in 3 (2.2%) patients (Table 6).

All the 200 patients were taken for FNAC. Fibroadenoma was the most common FNAC diagnosis seen in 119 (59.5%)

Table 5 Ultrasonographic impression of the breast lumps in the patients (n = 200)

USG impression	n	%
Fibroadenoma	121	60.5
Fibroadenosis	47	23.5
Galactocele	2	1.0
Breast abscess	17	8.5
Lactational changes	1	0.5
Solid mass	6	3.0
Solid mass with irregular margins	4	2.0
Loss of normal architecture	1	0.5
Cyst	1	0.5
Total	200	100

Table 6 Mamographic findings in patients

Findings	No. of patients	%
Well circumscribed mass with regular margins	126	90.6
Density lesion with microcalcification	3	2.2
Density lesion with irregular margins and spiculation	7	5.0
Density lesion with microcalcification, irregular margins and spiculation	3	2.2
Total	139	100

patients. Fibroadenosis was seen in 50 (25%) cases with galactocele in 2 patients, breast abscess in 18 patients and ductal cell carcinoma of breast in 11 (5.5%) patients (Table 7). Result of triple assessment were in favour of benign diagnosis in 186 patients while as malignant diagnosis was made in 14 (7%) patients (Table 8).

Histopathology diagnosed fibroadenoma in 113 (75.3%) cases, breast abscess in 15 (10%) cases, infiltrating ductal

cell carcinoma in 15 (10%) cases and fibroadenosis in 6 (4%). Inflammatory changes were seen in 1 (0.7%) case (Table 9). Only 6 (3%) patients proved hormone receptor positive (Table 9). Physical examination when compared with histopathology had a concordance of 97.3%, positive predictive value of 80%, negative predictive value of 99.3%, sensitivity of 92.3% and specificity of 97.8%. p value was significant (0.000).

Mammography when compared with histopathology had a concordance of 98.1%, positive predictive value of 86.7%, negative predictive value of 100%, specificity of 97.9% and sensitivity of 100%. p value was significant (0.000) (Fig. 1).

Ultrasonography when compared with histopathology had a concordance of 96.7%, positive predictive value of 66.7%, negative predictive value of 100%, sensitivity of 100% and specificity 96.4%. p value was significant (0.000) (Figs. 2 and 3).

FNAC results when compared with histopathology results showed a concordance of 97.3%, positive predictive

Table 7 Results of FNAC in the studied patients

FNAC	n	%
Fibroadenoma	119	59.5
Fibroadenosis	50	25
Galactocele	2	1.0
Breast abscess	18	9.0
Ductal carcinoma of breast	11	5.5
Total	200	100

Table 8 Results of triple assessment in the studied patients

Triple assessment	n	%
Benign breast disease	186	93.0
Malignant breast disease	14	7.0
Total	200	100

Table 9 Results of histopathology and hormonal status in the studied patients (n = 200)

Findings	No. of patients	%
Fibroadenoma	113	75.3
Fibroadenosis	6	4
Breast abscess	15	10
Infiltrating ductal carcinoma of breast	15	10
Inflammatory changes	1	0.7
Positive hormonal status	6	3.0

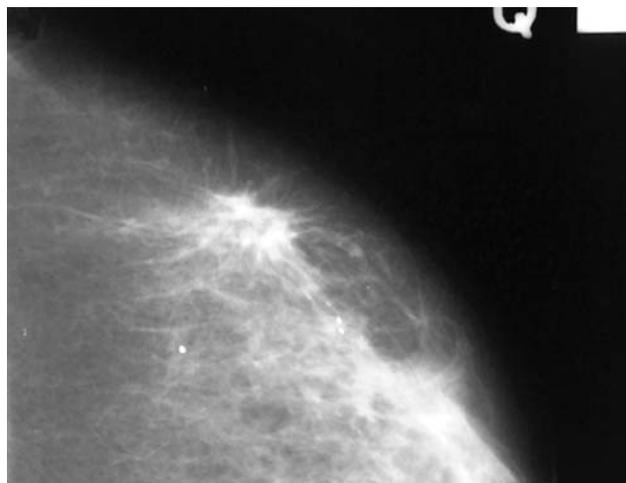
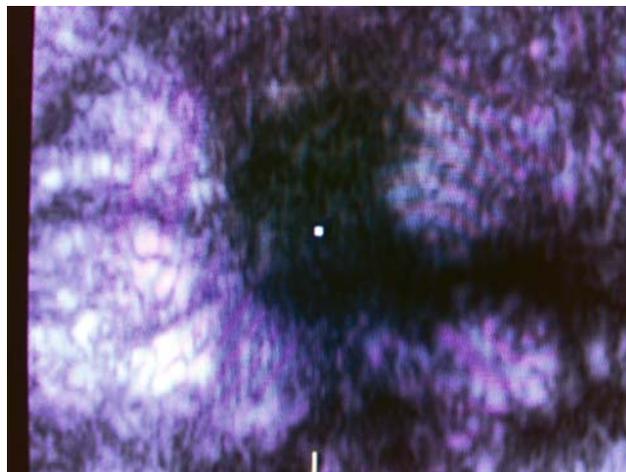
**Fig. 1** Mammogram showing malignancy**Fig. 2** USG of breast showing malignancy



Fig. 3 USG of a breast showing fibroadenoma

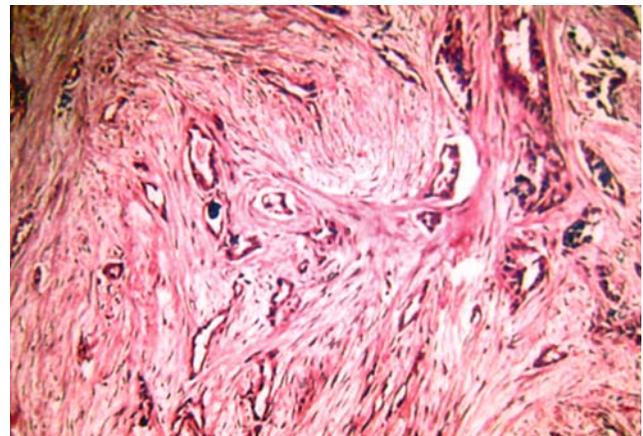


Fig. 4 A photo micrograph showing duct cell carcinoma of breast

Table 10 Results of triple assessment

Modality of triple assessment		Histopathology		No. of patients	Concordance of physical examination	Positive predictive value	Negative predictive value	p value
		Malignant	Benign					
Physical examination	Malignant (+)	12 (92.3%)	1 (7.7%)	13	97.3	80%	99.3%	0.000 significant
	Benign (-)	3 (2.2%)	134	137				
Total		15	135	150				
Mammography	Malignant	13 (100%)	0	13	98.1%	86.7%	100%	0.000 significant
	Benign	2 (2.1%)	92 (97.9)	94				
Total		15	92	107				
USG	Malignant	10 (100%)	0	10	96.7%	66.7%	100%	0.000 significant
	Benign	5 (3.6)	135 (96.4)	140				
Total		15	135	150				
FNAC	Malignant	11 (100%)	0	11	97.3%	73.3%	100%	0.000 significant
	Benign	4 (2.9)	135 (97.1)	139				
Total		15	135	150				

value of 73.3%, negative predictive value of 100%, sensitivity of 100% and specificity 97.1%. p value was significant (0.000) (Fig. 4).

The sensitivity and specificity of all the modalities used in triple assessment when combined together was 100% and 99.3%, respectively. The concordance for the triple assessment was 99.3%, positive predictive value was 93.3%, negative predictive value was 100%, sensitivity was 100% and specificity was 99.3% (Table 10). p value was significant (0.000).

Discussion

The study entitled “triple assessment in the diagnosis of breast cancer” was a prospective study conducted in the

postgraduate Department of Surgery, Government Medical College, Srinagar on OPD basis. A total 200 patients with breast lump were included in the study to determine the number of patients having breast cancer. This study was carried out over a period of 3 years from June 2005 to May 2008. Currently a combination of three tests, i.e. clinical examination, radiological imaging (mammography, USG) and FNAC (pathology) together called as triple assessment is used to accurately diagnose all palpable breast lumps. The triple assessment is taken positive if any of the three components is positive for malignancy and negative only if all of its components are negative for malignancy.

Physical examination was in favour of malignant disease in 13 patients. However histopathology confirmed malignancy in 12 patients only and 1 patient proved to be benign. Similarly benign diagnosis was made on physical exami-

nation in 137 patients. However histopathology confirmed benign diagnosis in 134 patients only with the remaining 3 patients being diagnosed as malignant. Thus histopathology confirmed malignant breast disease in 15 patients. Yang et al. (1996) found a sensitivity, specificity and positive predictive value for clinical examination as 88%, 92%, 67%, respectively [3].

Ultrasonography was in favour of malignant diagnosis in 10 patients, all of which turned out to be malignant on histopathology. Out of 140 cases diagnosed as benign on ultrasound, 5 turned out to be on histopathology. Thus the concordance for histopathology was 96.7%, sensitivity was 100% and specificity was 96.4%. Positive predictive value was 66.7% and negative predictive value was 100%. 'P' value was significant (0.000). When we compare these results with the available literature we found that our result correlated with other studies. Pande et al. (2003) found that sensitivity specificity, positive predictive value and negative predictive value for USG was 95%, 94.10%, 95.50%, 93.75%, respectively [4]. Yang et al. (1996) found that sensitivity, specificity and positive predictive value for USG was 97%, and 85%, respectively [3]. Concordance for mammography was 98.1%, sensitivity was 100% and specificity was 97.9%. Positive predictive value was 86.7%, negative predictive value was 100% and 'p' value was significant (0.000). Our results were in agreement with the results of other studies. Shetty et al. (2003) sensitivity for a combined mammographic and sonographic assessment were 100%; the specificity was 80.1% [5]. Martelli et al. (1990) found that sensitivity of mammography was 73%. Kaufman et al. (1994) found that sensitivity and specificity of mammography was 89% and 73%, respectively [6, 7]. Steinberg et al. (1996) found that mammography had a sensitivity and specificity of 85.3% and 70.6%, respectively [8]. Yang et al. (1996) found that the sensitivity of mammography was 92%, specificity was 94% and positive predictive value of 84% [3].

FNAC was in favour of malignant diagnosis in 11 patients. Histopathology was in agreement with FNAC results in all 11 patients. FNAC was in favour of benign diagnosis in 139 patients. However histopathology was in favour of benign diagnosis in 135 patients with 4 patients proving to be malignant on histopathology. Concordance for FNAC was 97.3, sensitivity was 100% and specificity was 97.1%. Positive predictive value for FNAC was 86.7% and negative predictive value was 100%. 'p' value was significant (0.000).

Our results were in correlation with the results of other studies. Martelli et al. (1990) found that FNAC had a sensitivity of 68% and specificity of 97%. Kaufman et al. (1994) found that sensitivity and specificity of FNAC was 93% and 97%, respectively [6, 7]. Steinberg et al. (1996) found that concordance for FANC was 83.0%, Specificity was 99.5% and sensitivity was 49.0% [8]. Positive predictive value was 98%. Reinikainen et al. (1999) found that sensitivity

of FNAC was 92% and specificity was 83% while overall accuracy was 88% [9]. Ariga et al. (2002) found that FNAC had a sensitivity of 99%, positive predictive value of 99%, specificity 99%, respectively [10]. Mohammed et al. (2005) found that fine needle aspiration biopsy (FNAB) had a positive predictive value of 100%, sensitivity of 90.6% and specificity of 100% [11].

When triple assessment was compared with the results of histopathology we found that concordance for triple test was 99.3%, specificity was 100% and sensitivity was 99.3%. Positive predictive value was 93.3%, negative predictive value was 100% and 'p' value was significant (0.000). Our result compare favourably with the available literature. Martelli et al. (1990) found that sensitivity of triple assessment was 95% and positive predictive value was 100%. Kaufman et al. (1994) found that sensitivity of triple assessment was 100% and negative predictive value was 100% [6, 7]. Steinberg et al. (1996) found that concordance for triple test was 98.8%, specificity was 100% and sensitivity was 95.5% [8]. Ahmad et al. (2007) found that the sensitivity of triple test was 100% and specificity was 100% [12].

Conclusion

Triple assessment is a very useful diagnostic tool to evaluate patients with breast lumps and to detect patients with breast cancers with an overall accuracy of 99.3%. Triple assessment was useful in diagnosing breast cancers at an earlier stage, with most of breast cancers detected at stage I or stage II (T1 or T2 : N0 or N1, M0). It was found that when clinical examination, mammography, USG and FNAC were all negative for malignancy in a patient with a breast lump, the patient can be safely observed, obviating the need for histology (surgical biopsies). Triple assessment did not require hospitalisation, but was performed on OPD basis, without any complications. The modalities used are either non-invasive or minimally invasive. Recent advances in imaging and cytopathology have made the diagnosis of breast cancer easy and accurate. We found that sensitivity of triple assessment with regard to histopathology was 100, specificity was 99.3% and concordance was 99.3%.

References

1. Bland KI, Beenken S, Copeland EM III (2005) The Breast. Schwartz's Princip Surg 16:454
2. Iglehart JD, Kaelin CM (2004) Diseases of the breast. In: *Sabiston Text Book of Surgery*; 17th edition, Vol. 1; pp 877
3. Yang WT, Mok CO, King W, Tang, Metreweli C (1996) Role of high frequency ultrasonography in the evaluation of palpable breast masses in Chinese women: Alternative to mammography. *J Ultrasound Med* 15(9):637–644
4. Pande AR, Lohani B, Sayami P, Pradhan (2003) Predictive value of ultrasonography in the diagnosis of palpable breast

- lump. Kathmandu Univ Med J (KUMJ) 1(2):78–84
5. Shetty MK, Shah YP, Sharman RS (2003) Prospective evaluation of the value of combined mammographic and Sonographic assessment in patients with palpable abnormalities. *J Ultrasound Med* 22(3):263–268, quiz 2670
 6. Martelli G, Pilotti S, Coopmans de Yoldi G, Viganotti G, Fariselli G, Lepera P, Moglia D (1990) Diagnostic efficacy of physical examination, mammography, fine needle aspiration cytology (Triple test) in solid breast lumps: An analysis of 1708 consecutive cases. *Tumori* 76(5):476–479
 7. Kaufman Z, Shpitz B, Shapiro M, Rona R, Lew S, Dinbar A (1994) Triple approach in the diagnosis of dominant breast masses: Combined physical examination, mammography, and fine-needle aspiration. *J Surg Oncol* 56(4):254–257
 8. Steinberg JL, Trudeau ME, Ryder DE, Fishell E, Chapman JA, McCreedy DR, Fish EB, Hiraki GY, Ross TM, Lickley LA (1997) Combined fine-needle aspiration, physical examination and mammography in the diagnosis of palpable breast masses: their relation to outcome for women with primary breast cancer. *Can J Surg*. 1996 39(4):302–311.
 9. Reinikainen HT, Rissanen TJ, Piippo UK, Päivänsalo MJ (1998) Contribution of ultrasonography and fine-needle aspiration cytology to the differential diagnosis of palpable solid breast lesions. *Acta Radiol* 40(4):383–389
 10. Ariga R, Bloom K, Reddy VB, Kluskens L, Francescatti D, Dowlat K, Siziopikou P, Gattuso P (2002) Fine-needle aspiration of clinically suspicious palpable breast masses with histopathologic correlation. *Am J Surg* 184(5):41–43
 11. Mohammed AZ, Edino ST, Ochicha O, Alhassan SU (2005) Value of fine needle aspiration biopsy in preoperative diagnosis of palpable breast lumps. *Ann Afric Medi* 4(1):19–222
 12. Ahmed I, Nazir R, Chaudhary MY, Kundi S (2007). Triple assessment of breast lumps. *J Coll Physicians Surg Pak* 17(9):535