A Study of Modified Triple Test Score for Assessment of Palpable Breast Masses in Young Females

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Research Article

Abstract: **Background**: Breast lump is a common complaint of women presenting to surgeons. Although most of them are benign, careful evaluation, exact diagnosis and definite treatment is mandatory to rule out cancer. Young women are conventionally evaluated by triple test score which consists of clinical breast examination, mammography and fine needle aspiration biopsy. The sensitivity of mammography is low in young breast owing to its increased glandular component. Ultrasonography can be used for evaluation and diagnosis these breast lumps with sensitivity and specificity more than 80%. **Methods**: This study evaluated the efficacy of ultrasound instead of mammography in the conventional 'triple test score' for diagnosis of palpable breast lumps in young females and compare the result with open biopsy. 75 females with breast mass, of the age group 15 to 40 years were selected randomly and assessed by clinical breast examination, local ultrasonography of both breasts and fine needle aspiration biopsy to calculate a 'modified triple test score'. The 'modified' score was calculated by assigning score 1 for benign, score 2 for suspicious and score 3 for malignant results in each component and adding them up. All the masses were thereafter evaluated by open biopsy with consent. Score of 4 or less is interpreted as benign, 5 as inconclusive/equivocal, 6 or more as malignant in Modified Triple Test Score. **Results**: In the study, out of 75 patients 69 scored 3 or 4 points; all of which were benign, 4 scored 5 points; of which 1 was malignant and 2 scored 6 or more points; all of which were malignant. **Conclusion**: In our study we studied the results of score Points along with the final histopathology of the respective patient. Breast masses with a MTTS of 7 or more points were accurately diagnosed as malignant, thus a score of 7 or more points can proceed to definitive therapy, masses scoring 4 or less points were all benign could be safely observed and masses scoring 5 points need further evaluation with clinical examination and open biopsy. The MTTS is as accurate as conventional TTS in evaluation of breast masses in Young females and can avoid unnecessary evaluation. The score was particularly found to be useful for evaluation and analysis of breast lumps in young females.

Key Words: Modified triple test score (MTTS); Palpable breast masses; Benign; Malignant.

Introduction

Patients with breast problems make up a major part of the patient load at a general surgical out-patients clinic. With the increasing public and professional awareness each year large number of young women are being referred to general surgeons with palpable breast masses. Some of breast masses are clinically ambiguous and present as a dilemma to the surgeons. Breasts are the most important feature of female anatomy and an integral part of the reproductive system. They are symbols of womanhood and fertility. Thus, every woman with a breast mass, breast pain or discharge from nipple fears that she has breast cancer. Majority of them prove to be benign, but the probability of the diagnosis of a cancer is never zero. So careful evaluation, exact diagnosis and definite treatment is mandatory in any breast mass. Despite centuries of theoretical meanderings and scientific research, cancer of the breast remains one of the most dreaded of human diseases. The breast being a paired organ further increases its exposure to the disease[1,8]. Open surgical biopsy has been the "gold standard" or "reference standard" method of evaluating a suspicious breast lesion[2]. However surgical excision or biopsy of mass can be painful, expensive and frequently unnecessary in the young age groups, which have very low rates of malignancies. The dilemma still remains that the dogmatic statement: "every palpable mass in the breast must be excised" should be replaced by the recommendation that "every palpable mass in the breast must be assessed and clarified"[9]. Breast mass is a common complaint along with pain. Such symptomatic masses have been traditionally assessed by clinical, cytological and radiologic modalities like mammography[3,4]. While open biopsy provides more data, it results in undesirable cosmetic problems. Thus, up to 95% of such lesions could be diagnosed by the triple assessment. Although the role of FNAC and Clinical examination has been unanimous[5], the role of USG, instead of mammography, has been emphasised recently[11,13,14], especially in the young Female population. Although the sensitivity of Mammography has been proven, additional diagnostic procedures often become necessary in view of its low specificity[6,7]. These values deteriorate further in young women under 40 years of age because of the denser breast tissue. This makes sonography more useful in such patients. In spite of the individual appreciable false negative rates

associated with these modalities, the recent technological advancements in these diagnostic modalities have improved sensitivity approaching invasive methods like open biopsy, thus avoiding a number of unnecessary 'scars', stress, workload and expenditure[15].

Materials and Methods

This Prospective study includes 75 females of the age group 15 to 40 years selected randomly, having a breast mass (in one or both the breasts), who attended the OPD or were admitted in our department of surgery during the period of December 2010 to August 2012.

Patients having complaint of breast mass were assessed as follows:-

1.Clinical breast examination of the breast mass for size, site, consistency, tenderness, mobility, fixity of lump to breast tissue, skin or deeper structures.

2.Ultrasonography (local) of both the breasts and axillae.

3.Fine needle aspiration cytology (FNAC) of Breast mass.

A Modified triple test score (MTTS) was calculated by summation of the individual scores of all the three components of the modified triple test. Each component was graded by a score of 1, 2 or 3 as per the findings. Each Patient was assessed independently by an expert in the use of respective modality. An individual score was appointed based on the findings in respective test. Accordingly, a completely benign finding was given a score of 1 point, a suspicious finding was given a score of 2 points and a malignant finding was given a score of 3 points.

Thus, on physical examination:

A soft or firm, freely mobile lump was assigned a score of 1.

A lump with doubtful fixity to skin or breast tissue & not freely mobile was assigned a score of 2.

A hard, immobile lump with definite fixity to skin or breast tissue was assigned a score of 3.

Photo 1: *Clinical Examination*

On Ultrasonography:

A round to oval, ellipsoidal, hyper- or hypo-echoic lump with thin echogenic pseudo capsule, width to anteroposterior diameter ratio >/= 1.4 & gentle bi- / tri-lobulation w/o any malignant finding was assigned a score of 1. An iso-/mildly hypo-echogenic lump with normal/enhanced sound transmission & a homo-/hetro-genous texture was assigned a score of 2. A poorly defined, irregular lump with mixed/marked hypoecogenicity, width to AP diameter ratio </=1.4, spiculation, angular margins, calcification, shadowing, duct extension, brand pattern or microlobulation was assigned a score of 3.

Photo 2: *Sonography Machine*

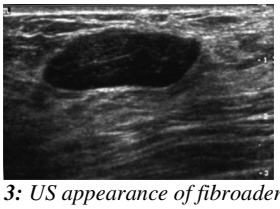

Photo 3: *US appearance of fibroadenoma.*

On FNAC:

A lump with benign report was assigned a score of 1.

An ambiguous or suspicious for malignant cells report was assigned a score of 2.

A positive for malignant cells report was assigned a score of 3.

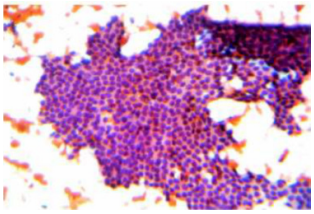

Photo 4: *FNAC appearance of Fibrodenoma (Benign)*

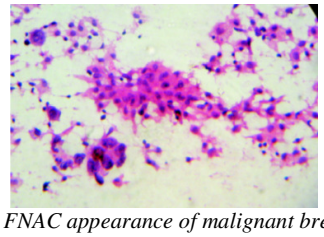

Photo 5: *FNAC appearance of malignant breast mass*

The respective scores were combined to calculate the MTTS for each patient.

1.A combined score of 6 or above was considered as malignancy.

2.A combined score of 5 was considered as equivocal.

3.A combined score of 4 or less was considered as benign.

All patients were subjected to excisional biopsy with consent for the purpose of this study.

Biopsy report was correlated with modified triple test score (MTTS).

All patients having strong family history breast malignancy were treated aggressively irrespective of their Modified Triple Test Score.

Criteria of Exclusion: Previously diagnosed malignancy of the same breast, Obvious advanced malignancy of breast, Radiation therapy given to the breast, acute inflammatory conditions of the breast and Male patients with breast mass.

Observations and Results

Out of the 75 patients included in the study it was found that incidence of breast mass was more in the age group of 26 to 30 years (Table 1). The mean age of the patients was between 21 to 25 years (23 years). The Mean duration of the patient symptoms at the time of presentation was found to be 1-3 months (Table 2). More than 50 % patients had the symptoms for a period between 1 to 3 months. In the present study, the most common side of breast affected was left (Table 3). Breast masses were more common in the left breast(58.67%) of patients included in this study. The most common site of the tumour in the breast was the Upper outer quadrant of the breast (Table 4). Out of 75, 28 patients (37 %) had a mass in upper outer quadrant of the breast. 25 patients (33 %) had the mass in upper inner quadrant of breast. Only 2 patients (2.67%) had the mass located in central quadrant. In the present study, the consistency of mass was assessed by clinical breast examination. The masses were categorised as soft, firm and hard on palpation. The average Consistency of the Mass was firm in most (73%) of the patients (Table 5).

Table 1: Age wise incidence of breast mass

Age Distribution	No. of Cases	Percentage
15 to 20 yrs.	25	33.33
21 to 25 yrs.	33	44
26 to 30 yrs.	10	13.33
31 to 35 yrs.	4	5.33
35 to 40 yrs.	3	4
Total	**75**	**100**

Table 2: Mean duration of the patient symptoms

Duration (months)	Number	Percentage
1-3	38	50.66
4-6	19	25.33
>6	18	24
Total	**75**	**100**

Table 3: Most common side of breast affected

Side	Number	Percentage (%)
Left Side	44	58.67
Right Side	31	41.33
Total	**75**	**100**

Table 4: Most common site of the tumour in the breast

Quadrant of the Breast	No. of cases.	Percentage (%)
Upper Outer quadrant	28	37.33
Upper Inner quadrant	25	33.33
Lower Outer quadrant	13	17.33
Lower Inner quadrant	7	9.33
Central	2	2.67
Total	**75**	**100**

Table 5: Consistency of the Mass

Consistency	Number	Percentage
Hard	18	24
Firm	55	73.33
Soft	2	2.67
Total	**75**	**100**

In the present study, the size of the mass was assessed by palpation. The maximum diameter of the mass was assessed in different planes. The Average size of the mass was less than 5 cm in most of the patients (Table 6). Out of 75 patients 74 patients (98.67%) had a mass of size less than 5 cm.

Table 6: Size of the Mass

Size of mass (cm)	No. of Patients	Percentage
<5	74	98.67
>5	1	1.33
Total	**75**	**100**

In the present study, all patients who consented for biopsy were subjected to histopathological examination. On Histo-Pathological examination, most (96%) of the masses were diagnosed as benign (Table 7). The most common diagnosis was found to be a benign fibro-adenoma. The next most common finding was consistent with fibrocystic disease of the breast. Out of 75 biopsies, 3 (4%) patients were diagnosed as malignancy of the breast.

Table 7: Histo-Pathological examination of mass

Type	No. of Patients	Percentage (%)
Benign	72	96
Malignant	3	4
Total	**75**	**100**

The Modified triple test scores of the cases in our study were as follows:

A total of 75 breast masses were evaluated in women (mean age 23 years, range 15 to 40). MTTS was calculated and Biopsy was done (Table 8).

•69 patients (92%) had a MTTS of 3 or 4 points (concordant benign). All these masses were benign on open biopsy.

•Four masses (5.33%) had MTTS of 5 points (non-concordant). All underwent biopsy analysis, and one was proved to be malignant.

•Two masses had MTTS ≥ 6 points (concordant malignant) and both were malignant on biopsy.

The overall malignancy rate for this series was 4%.

In the present study, 4 masses out of 75 had a score of 5 points. These masses were identified as suspicious by at

least two modalities of the MTTS. Out of these, two masses that were found suspicious on CBE were confirmed as benign on HPR. While two masses that were found suspicious on Ultrasonography, were confirmed as benign on HPR. Only one mass was identified as malignant on FNAC, which was confirmed as malignant on HPR.

Table 8: MTTS

Score	No.of Cases	Prediction(Diagnosis)
4 or less	69	Benign
5	4	Suspicious
6 or more	2	Malignant

All Masses scoring 5 points (Table 9) were evaluated further with excisional biopsy. The results of Biopsy on HPR were considered as the final diagnosis. Thus, out of 4 patients scoring 5 points on MTTS, one was diagnosed as malignant and treated accordingly. Thus with the use of MTTS for assessment of palpable breast masses in young females, open biopsy could have been avoided in majority of patients (69). We recommend that biopsy should be advised to only those patients having MTTS of 5.

Table 9: Description of patients with MTTS of 5

No.	CBE	USG	FNAC	MTTS	HPR
1	2	1	2	5	**B**
2	1	2	2	5	**B**
3	1	1	3	5	**M**
4	2	2	1	5	**B**

Discussion

Breast Cancer deprives us all too frequently and prematurely of our mothers, sisters, wives and daughters. It remains the leading organ site of cancer incidence. Also it is invariably fatal if it is not cured by our initial efforts. With increasing incidence in intermediate and low risk populations of this part of the world, the patients are presenting at an earlier age[16,,17,18]. The tumours in women under 40 years of age tend to behave more aggressively as compared to older patients[19]. The detection of cancerous lesions becomes difficult in younger women owing to the more firm and more cystic (glandular) consistency of these breasts[20]. With increasing public awareness, patient expectations for a successful and efficient management have risen. There is also an increasing professional obligation on the part of clinicians for improved delivery of healthcare for patients of breast diseases. The rise of public awareness and concern has brought up new changes in referral patterns of patients with breast symptoms. Thus more and more patients are being referred to specialists. With these referrals the ratio of benign to malignant ratio has risen consistently[32,33]. The MTTS scoring system substitutes ultrasonography for mammography in women younger than age 40 years. The scoring system derived in this series for diagnosing breast masses using the MTTS is identical to that derived for the TTS. Masses with a MTTS of 3 and 4 points are benign and may be safely followed up. Masses of a MTTS ≥6 points are all malignant and may proceed to definitive therapy. Only the masses with a MTTS of 5 points cannot be diagnosed and will require an additional open biopsy for confirmation. In the present study, MTTS could diagnose 71 out of 75 patients accurately and only 4 patients were non-concordant. In the study done by John Vetto et al[12] in 1996, modified triple test was first used for assessing Fifty-five women below the recommended age of screening mammography (mean age, 33 years) with unilateral palpable breast lesion, by using USG instead of mammogram. Forty-eight patients had concordant benign MTTS, including 14 patients with breast cysts. No cancers developed at the index sites during follow-up, including 5 biopsies done at the patients' request (negative predictive value and specificity, 100%). They concluded that Fine-needle aspiration and physical examination were more accurate than ultrasonography in the 7 cases in which MTT was non-concordant. They also concluded that Use of MTT for the diagnosis of unilateral, palpable breast lesions in younger women yields high diagnostic accuracy without the need for routine open biopsy, resulting in an overall reduction in patient expenditure. In the study carried out by A. Ghafouriet al[23] on 100 masses in 100 women for evaluation of breast masses in women under 40 years of age using MTTS, 69 scored 3 points, 15 scored 4 points; all of them were benign. Four scored 5 points; 1 of them was malignant. Five scored 6 points; three of them were malignant. Seven scored 7, 8, and 9; all of them were malignant. They concluded that MTTS is with 100% diagnostic accuracy for malignancy when it is greater than 7 points. Masses scoring 4 points or lower are benign. Seven up to nine points may proceed to definitive therapy. Five and six points need clinical evaluation and open biopsy. The results of MTTS are similar to TTS in evaluation of breast masses in women under 40 years old and could avoid unnecessary open breast biopsy. The MTTS reliably guides evaluation and treatment of palpable breast masses in women under age 40. MTTS 3 or 4 are always benign and with scores greater than or equal to 6 are malignant and should be treated accordingly. This approach avoids open biopsy in the majority of cases, while capturing all malignancies. The MTTS provides equivalent diagnostic effectiveness but substantially lower cost than traditional management.

Conclusion

The management of breast mass in young females is influenced by Physical examination, breast imaging by sonography/Mammography and Fine Needle Aspiration Cytology.

1.The modified triple test score was found to be highly accurate in our study to diagnose a palpable breast lump as benign or malignant.

2.The Modified Triple Test Score conclusively diagnosed more than 94% of the patients without the

need for further investigation. The Modified triple test score had a substantial agreement with histopathological report of the masses subjected to additional biopsy.

3.The Modified triple test has the advantage of being applicable to majority of young patients presenting to an outpatient department. The modalities involved have the advantages of being widely available, fairly accurate, less time consuming, relatively cheap, non-invasive with no environmental risks and no side effects.

4.The assessment of breast masses using MTTS does not require admission to hospital. The Test however bears the statistical disadvantage of missing malignancy in some cases. It still requires a subset of patient (non-concordant group) to undergo additional investigation of open biopsy for confirmation of diagnosis. The MTTS cannot be used in cases with strong family history of breast cancer due to additional inherited risk factor.

The modified triple test bears the limitation for the score of 5 that require further open biopsy for confirmation of the diagnosis. To minimize delay and, therefore, reduce anxiety in the majority of cases of breast mass in young women presenting to hospital and to avoid unnecessary outpatient follow-up and open biopsy, a policy of Modified triple assessment with immediate reporting to provide a "one stop" diagnostic service proves to be useful.

Bibliography

1. Frykberg ER, Kirby BI. Evolution of surgical principles and techniques for the management of breast cancer. In: Kirby BI, Copeland EM. The breast – Comprehensive management of benign and malignant disease, Vol. 2. 2nd ed. Philadelphia: W.B. Saunders Company; 1998: p766-801.
2. John A. Butler, Herman Vargas, Nancy Worthen, Samuel Wilson. Accuracy of combined clinical – mammographic – cytologic diagnosis of dominant breast masses.A prospective study. Archives Surgery July 1990; 125:893-896.
3. Katherine T. Morris, Rodney F. Pommier; Arden Morris, Waldermar A. Schmidt, Gregory Beagle, Priscilla W. Alexander et al. Usefulness of the triple test score for palpable breast masses. Archive of Surgery 2001; 136:1008-1013.
4. Arden Morris, Rodney F. Pommier, Waldermar A. Schnidt, Richard L. Shih, Priscilla W. Alexander, John T. Vetto. Accurate evaluation of palpable breast masses by triple test score. Archives Surgery 1998; 133:930-934.
5. Johansen C. A clinical study with special reference to Diagnostic Procedures.ActaclinScand, 1975; 45/ (suppl.): 1-70.
6. John T. Vetto, Rodney F. Pommier, Waldermar A. Schmidt, Heidi Eppich, Priscilla W. Alexander. Diagnosis of palpable breast lesions in younger women by the modified triple test is accurate and cost effective, Archives of Surgery, Sep 1996; 131: 967-974.
7. Katherine T. Morris, John T. Vetto, J.K. Petty, Sharon S. Lum, Waldermar A. Schmidt, SuEllenToth – Fejel et al. A new score for the evaluation of palpable breast masses in women under age 40. The American Journal of Surgery 2002; 184:346-347.
8. KirbyI.Bland, Samuel W.Beenken, Edward M.CopelandIII.The Breast. Schwartz's Principles of Surgery, Charles F. Brunicardi, McGraw Hill 2005, P.470,475-77.
9. Donegan WL: Evaluation of a palpable breast mass. N Engl J Med,1992, 24; 327(13): 937-42.
10. Hermansen C, SkovgaardPoulsen H, Jensen J, et al. Diagnostic reliability of combined physical examination, mammography, and fine-needle puncture ("triple-test") in breast tumors: a prospective study. Cancer 1987; 60:1866–68.
11. Bassett LW, Ysrael M, Gold RH, Ysrael C. Usefulness of mammography and sonography in women less than 35 years of age. Radiology. Sep 1991;180(3):831-5.
12. Vetto J: Diagnosis of palpable breast lesion in younger women by modified triple test scores: accurate and cost benefit. Archive of Surgery ,1996,12(9): 967-972.
13. American College of Radiology. Breast Imaging Reporting and Data System (BI-RADS). 4th ed. Reston, VA: American College of Radiology; 2003.
14. Kim EK, Oh KK, Ko KH. Clinical application of BI-RADS assessment to breast ultrasound . Presented at the Annual Meeting of the Radiological Society of North America; December 2003; Chicago, IL.
15. Shetty MK, Shah YP, Sharman RS. Prospective evaluation of the value of combined mammographic and sonographic assessment in patients with palpable abnormalities of the breast. J Ultrasound Med 2003; 22:263–268.
16. Chandawarkar RY, Shinde SR. preoperative diagnosis of carcinoma of the breast. J SurgOncol 1997; 64: 153-8.
17. Herrad J, Lyer RB, Atkinson EN. Sneige N, BuzdarAU. Hortobagyign: Relative value of physical examination. Mammography and breast sonography in evaluation of the size of primary tumor and regional lymph node. Clin Cancer Res 1997; 3: 1565-9.
18. Tresserra F, Feu J, Grases PJ, Navarro B, Alegret X, Frenadez Cid A. Assessment of breast cancer size. Sonographic and pathologic correlation.J Clin Ultrasound 1999; 27: 485-91.
19. Jussawalla DJ, Natekar MV, Yeole BB. Cancer incidence in Indian Christian.Br J Cancer 1985; 51: 883-91.
20. Rahim MA. Breast cancer. Ban Can report 1984; 8: 12-3.
21. Flobbe K, Bosch AM, Kessels AG, Beets GL, Nelemans PJ, et al. The additional diagnostic value of ultrasonography in the diagnosis of breast cancer. Arch Intern Med. 2003;163(10):1194-9.
22. Houssami N, Irwig L, Simpson JM, McKessar M, Blome S, et al. Sydney Breast Imaging Accuracy Study: Comparative sensitivity and specificity of mammography and sonography in young women with symptoms. AJR Am J Roentgenol. 2003;180(4):935-40.
23. Crone P, Hertz J, Nilsson T, Junge J, Hoier-Madsen K, Kennedy M, Bojsen-Moller J, et al: The predictive value of three diagnostic procedures in the evaluation

of palpable breast tumours. Ann ChirGynaecol, 1984, 73(5): 273-6.
24. A. Ghafouri, Sh. Attarian, M. Tavangar, N. Sedighi:MODIFIED TRIPLE TEST SCORE (MTTS) FOR EVALUATION OFPALPABLE BREAST MASSES IN WOMEN UNDER AGE 40.MJIRI; 2006:20(3):115-118.
25. Afsar A Bhatti, Muhammad M Gilani, Muhammad Tanveer Anwar, Sikander H Gondal, Zia Ullah.Role of Modified Triple Test Scoring System for Evaluation of Palpable Breast Masses in Women Under Age 40.A.P.M.C July-December 2010.: 4(2):128-132.
26. Khemkha A, Chakrabarti N, Shah S, Patel V. Palpable breast lumps: Fine needle aspiration cytology versus histopathology: a correlation of diagnostic accuracy. Internet J Surg 2009; 18:1.
27. Roche NA, Layer GT, Ray SA. Immediate cytodiagnosis and imaging in the clinical management of discrete benign breast lesions. Ann R CollEngl 1997; 79:268-71.
28. Purasiri P et al. A novel diagnostic index for use in the breast clinic.J.R. CollSurgEdinb, 41 (1), 1996, 30-4.
29. Hardly JR et al. How many tests are required in the diagnosis of palpable breast abnormalities ?Department of Radiology, Royal Marsden Hospital, Sutton, Survey, U.K. ClinOncol, 2(3), 1990, 148-52.
30. Lawrence W, Bassett MD. Et al Usefulness of Mammography and Sonography in women Less than 35 year of Age. Radiology, 180, 1991, 831-835.
31. Jill S. Montrey MD et Al. Breast Ultrasonography: Is it Being Used Correctly? Medscape.
32. Morrow M, Wong S, Venta L: The evaluation of breastmasses in women younger than forty years of age. 1998. Surgery 124(4): 634-40; discussion 640-641.
33. Beyer T, Moonka R: Normal mammography and ultrasonographyin the setting of palpable breast cancer. 2003: Am JSurg 185(5): 416-9.
34. Vetto JT, Petty JK, Dunn N, Prouser NC, Austin DF: Structuredclinical breast examination (CBE) training results inobjective improvement in CBE skills. J Cancer Educ. 2002. 17(3): 124-7.
35. Dennis M: Breast biopsy avoidance; the value of normal mammography and ultrasonography in detecting the palpable breast lump. Radiology, 2001: 121(1): 186-191.
36. Crystal P, Strano SD, Shcharynski S, Koretz MJ: Using sonography to screen women with mammographically dense breast. Am J Roentgenol. 2004: 182(1): 259-60.
37. Hughes JE, Royle GT, Buchaman T, Taylor I. Depression and social stress among patients with benign breast disease. Br J Surg 1986; 73: 997-9.