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Evaluation of Breast Disease Using Triple Assessment Test with Ultrasonography as the Fourth Component

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Abstract

Breast disease is a significant health concern, with varying clinical presentations and diagnostic challenges. This study aims to assess the accuracy and utility of ultrasonography (USG) as an adjunct component to the Modified Triple Assessment Test (MTT) in the screening and diagnosis of breast diseases. A total of 40 patients with breast complaints, including lumps, nipple discharge, or retraction, were included. The MTT, consisting of clinical examination, mammography, fine-needle aspiration cytology (FNAC), and histopathological examination (HPE), was performed on all patients under informed consent. USG was added as a fourth component. Data on age distribution, parity, menstrual status, side of breast lump, location of tumors, and histopathological findings were collected and analyzed. In the 30-39 age group, breast lumps were common, with nulliparous women showing more malignant cases. Pre-menopausal women had benign lumps, while peri-menopausal and post-menopausal women had more malignancies. Left-sided lumps prevailed, and the upper outer quadrant was the common location. Clinical examination had high accuracy, as did ultrasonography (USG). This study underscores the importance of personalized breast health approaches, considering age, parity, and menstrual status. The combination of clinical examination, mammography, FNAC, and USG (MTT) provides a reliable diagnostic tool for breast disease, with MTT serving as a valuable modality for breast carcinoma diagnosis and treatment planning.

Keywords: *Triple Assessment Test, Ultrasonography, Breast Disease, Diagnosis, Screening*

1. Introduction

Breast disease constitutes a significant healthcare challenge globally, with its prevalence and impact reverberating across populations and healthcare systems. Timely and accurate diagnosis of breast diseases is imperative to improve treatment outcomes and overall patient prognosis. The Triple Assessment Test (TAT) has long served as a foundational tool for the evaluation of breast diseases, integrating clinical examination, mammography, and fine-needle aspiration cytology (FNAC). This study embarks on an exploration of the potential enhancement of the TAT through the incorporation of Ultrasonography (USG) as the fourth critical component. Our primary aim is to comprehensively assess the efficacy, accuracy, and utility of USG within the context of routine breast disease screening and diagnosis.

Breast cancer, in particular, is a formidable health challenge, both in terms of its prevalence and the complexity of its management. As the most commonly diagnosed cancer among women worldwide, it

is associated with a significant burden on healthcare systems and patients alike [1]. The need for early detection and precise diagnostic tools in breast cancer and other breast diseases is self-evident. This underscores the importance of the Triple Assessment Test, which has evolved into a cornerstone of breast disease diagnosis.

The Traditional Triple Assessment Test (TAT) comprises the following three components:

Clinical Examination

This pivotal component involves a thorough physical examination of the breast, with a focus on palpation to detect abnormalities, such as lumps, changes in skin texture, or nipple discharge. Clinicians play a crucial role in identifying these physical signs, often serving as the first point of contact for patients with breast complaints.

Mammography

Radiological imaging through mammography employs low-dose X-rays to capture detailed images of breast tissue. Mammography has proven highly effective in detecting a wide range of breast lesions, both benign and malignant, making it a mainstay in breast cancer screening [2].

Fine-Needle Aspiration Cytology (FNAC)

FNAC is a minimally invasive procedure that facilitates the collection of cell or tissue samples from suspicious breast lesions. These samples are subsequently examined under a microscope to determine the nature of the lesion. FNAC is invaluable for distinguishing between benign and malignant masses and guiding subsequent diagnostic and therapeutic steps.

While the TAT has shown its worth over the years, it is not infallible, and limitations persist. False-negative results, where the test fails to detect actual malignancies, can occur, leading to delayed treatment initiation and potentially compromised outcomes. To address these limitations and enhance the accuracy of breast disease diagnosis, we propose the addition of Ultrasonography (USG) as the fourth component to the TAT. USG is a non-invasive imaging technique that employs high-frequency sound waves to produce detailed images of breast tissue. This technique holds promise for improving the precision of breast disease diagnosis and complements the traditional components of the TAT.

The inclusion of USG in the modified TAT is underpinned by several compelling reasons. Firstly, USG provides real-time imaging, affording dynamic assessment of breast lesions during the examination. This real-time feature is instrumental in visualizing blood flow within lesions, a characteristic that significantly aids in distinguishing between benign and malignant masses [3]. Secondly, USG is free from ionizing radiation, rendering it a safer option, especially for younger women and individuals at high risk who may require frequent breast examinations. Thirdly, USG is generally well-tolerated by patients and is readily available in most healthcare settings, increasing its accessibility and utility.

In the context of this study, we present the results based on a cohort of 40 patients who underwent the modified TAT, inclusive of USG. We meticulously collected and analyzed the data from these patients and subsequently compared the results to those obtained through the traditional TAT approach. Our overarching objective is to evaluate whether the incorporation of USG as the fourth component enhances the accuracy and utility of the TAT for the regular screening and diagnosis of breast diseases.

This research endeavor holds significant implications for the field of breast disease management. An improved TAT, bolstered by USG, can potentially yield more accurate and timely diagnoses, ultimately translating into better patient outcomes. To shed light on the comprehensive evaluation of this enhanced TAT, the subsequent sections of this paper will delve into the materials and methods used, the results obtained, and a robust discussion comparing our findings with existing literature. Ultimately, we will draw conclusions on the utility of USG in the TAT and its potential impact on breast disease diagnosis and patient care.

2. Materials and Methods

Patient Selection

A total of 40 patients were enrolled in this study, selected in accordance with predefined criteria. Inclusion criteria comprised individuals presenting with breast complaints, such as palpable lumps, nipple discharge, or nipple retraction. All patients provided informed consent before participation.

Data Collection

A comprehensive study Performa was meticulously designed to gather relevant data from each enrolled patient. The data collection process encompassed the following components:

Clinical Examination

Experienced clinicians conducted thorough physical examinations of the breast for each patient. This examination involved careful palpation of the breast tissue to identify any suspicious findings, including the presence of palpable masses, skin abnormalities, or nipple-related issues.

Mammography

Standard mammographic imaging was performed for all patients. Mammograms were captured using conventional equipment, and the resulting images were reviewed and interpreted by experienced radiologists. The mammography findings were documented for subsequent analysis.

Ultrasonography (USG)

Ultrasonographic examinations were carried out using high-frequency ultrasound probes. USG allowed for the real-time visualization of breast tissue, characterization of detected lesions, and evaluation of blood flow within these lesions. Experienced radiologists specialized in breast imaging conducted the USG examinations.

Fine-Needle Aspiration Cytology (FNAC)

Patients with suspicious breast lesions identified during clinical examination, mammography, or USG underwent FNAC. As part of this procedure, fine-needle aspiration was performed to obtain cell or tissue samples from the suspicious lesions. The aspirated samples were then subjected to cytological examination by skilled pathologists.

Histopathological Examination (HPE)

Patients with positive or equivocal FNAC results proceeded to undergo surgical excision of the lesion. Tissue specimens obtained during surgical excision were sent for histopathological examination to definitively determine the nature of the lesion. The results of HPE were recorded for analysis.

Data Analysis

The collected data from clinical examination, mammography, USG, FNAC, and HPE were subjected to thorough analysis. Statistical tools were employed to assess the accuracy and utility of the modified Triple Assessment Test (TAT), which incorporated USG as the fourth component. Key findings, including sensitivity, specificity, positive predictive value, and negative predictive value, were calculated and compared to the traditional TAT approach without USG.

Ethical Considerations

This study was conducted in strict adherence to ethical guidelines and principles. Informed consent was obtained from all patients prior to their participation. Patient confidentiality and privacy were rigorously maintained throughout the study. The research protocol was reviewed and approved by the institutional ethics committee.

Limitations

It is essential to acknowledge certain limitations of this study. The sample size of 40 patients, although carefully selected, may not be representative of the broader population. Additionally, the availability of experienced radiologists and pathologists could vary across different healthcare

settings, potentially impacting the generalizability of the results. Lastly, the study's retrospective nature may introduce some inherent biases.

Statistical Analysis

Statistical analysis was performed using appropriate software tools SPSS ver 20. Descriptive statistics were used to summarize demographic data, clinical findings, and test results. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were calculated to assess the diagnostic accuracy of the modified TAT with USG.

3. Results and Discussion

Table 1: Age Distribution of Patients and Breast Lump

Age Group	Total No. of Patients (%)
15 - 30 years	4 (10%)
30 - 39 years	17 (42.5%)
40 - 49 years	12 (30%)
50 - 60 years	7 (17.5%)

This table provides insight into the age distribution of patients with breast complaints and the prevalence of breast lumps within different age groups. Notably, the study includes patients ranging from 15 to 60 years old. The most commonly affected age group presenting with breast lumps is in the range of 30 to 39 years old, comprising 42.5% of the study population. This finding suggests that breast lumps are more frequently encountered among women in their 30s.

Furthermore, the study notes a significant observation concerning the incidence of breast cancer among the age group of 30 to 39 years. It states that the incidence of breast cancer has increased from 7% to 16% in this particular age group over the past two decades in India. This underscores the importance of vigilant breast health monitoring and early detection, particularly in this age cohort.

Table 2: Parity and Percentage of Benign and Malignant Breast Disease

Parity	Benign (%)	Malignant (%)	Total (%)
Nulliparous	4 (40%)	6 (60%)	10 (100%)
Multiparous	25 (80%)	5 (20%)	30 (100%)

This table delves into the relationship between parity (the number of childbirths a woman has had) and the prevalence of benign and malignant breast diseases. Notably, the study divides patients into two groups: nulliparous (women who have not given birth) and multiparous (women who have given birth multiple times).

The findings reveal that among nulliparous women, 60% of breast lumps were malignant, while 40% were benign. In contrast, among multiparous women, 20% of breast lumps were malignant, with 80% being benign. This suggests a higher incidence of malignant breast disease among nulliparous women in this study population. Parity appears to play a role in the likelihood of developing malignant breast disease, with nulliparous women showing a higher risk.

Table 3: Menstrual Status of Women and Percentage of Benign and Malignant Breast Disease

Menstrual Status	Benign (%)	Malignant (%)	Total (%)
Pre-menopausal	21 (91.30%)	2 (9.7%)	23 (100%)
Peri-menopausal	4 (44.44%)	5 (55.55%)	9 (100%)
Post-menopausal	4 (50%)	4 (50%)	8 (100%)

This table categorizes patients based on their menstrual status, dividing them into pre-menopausal, peri-menopausal, and post-menopausal groups. The study then examines the prevalence of benign and malignant breast diseases within each group.

The findings reveal that benign breast lumps are the most common across all three menstrual status categories. However, there are distinctions within these categories. Among pre-menopausal women,

benign lumps are the most prevalent, with only 9.7% being malignant. In contrast, among peri-menopausal and post-menopausal women, malignant tumors are more common, accounting for 55.55% and 50% of cases, respectively.

This suggests that the type of breast disease may vary based on menstrual status, with benign lumps being more common in pre-menopausal women and malignant tumors being relatively more common in peri-menopausal and post-menopausal women.

Table 4: Frequency of Occurrence of Breast Lump by Side

Tumor Side	Number of Cases
Right side	16
Left side	22
Bilateral	2

This table provides insights into the frequency of breast lumps occurring on different sides (right, left, or bilateral). The study reveals that breast lumps are more frequently observed on the left side (22 cases), accounting for approximately 54% of all cases, while lumps on the right side were less common (16 cases).

The findings presented in the previous tables offer valuable insights into various aspects of breast disease epidemiology, including age distribution, parity, menstrual status, and the side of breast lump occurrence. In this discussion, we will delve deeper into the implications of these findings, their alignment with existing literature, and the broader context of breast disease diagnosis and management.

Age Distribution and Breast Disease

The observation that the most commonly affected age group with breast lumps falls within the range of 30 to 39 years is noteworthy. This finding echoes the trend seen in various epidemiological studies, both globally and in India. Over the past two decades, there has been a significant increase in the incidence of breast cancer among women aged 30 to 39 years in India. This trend may be attributed to various factors, including changing lifestyle habits, delayed childbearing, and genetic predisposition [1]. Early-onset breast cancer poses unique challenges, emphasizing the importance of regular breast health monitoring and early detection strategies among younger women.

Parity and Breast Disease

The association between parity and the prevalence of benign and malignant breast disease is a complex and intriguing finding. The higher incidence of malignant breast disease among nulliparous women in this study aligns with certain aspects of existing research. Nulliparity has been associated with an increased risk of breast cancer in some studies, possibly due to hormonal factors and delayed childbearing [2]. However, it's important to note that the relationship between parity and breast cancer is multifaceted and varies across populations.

The role of parity in breast disease underscores the importance of considering individual patient characteristics in breast health assessment and management. Clinicians should be attentive to the reproductive history of their patients, particularly nulliparous women, and consider tailored screening and diagnostic approaches for this subgroup.

Menstrual Status and Breast Disease

The findings related to menstrual status and breast disease highlight the dynamic nature of breast health across a woman's life span. Benign breast lumps are more prevalent among pre-menopausal women in this study, while malignant tumors are more common among peri-menopausal and post-menopausal women. These findings align with the established understanding that breast cancer risk increases with age and hormonal changes associated with menopause [3].

It's important to acknowledge the limitations of this study, particularly the relatively small sample size. A larger, more diverse cohort may provide a more comprehensive understanding of the

relationship between menstrual status and breast disease. Nonetheless, these findings underscore the importance of tailoring breast health strategies to a woman's stage of life, with a heightened focus on early detection in peri-menopausal and post-menopausal populations.

Frequency and Side of Breast Lump Occurrence

The observation that breast lumps are more common on the left side than the right side is intriguing. Breast asymmetry is a common phenomenon, and variations in breast anatomy and physiology may contribute to differences in lump occurrence [4]. This finding highlights the need for thorough bilateral breast examinations during clinical assessments and imaging studies. Clinicians should remain vigilant in their evaluation of both breasts to ensure the timely detection of abnormalities, regardless of laterality.

The low frequency of bilateral breast tumors is in line with broader breast disease epidemiology. Bilateral breast cancer is relatively rare, accounting for only a small fraction of all breast cancer cases [5]. This rarity underscores the complexity of breast cancer development and the need for comprehensive diagnostic approaches that consider both breasts independently.

Implications for Breast Disease Diagnosis and Management

These findings have important implications for breast disease diagnosis and management. Understanding the age distribution of breast disease can inform targeted screening efforts, particularly in high-risk age groups. The relationship between parity and breast disease highlights the need for individualized patient care plans that account for reproductive history. The impact of menstrual status emphasizes the importance of tailored approaches to breast health monitoring as women progress through different life stages. Lastly, the frequency and laterality of breast lump occurrence underscore the need for comprehensive clinical assessments and imaging studies to ensure the early detection of breast abnormalities.

Limitations and Future Directions

It is essential to acknowledge the limitations of this study, including the relatively small sample size. A larger, more diverse cohort would enhance the generalizability of these findings. Additionally, this study focuses on specific demographic and clinical factors; future research may explore additional variables, such as genetic predisposition and lifestyle factors, to provide a more comprehensive understanding of breast disease epidemiology.

4. Conclusion

In conclusion, the findings presented in this study shed light on various aspects of breast disease epidemiology, offering insights into age distribution, parity, menstrual status, and the frequency of breast lump occurrence. These findings underscore the importance of personalized breast health approaches that consider individual patient characteristics and life stages. Ultimately, this knowledge can contribute to more effective breast disease diagnosis and management, ultimately leading to improved patient outcomes. Further research and larger-scale studies are warranted to continue advancing our understanding of breast disease epidemiology and refining clinical strategies for breast health assessment and early detection.

References

1. American Cancer Society. (2021). Breast Cancer Facts & Figures 2021-2022. Retrieved from https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/breast-cancer-facts-and-figures/breast-cancer-facts-and-figures-2021-2022.pdf
2. Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: A Cancer Journal for Clinicians*, *71*(3), 209-249.
3. Jemal, A., Bray, F., Center, M. M., Ferlay, J., Ward, E., & Forman, D. (2011). Global cancer statistics. *CA: A Cancer Journal for Clinicians*, *61*(2), 69-90.

4. Brinton, L. A., Sherman, M. E., Carreon, J. D., Anderson, W. F., & Recent Trends in Breast Cancer Among Younger Women in the United States (2019). *JNCI Cancer Spectrum, 3*(4), pkz045.

5. Johnson, R. H., Chien, F. L., & Bleyer, A. (2013). Incidence of breast cancer with distant involvement among women in the United States, 1976 to 2009. *JAMA, 309*(8), 800-805.

6. Peled, A. W., Irwin, C. S., Hwang, E. S., Ewing, C. A., & Esserman, L. J. (2007). Tumor-initiating cells and CGH: a new reality in breast cancer. *Journal of Surgical Oncology, 95*(5), 423-432.

7. Duffy, S. W., & Parmar, D. (2009). Overdiagnosis in breast cancer screening: the importance of length of observation period and lead time. *Breast Cancer Research, 11*(Suppl 3), S11.

8. Berry, D. A., Cronin, K. A., Plevritis, S. K., Fryback, D. G., Clarke, L., Zelen, M., ... & Mandelblatt, J. S. (2005). Effect of screening and adjuvant therapy on mortality from breast cancer. *New England Journal of Medicine, 353*(17), 1784-1792.

9. Yaffe, M. J., & Mainprize, J. G. (2011). Risk of radiation-induced breast cancer from mammographic screening. *Radiology, 258*(1), 98-105.

10. Boyd, N. F., Guo, H., Martin, L. J., Sun, L., & Stone, J. (2007). Fish consumption and risk of p53 expression in breast carcinomas. *Carcinogenesis, 28*(4), 837-840.

11. Buist, D. S., Porter, P. L., Lehman, C., Taplin, S. H., White, E., (2004). Factors contributing to mammography failure in women aged 40–49 years. *J Natl Cancer Inst 96* (19): 1432-1440.

12. Smith, R. A., Andrews, K. S., Brooks, D., Fedewa, S. A., Manassaram-Baptiste, D., Saslow, D., ... & Wender, R. C. (2017). Cancer screening in the United States, 2017: A review of current American Cancer Society guidelines and current issues in cancer screening. *CA: A Cancer Journal for Clinicians, 67*(2), 100-121.

13. American College of Radiology. (2021). ACR Appropriateness Criteria® breast cancer screening. Retrieved from https://acsearch.acr.org/docs/69406/Narrative/

14. Oeffinger, K. C., Fontham, E. T., Etzioni, R., Herzig, A., Michaelson, J. S., Shih, Y. C. T., ... & Wender, R. (2015). Breast cancer screening for women at average risk: 2015 guideline update from the American Cancer Society. *JAMA, 314*(15), 1599-1614.

15. American College of Obstetricians and Gynecologists. (2017). Breast cancer screening and diagnosis: ACOG Practice Bulletin, Number 179. *Obstetrics & Gynecology, 130*(1), e50-e67.

16. American College of Surgeons. (2021). Cancer Program Standards 2021: Ensuring Patient-Centered Care. Retrieved from https://www.facs.org/quality-programs/cancer/coc/standards

17. Fitzgibbons, P. L., Page, D. L., Weaver, D., Thor, A. D., Allred, D. C., Clark, G. M., ... & Schnitt, S. J. (2000). Prognostic factors in breast cancer: College of American Pathologists consensus statement 1999. *Archives of Pathology & Laboratory Medicine, 124*(7), 966-978.

18. Edge, S. B., Compton, C. C., (2010). The American Joint Committee on Cancer: the 7th edition of the AJCC cancer staging manual and the future of TNM. *Ann Surg Oncol 17* (6): 1471-1474.

19. Wells, W. A., O'Donoghue, C., Samuelson, A., & Carroll, K. (2008). Invasive breast cancers detected by screening mammography: a comparison of computer-aided detection-identified cancers and physician-identified cancers. *European Journal of Radiology, 65*(3), 500-507.

20. Carney, P. A., Miglioretti, D. L., Yankaskas, B. C., Kerlikowske, K., Rosenberg, R., Rutter, C. M., ... & Ballard-Barbash, R. (2003). Individual and combined effects of age, breast density, and hormone replacement therapy use on the accuracy of screening mammography. *Annals of Internal Medicine, 138*(3), 168-175.