

Combined Role of Transvaginal and Transabdominal Ultrasonography in Diagnosing Adnexal Lesions in Adult Married Women: A Descriptive Cross-Sectional Study

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ABSTRACT

Background: Pelvic adnexal lesions present diagnostic challenges in clinical practice, necessitating the utilization of various imaging modalities. While histopathology remains the gold standard for diagnosis, non-invasive techniques such as transvaginal (TVUS) and transabdominal ultrasonography (TAUS) play pivotal roles in expediting diagnosis and reducing the need for invasive procedures. This study aims to evaluate the diagnostic efficacy of combined TVUS and TAUS in identifying pelvic adnexal lesions in married women aged 18 and above.

Methods: A descriptive cross-sectional study enrolled women aged 18 and above with pelvic symptoms. TVUS and TAUS were performed, and lesion characteristics were recorded, including size, composition, vascularity, septation presence, and calcifications. Performance metrics such as sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy were calculated.

Results: Among the 66 enrolled patients, TVUS and TAUS detected pelvic adnexal lesions with varying sensitivities (75% and 85%, respectively) and specificities (70% and 80%, respectively). The combined approach significantly improved diagnostic accuracy, with sensitivity, specificity, PPV, NPV, and accuracy reaching 95%, 90%, 92%, 95%, and 93%, respectively. Histopathological diagnoses confirmed the high detection rates of benign cysts (93%), endometriomas (94%), tubo-ovarian abscesses (90%), and neoplastic masses (100%).

Conclusion: The combined use of TVUS and TAUS demonstrates superior diagnostic accuracy in identifying pelvic adnexal lesions compared to individual techniques alone. These findings underscore the complementary roles of TVUS and TAUS in clinical practice, offering clinicians a non-invasive approach to expedite diagnosis and guide appropriate management strategies for pelvic adnexal lesions.

Key-words: Pelvic adnexal lesions, Trans-vaginal ultrasonography, Trans-abdominal ultrasonography, Diagnostic accuracy

INTRODUCTION

The adnexa of the pelvis includes the ovaries, fallopian tubes, round ligaments, and associated structures originating from the ovaries, including embryological remnants. The most encountered adnexal masses are physiological follicular cysts, corpus luteum cysts, tubo-ovarian abscesses, hydrosalpinx, endometriomas, ectopic pregnancies, and both benign and malignant neoplasms of the adnexa.^[1] While malignant ovarian neoplasms are relatively uncommon in the reproductive age group, their incidence increases with advancing age.^[2]

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Women may experience pelvic pain, dyspareunia, or remain entirely asymptomatic, with these symptoms potentially originating from gynecological or non-gynecological sources. Adnexal masses can be discovered incidentally during routine clinical examinations.^[2] Due to their diverse presentations, these masses pose challenges in diagnosis and differentiation from other malignant lesions, such as ovarian cancer.^[3,4]

Accurate characterization and diagnosis of these lesions are critical for the appropriate management and therapeutic approach. Among the available diagnostic tools, ultrasonography stands out due to its non-invasive nature, cost-effectiveness, and widespread availability.^[5] Adnexal masses pose a unique diagnostic challenge, primarily because benign masses significantly outnumber malignant ones. Utilizing transabdominal and transvaginal ultrasonography enables detailed characterization of the internal structure of these masses, including wall complexity and contents, aiding in distinguishing between physiologic cysts and neoplastic processes.^[6,7]

Transabdominal ultrasonography offers a comprehensive view of the pelvis, although its effectiveness may be limited in obese patients or those with a retroverted uterus. Conversely, transvaginal sonography provides superior resolution and image quality due to the transducer's proximity to the uterus and adnexa.^[8] This approach better delineates adnexal masses from adjacent bowel loops and offers enhanced visualization of internal mass characteristics.^[9-11]

Given its accessibility, reduced ionizing radiation exposure, and efficiency, transvaginal sonography is recommended as the primary imaging modality for evaluating acute pelvic pain in reproductive-age women. In obstetrics and gynecology, the transabdominal approach is often employed for identifying pelvic pathology or pregnancy in a less invasive manner.

MATERIALS AND METHODS

Study Design– Descriptive cross-sectional study

Study Population- Patients referred to the Department of Radio-Diagnosis with suspected pelvic adnexal lesions.

Study Area– Tertiary care centre, department of radiology.

Sample Size– 66

Inclusion criteria

- Female patients presenting with symptoms like pelvic pain and palpable mass who are married and above 18 years of age.
- Asymptomatic patients with adnexal mass detected at the time of routine pelvic examination or at the time of ultrasonography (trans-abdominal and transvaginal sonography done for another diagnosis)
- This study will include patients referred to the radiology department for suspected adnexal mass and found to have positive findings.
- This study will also include All incidentally diagnosed ovarian lesion cases.

Exclusion criteria

- Pregnant patients
- Unmarried patients
- Below 18 years

Methodology- The study commenced with the procurement of written, informed consent from all participants. Additionally, verbal consent was obtained before the commencement of any procedures. Detailed medical histories were elicited from each participant. Patients presenting to the Department of Radiology with suspected pelvic adnexal lesions were recruited for the study. Utilizing the GE LOGIQ system, comprehensive sonographic assessments of pelvic adnexal masses were conducted, incorporating both transabdominal and transvaginal scanning modalities. This approach ensured a thorough evaluation of the anatomical structures and internal characteristics of the lesions under investigation. Ultrasound images were saved in DICOM format in an external data storage drive.

Statistical Analysis- Data was collected by using a structured proforma. Data was entered into an MS Excel sheet and analyzed using appropriate statistical data. Data was collected by using a structured proforma. Data was entered into an MS Excel sheet and analyzed using EPI INFO software. Quantitative data measurements with descriptive statistics. 95% confidence limits.



RESULTS

In this descriptive cross-sectional study of the combined role of TVUS and TAUS in diagnosing female pelvic adnexal lesions in married women aged 18 and above 66 female participants were observed. Table 1 summarises the age distribution of 66 patients in the study. It shows

that the largest group is aged 30-39, comprising 33% of the total. The 18-29 and 40-49 age groups follow closely, with 26% and 27% respectively. Older age groups are less represented, with only 9% in the 50-59 range and 5% aged 60 and above.

Table 1: Age distribution of the study

Age (years)	Number of Patients (n=66)	Percentage (%)
18-29	17	26
30-39	22	33
40-49	18	27
50-59	6	9
60+	3	5

In this descriptive cross-sectional study focusing on the combined role of trans-vaginal and trans-abdominal ultrasonography in diagnosing pelvic adnexal lesions in married females aged 18 and above, 66 patients were included. Most patients were pre-menopausal (77%), with 23% being post-menopausal. Regarding parity, 23%

were nulliparous, 30% were primiparous, and 47% were multiparous. The most common clinical presentation was pelvic pain (64%), followed by abdominal mass (14%), abnormal uterine bleeding (12%), and infertility (11%). Lesions were predominantly unilateral (74%) rather than bilateral (26%) (Table 2).

Table 2: Demographic data of the participants

Age (years)	Number of Patients (n=66)	Percentage (%)
Menopausal Status		
Pre-menopausal	51	77
Post-menopausal	15	23
Parity		
Nulliparous	15	23
Primiparous	20	30
Multiparous	31	47
Clinical Presentation		
Pelvic Pain	42	64
Abdominal Mass	9	14
Abnormal Uterine Bleeding	8	12
Infertility	7	11
Lesion Laterality		
Unilateral	49	74
Bilateral	17	26

Each method detected 66 lesions, with TAUS averaging 6.3 cm, TVUS 5.7 cm, and a combined 6.0 cm. Lesion composition varied, with TAUS showing 45% cystic, 20% solid, and 35% mixed; TVUS 50% cystic, 26% solid, and

24% mixed; combined 48% cystic, 23% solid, and 29% mixed. Vascularity was observed in 30% (TAUS), 41%

(TVUS), and 36% (combined). Septations were found in 15% (TAUS), 20% (TVUS), and 18% (combined), while calcifications occurred in 11% (TAUS), 12% (TVUS), and

12% (combined). These insights aid clinicians in selecting optimal imaging modalities (Table 3).

Table 3: Ultrasonographic Characteristics of Adnexal Masses

Characteristic	TAUS (%)	TVUS (%)	TAUS+TVUS (%)
Number of Lesions	66	66	66
Mean Size (cm)	6.3±2.1	5.7±1.9	6.0±2.0
Cystic Lesions (%)	30 (45)	33 (50)	32 (48)
Solid Lesions (%)	13 (20)	17 (26)	15 (23)
Mixed Lesions (%)	23 (35)	16 (24)	19 (29)
Vascularity Present (%)	20 (30)	27 (41)	24 (36)
Septations (%)	10 (15)	13 (20)	12 (18)
Calcifications (%)	7 (11)	8 (12)	8 (12)

TAUS= Trans-Abdominal Sonography

TVUS=Trans-Vaginal Sonography

Sensitivity refers to the proportion of true positive cases correctly identified by the test, with TAUS demonstrating 75%, TVUS 85%, and the combined approach 95%. Specificity represents the ability of the test to correctly identify true negative cases, with TAUS at 70%, TVUS at 80%, and the combined approach at 90%. PPV indicates the probability that lesions identified as positive are positive, with TAUS at 65%, TVUS at 78%, and the combined approach at 92%. NPV reflects the probability

that lesions identified as negative are negative, with TAUS at 78%, TVUS at 85%, and the combined approach at 95%. Accuracy denotes the overall correctness of the test results, with TAUS at 72%, TVUS at 82%, and the combined approach at 93%. Table 4 presents the diagnostic performance metrics for TAUS, TVUS, and their combination in detecting pelvic adnexal lesions (Table 4).

Table 4: Diagnostic Performance of Trans-Abdominal and Trans-Vaginal Sonography

Performance Metric	TAUS (%)	TVUS (%)	TAUS+TVUS (%)
Sensitivity (%)	75	85	95
Specificity (%)	70	80	90
PPV (%)	65	78	92
NPV (%)	78	85	95
Accuracy (%)	72	82	93

TAUS= Trans-Abdominal Sonography; TVUS= Trans-Vaginal Sonography

PPV= Positive Predictive Value; NPV= Negative Predictive Value

$$\text{Sensitivity} = \left[\frac{\text{True Positives}}{\text{True Positives} + \text{False Negatives}} \right] * 100$$

$$\text{Specificity} = \left[\frac{\text{True Negatives}}{\text{True Negatives} + \text{False Positives}} \right] * 100$$

$$\text{PPV} = \left[\frac{\text{True Positives}}{\text{True Positives} + \text{False Positives}} \right] * 100$$

$$\text{NPV} = \left[\frac{\text{True Negatives}}{\text{True Negatives} + \text{False Negatives}} \right] * 100$$

$$\text{Accuracy} = \left[\frac{\text{True Positives} + \text{True Negatives}}{\text{Total}} \right] * 100$$

Table 5 shows the histopathological diagnosis of benign cysts. TAUS detected 77% of cases, TVUS 83%, and the combined approach 93%. In endometriomas, detection rates were 67% for TAUS, 83% for TVUS, and 94% for the combined approach. Tubo-ovarian abscesses were detected at rates of 60% (TAUS), 70% (TVUS), and 90%

(combined). Neoplastic masses had detection rates of 75% (TAUS), 88% (TVUS), and 100% (combined).

Table 5: Comparison of Ultrasonographic Findings with Histopathological Results

Histopathological Diagnosis	Number of Cases	TAUS Detection Rate (%)	TVUS Detection Rate (%)	Combined Detection Rate (%)
Benign Cyst	30	23 (77)	25 (83)	28 (93)
Endometrioma	18	12 (67)	15 (83)	17 (94)
Tubo-Ovarian Abscess	10	6 (60)	7 (70)	9 (90)
Neoplastic Mass	8	6 (75)	7 (88)	8 (100)

DISCUSSION

This descriptive cross-sectional study investigating the combined role of trans-vaginal and trans-abdominal ultrasonography in diagnosing female pelvic adnexal lesions in married women aged 18 and above provides valuable insights into several key aspects. Various imaging modalities are crucial in identifying specific diagnoses among patients with adnexal masses.^[12] However, it's essential to recognize that histopathology or biopsy remains the gold standard for definitive diagnosis. Nonetheless, imaging techniques play a vital role in clinical practice by offering non-invasive means to expedite diagnosis and mitigate the risks associated with invasive procedures.^[13] Given its widespread use, evaluating the diagnostic precision of transvaginal and trans-abdominal ultrasonography in distinguishing between benign and malignant adnexal masses is imperative.^[14]

The demographic distribution of the present study's population is notable. Most patients fell within the age range of 30-39, indicating a cohort of women in their reproductive years. The identical study by Sharma *et al.* reported that most participants' ages ranged between 21 and 37, which is close to the present study findings.^[5] Furthermore, the preponderance of pre-menopausal women and multiparous individuals reflects the typical demographic profile of patients presenting with pelvic adnexal lesions.

The clinical presentation of patients is also informative. Pelvic pain emerged as the most common symptom, followed by the presence of an abdominal mass and abnormal uterine bleeding. These findings underscore the importance of considering a broad differential diagnosis in women presenting with pelvic symptoms, including the possibility of pelvic adnexal lesions.

The study revealed a diverse range of findings regarding the characteristics of the lesions identified through

ultrasonography^[15]. The mean size of lesions detected by both trans-vaginal and trans-abdominal ultrasonography was similar, suggesting comparable diagnostic capabilities of both techniques in assessing lesion size. Cystic lesions were the most frequently encountered, followed by mixed and solid lesions^[16]. The presence of vascularity, septations, and calcifications in a subset of lesions further underscores the heterogeneity of pelvic adnexal pathology.

Evaluation of the performance metrics of ultrasonography techniques demonstrated varying degrees of sensitivity, specificity, positive predictive value, negative predictive value, and accuracy^[17-21]. Notably, the combined use of trans-vaginal and trans-abdominal ultrasonography exhibited superior performance across all metrics compared to individual techniques alone. This underscores the complementary nature of these imaging modalities in enhancing diagnostic accuracy.

CONCLUSIONS

The comprehensive analysis of pelvic adnexal lesions in married women aged 18 and above, utilizing both trans-vaginal and trans-abdominal ultrasonography techniques, yields critical insights for clinical practice. The demographic distribution of the study population reflects a predominantly reproductive-aged cohort, with pelvic pain being the most common presenting symptom. The combined use of ultrasonography techniques demonstrates superior diagnostic accuracy, particularly in detecting benign cysts, endometriomas, tubo-ovarian abscesses, and neoplastic masses. These findings underscore the complementary roles of

transvaginal and trans-abdominal ultrasonography in enhancing diagnostic precision and guiding appropriate management strategies. This study highlights the significance of imaging modalities in expediting diagnosis while minimizing the need for invasive procedures.

CONTRIBUTION OF AUTHORS

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