RESEARCH PAPER

Sonographic Evaluation Of Female Pelvic Adnexal Lesions In Reproductive Age Group:A Cross-Sectional Observational Study

Dr Aishwarya Gosavi[1] Dr Devendra Kulkarni[2] Dr Poonam Dabhade[3*]

[1]MBBS, MD Radiology Senior Resident Radiology Department SMBT Institute of Medical Sciences and Research Center
[2]MBBS, MD Radiology Associate Professor Radiology Department Seth GSMC and KEM Hospital Mumbai
[3*]MBBS, MD Radiology Assistant Professor Radiology Department SMBT Institute of Medical Sciences and Research Center

***Corresponding Author:** Dr Poonam Dabhade
MBBS, MD Radiology Assistant Professor Radiology Department SMBT Institute of Medical Sciences and Research Center Email: drpoonamd5@gmail.com

Abstract

Background: Pelvic adnexal lesions are commonly encountered in women of reproductive age and encompass a wide spectrum of benign and malignant pathologies. Early and accurate differentiation between benign and malignant adnexal masses is crucial for appropriate patient management. Ultrasonography, particularly with the application of standardized scoring systems such as the International Ovarian Tumor Analysis (IOTA) simple rules, plays a pivotal role in the evaluation of these lesions.

Aim: To evaluate the sonographic characteristics of female pelvic adnexal lesions in the reproductive age group and to assess the diagnostic utility of ultrasonography using IOTA simple rules with histopathological correlation wherever available.

Materials and Methods: This cross-sectional observational study included 97 female patients aged 15–50 years presenting with clinically suspected adnexal lesions. All patients underwent transabdominal and transvaginal ultrasonography with grayscale and color Doppler evaluation. Lesions were assessed for morphological features and vascularity, and categorized using IOTA simple rules. Histopathological correlation was performed in surgically managed cases.

Results: The mean age of patients was 33.67 years, with the majority belonging to the 20–40 year age group. Lower abdominal pain was the most common presenting complaint (93.8%). On ultrasonography, simple ovarian cysts (45.4%) and hemorrhagic cysts (29.9%) were the most frequent lesions. According to IOTA classification, 87.6% of lesions were benign, 2.1% borderline, and 10.3% malignant. Malignant lesions constituted 6.2% on ultrasonography, with epithelial ovarian tumors being the most common on histopathology. Serous cystadenocarcinoma was the predominant malignant subtype.

Conclusion: Most adnexal lesions in women of reproductive age are benign. Ultrasonography combined with IOTA simple rules is a reliable, non-invasive tool for differentiating benign and malignant adnexal lesions, thereby aiding in appropriate clinical decision-making and management.

Keywords: Adnexal lesions; Ultrasonography; IOTA simple rules; Ovarian tumors; Reproductive age group
How to cite this article: Gosavi A, Kulkarni D, Dabhade P. Sonographic Evaluation of Female Pelvic Adnexal Lesions in Reproductive Age Group: A Cross-Sectional Observational Study. Int J Drug Deliv Technol. 2026;16(17s): 727-731. DOI: 10.25258/ijddt.16.17s.85

Introduction

Adnexal lesions represent a wide spectrum of gynecological conditions involving the ovaries, fallopian tubes, and surrounding connective tissues. These lesions are commonly encountered in women of reproductive age and may range from physiological functional cysts to malignant ovarian neoplasms[1]. The clinical importance of adnexal masses lies in their potential for malignancy, which necessitates early and accurate diagnosis to reduce morbidity and mortality[2]. Ovarian cancer remains one of the leading causes of death among gynecological malignancies due to its vague clinical presentation and late-stage diagnosis[3].

Although the majority of adnexal lesions in reproductive-aged women are benign, preoperative differentiation between benign and malignant masses is critical, as treatment strategies differ significantly[4]. Benign lesions often require conservative management or minimally invasive surgical procedures, whereas malignant tumors demand extensive surgical staging and adjuvant therapy[5]. Hence, an accurate, non-invasive diagnostic modality is essential for optimal patient management

Ultrasonography is the first-line imaging modality for the evaluation of adnexal lesions owing to its accessibility, cost-effectiveness, lack of ionizing radiation, and high diagnostic yield[6]. Transvaginal ultrasonography provides superior spatial resolution, allowing detailed assessment of lesion morphology, internal architecture, and vascularity. Several ultrasound-based scoring systems have been developed to improve diagnostic accuracy, including the

*Author for Correspondence: drpoonamd5@gmail.com

Risk of Malignancy Index (RMI), Sassone index, and the International Ovarian Tumor Analysis (IOTA) models[7–9].

The IOTA simple rules utilize standardized sonographic criteria to classify adnexal masses as benign or malignant and have demonstrated high sensitivity and specificity in multiple studies[10–12]. The present study was undertaken to evaluate the sonographic characteristics of female pelvic adnexal lesions in reproductive-aged women and to assess the diagnostic performance of ultrasonography with IOTA simple rules, with histopathological correlation wherever available.

Materials and Methods

This descriptive cross-sectional observational study was conducted in the Department of Radio-Diagnosis of a tertiary care teaching hospital in North Maharashtra over a period of 18 months. A total of 97 female patients aged 15–50 years presenting with pelvic pain, menstrual irregularities, palpable pelvic masses, or incidentally detected adnexal lesions were included. Pregnant women were excluded from the study. All patients underwent transabdominal and transvaginal ultrasonography using high-frequency probes with grayscale and color Doppler evaluation. Lesions were assessed for size, morphology, wall thickness, septations, internal echoes, solid components, papillary projections, vascularity, and presence of ascites. The IOTA simple rules were applied wherever applicable to categorize lesions as benign, borderline, or malignant. Histopathological examination findings were correlated in surgically managed cases. Data were analyzed using descriptive statistical methods.

Results

The present study included 97 female patients with pelvic adnexal lesions, with ages ranging from 15 to 50 years and a mean age of 33.67 years (Table 1). The majority of patients belonged to the 20–40 year age group, indicating that adnexal lesions are more frequently encountered during the active reproductive period. Fewer cases were observed at the extremes of reproductive age, suggesting a relatively lower incidence in adolescents and perimenopausal women.

Lower abdominal pain was the most common presenting complaint, reported by 93.8% of patients, highlighting pain as the predominant clinical symptom associated with adnexal pathology. Other common symptoms included irregular menstruation and per vaginal bleeding, reflecting the hormonal and structural impact of adnexal lesions on the reproductive system (Table 2). Additional complaints such as per vaginal discharge, gastrointestinal symptoms, urinary frequency, and ascites were noted in a smaller proportion of patients.

On ultrasonographic evaluation, simple ovarian cysts were the most frequently encountered lesions, accounting for 45.4% of cases, followed by hemorrhagic cysts in 29.9% of patients. These findings indicate that the majority of adnexal lesions in the reproductive age group are functional or benign in nature. Other lesions identified included cystadenomas, complex cysts, endometriomas, and inflammatory adnexal pathologies. Malignant ovarian lesions constituted 6.2% of the total cases, underscoring the importance of careful sonographic evaluation to identify high-risk features (Table 3).

Based on the IOTA simple rules classification, 87.6% of adnexal lesions were categorized as benign, 2.1% as borderline, and 10.3% as malignant (Table 4). The application of IOTA criteria improved confidence in differentiating benign from malignant lesions by incorporating morphological characteristics and Doppler findings.

Histopathological examination was available in surgically managed cases and served as the reference standard for diagnosis. Histopathological correlation revealed epithelial ovarian tumors as the most common malignant lesions. Among these, serous cystadenocarcinoma emerged as the predominant malignant subtype, followed by other less frequent malignant and borderline tumors (Table 5). This correlation further validated the diagnostic accuracy of ultrasonography combined with IOTA simple rules in the evaluation of pelvic adnexal lesions.

Table 1: Age-wise Distribution of Patients with Adnexal Lesions

Age group (years)	Number of patients	Percentage (%)
15–20	12	12.4
21–30	28	28.9
31–40	35	36.1
41–50	22	22.6
Total	**97**	**100**

Table 2: Clinical Presentation of Patients

Presenting symptom	Number of patients	Percentage (%)
Lower abdominal pain	91	93.8
Irregular menstruation	34	35.1
Per vaginal bleeding	21	21.6
Per vaginal discharge	14	14.4
Abdominal distension	9	9.3
Urinary / bowel complaints	6	6.2

(Multiple symptoms were present in some patients)

Table 3: Ultrasonographic Diagnosis of Adnexal Lesions

Ultrasonographic diagnosis	Number of cases	Percentage (%)
Simple ovarian cyst	44	45.4
Hemorrhagic cyst	29	29.9
Endometrioma	7	7.2
Serous / mucinous cystadenoma	6	6.2
Inflammatory adnexal mass	5	5.1
Malignant ovarian lesion	6	6.2
Total	**97**	**100**

Table 4: Distribution of Adnexal Lesions According to IOTA Simple Rules

IOTA classification	Number of cases	Percentage (%)
Benign	85	87.6
Borderline	2	2.1
Malignant	10	10.3
Total	**97**	**100**

Table 5: Histopathological Correlation of Malignant Adnexal Lesions

Histopathological diagnosis	Number of cases	Percentage (%)
Serous cystadenocarcinoma	4	66.7
Mucinous cystadenocarcinoma	1	16.7
Germ cell tumor	1	16.6
Total malignant cases	**6**	**100**

Discussion

In the present study, pelvic adnexal lesions were most frequently observed in women below 40 years of age, with a clear predominance in the 20–40 year age group. This observation reflects the higher prevalence of functional and benign ovarian pathologies during the reproductive period, which is characterized by cyclical hormonal changes. Similar age distribution patterns have been reported by Kocak et al.[9] and Waseem et al.[10], who also noted a higher incidence of adnexal lesions among younger women. The relatively lower occurrence of lesions in adolescents and women approaching menopause in the present study further supports the influence of reproductive hormonal activity on adnexal pathology.

Lower abdominal pain emerged as the most common presenting symptom, reported by 93.8% of patients in this study. This finding is in concordance with observations made by Khatri et al.[11], who identified pelvic pain as the predominant clinical complaint in patients with adnexal masses. Pain in such cases may result from cyst enlargement, intracystic hemorrhage, torsion, or associated inflammatory changes. The high frequency of pain observed in the present study highlights the importance of considering adnexal pathology as a significant differential diagnosis in reproductive-aged women presenting with pelvic pain, particularly when accompanied by menstrual irregularities or abnormal vaginal bleeding.

The majority of adnexal lesions identified in this study were benign in nature, with simple ovarian cysts and hemorrhagic cysts accounting for most cases on ultrasonography. This predominance of benign and functional ovarian lesions is consistent with findings reported by Sharma et al.[12] and Bhattacharyya et al.[13], who also observed a higher incidence of non-neoplastic adnexal masses in women of reproductive age. These findings emphasize the role of ultrasonography as an effective primary imaging modality for reassuring patients and clinicians, thereby reducing unnecessary surgical interventions.

Malignant lesions constituted 10.3% of cases based on IOTA classification in the present study, a proportion that falls within the range of malignancy rates reported in previous studies. Sharma et al.[12] and Khatri et al.[11] have reported comparable malignancy rates in their respective cohorts, indicating consistency with existing literature. Among malignant lesions, epithelial ovarian tumors were the most common, with serous cystadenocarcinoma being the predominant histopathological subtype. This observation is in agreement with studies by Kanthikar et al.[19] and Sharma et al.[20], who also reported serous carcinoma as the most frequent malignant ovarian tumor.

The application of the IOTA simple rules in the present study demonstrated high diagnostic accuracy in differentiating benign from malignant adnexal lesions. The strong concordance between sonographic classification and histopathological diagnosis supports the reliability of these criteria. Similar high diagnostic performance has been reported by Feharsal and Putra[16] and Singh et al.[17], emphasizing the usefulness of standardized ultrasound-based scoring systems. The use of such validated criteria enhances diagnostic confidence, facilitates appropriate patient triage, and aids clinicians in planning optimal management strategies, including timely referral to gynecologic oncology services when indicated.

Conclusion

Most pelvic adnexal lesions in women of reproductive age are benign, with simple ovarian cysts and hemorrhagic cysts being the most common findings. Lower abdominal pain is the predominant presenting symptom, emphasizing the need to consider adnexal pathology in reproductive-aged women with pelvic pain. Ultrasonography, particularly when combined with IOTA simple rules, is a reliable and non-invasive modality for differentiating benign from malignant adnexal lesions, thereby facilitating accurate diagnosis and appropriate patient management.

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