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CLINICAL AND SONOGRAPHIC CORRELATION IN PELVIC MASS EVALUATION

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ABSTRACT

Background: Pelvic masses, encompassing a spectrum of benign and malignant entities, pose significant diagnostic challenges in clinical practice. Among the various imaging modalities available, ultrasonography stands out as a primary tool for the evaluation of pelvic pathology due to its non-invasiveness, cost-effectiveness, and widespread availability. However, establishing concordance between sonographic findings and histopathological diagnoses is imperative for ensuring diagnostic accuracy and optimizing patient outcomes. **Methods.** A cross-sectional prospective study was carried out in the Department of Radiology at our tertiary care hospital over a period of 12 months, following approval from the protocol review committee and institutional ethics committee. A total of 100 patients presenting with symptoms indicative of a pelvic mass were included in the study. Each patient was meticulously studied sonographically and confirmed histologically. **Results.** Our study demonstrates the remarkable accuracy of ultrasound in diagnosing various ovarian and tubo-ovarian pathologies. Benign cystic ovary lesions were identified with 100% accuracy on USG, while ovarian malignancies were diagnosed in 11 patients, all of which were confirmed histopatically, yielding a diagnostic accuracy of 100%. Tubo-ovulation masses were detected in 15 patients, with 11 cases accurately diagnosed by histology, resulting in a diagnosis accuracy of 73.33%. **Conclusions.** This study underscores the significance of sonographic evaluation in characterizing pelvic masses and guiding clinical management. By correlating sonography findings with histologic diagnoses, we enhance diagnostic accuracy, facilitate tailored treatment strategies, and facilitate personalized treatment strategies.

Keywords: Pelvic Masses, Ultrasonography, Diagnostic Accuracy, Histopathological Diagnosis, Ovarian Neoplasms, Tubo-Ovarian Pathologies

INTRODUCTION:

Pelvic masses, encompassing a spectrum of benign and malignant entities, pose significant diagnostic challenges in clinical practice. The accurate assessment of these masses is crucial for guiding appropriate management decisions and optimizing patient outcomes. **(1,2)** Among the various imaging modalities available, ultrasonography stands out as a primary tool for the evaluation of pelvic pathology due to its non-invasiveness, cost-effectiveness, and widespread availability(**3).** Gynecological masses constitute a substantial proportion of pelvic lesions

encountered in clinical settings. These masses may arise from diverse anatomical structures within the pelvis, including the uterus, ovaries, fallopian tubes, and adnexa **(4).** The clinical presentation of patients with pelvic masses can vary widely, ranging from asymptomatic incidental findings to symptomatic complaints such as pelvic pain, abnormal uterine bleeding, and reproductive dysfunction. Given the broad differential diagnoses associated with pelvic masses, precise imaging characterization is indispensable for facilitating targeted therapeutic strategies and prognostic assessments**(5).**

Ultrasonography, with its ability to provide real-time, high-resolution images, serves as a cornerstone in the initial evaluation of pelvic masses. The technique allows for detailed visualization of pelvic anatomy, enabling the identification of morphological features indicative of specific pathological entities **(6).** Notably, advances in ultrasonographic technology, including transvaginal and three-dimensional imaging modalities, have further enhanced its diagnostic capabilities in delineating pelvic pathology **(7).** By harnessing these technological advancements, clinicians can attain a comprehensive understanding of pelvic masses, aiding in the formulation of tailored management plans.

Histo-pathological analysis, often considered the gold standard for definitive diagnosis, plays a pivotal role in corroborating imaging findings and guiding clinical management. Surgical intervention, whether in the form of excisional biopsy, laparoscopy, or laparotomy, affords the opportunity to obtain tissue specimens for histo-pathological examination**.(8)** The histological classification of pelvic masses not only confirms the nature of the lesion but also provides valuable prognostic information, particularly in cases of malignancy **(9).** Therefore, establishing concordance between sonographic findings and histopathological diagnoses is imperative for ensuring diagnostic accuracy and optimizing patient care.

Against this backdrop, our study endeavors to bridge the gap between sonographic imaging and histopathological analysis in the evaluation of pelvic masses. By prospectively analyzing a cohort of patients presenting with gynecological masses, we aim to systematically characterize the sonographic morphology of these lesions and ascertain their histopathological correlates. Through meticulous data collection and rigorous statistical analysis, we seek to elucidate patterns and associations that may inform clinical decision-making and prognostic assessments.

This study delves into the realm of sonographic evaluation of pelvic masses, aiming to meticulously characterize their morphology and establish correlations with histopathological diagnoses, particularly in patients undergoing surgical intervention.

MATERIALS AND METHODS

A cross-sectional prospective study was carried out in the Department of Radiology at our tertiary care hospital over a period of 12 months, following approval from the protocol review committee and institutional ethics committee. The study included 100 patients presenting with symptoms indicative of a pelvic mass. Final diagnoses were compared with histopathological results, with cytohistopathology considered as the definitive diagnosis.

Inclusion Criteria:

Female patients of all age groups presenting with clinical suspicion of a pelvic mass or chronic pelvic pain, who provided written consent.

Exclusion Criteria:

Patients who had undergone previous pelvic surgery and those with non-gynecological pelvic masses.

Methodology:

The study employed contemporary pelvic sonography techniques, primarily transabdominal real-time scanning and transvaginal real-time scanning. Transabdominal scanning, using a 3 MHz transducer, focused on visualizing the uterus and ovaries through the urinary bladder at a depth of 10-15 cm. Transvaginal sonography visualized the same structures at a depth of 1-8 cm, utilizing 5-7 MHz transducers. Each case underwent transabdominal sonography, with findings correlated with transvaginal sonography in select cases. Comprehensive sonographic evaluations included assessment of the uterus, endometrium, adnexa, ovaries, bladder, anterior pelvic structures, pelvic walls, cul-de-sac, rectum, small bowel, and posterior pelvic structures. Lesion characteristics such as echogenicity, shape, borders, size, composition, calcifications, septation, locularity, laterality, presence of capsule invasion, and mass fixation were evaluated. Echogenicity categories included markedly hypoechoic, isoechoic, hyperechoic, and anechoic. Detailed clinical histories were recorded, and general and local pelvic examinations were conducted for all patients with palpable pelvic masses detected during bimanual pelvic examination. Pathological evaluations were performed on all identified lesions.

RESULTS

This table 1 presents the distribution of study participants according to age groups. A total of 100 participants were included in the study. The participants were categorized into different age groups, ranging from below 20 years to above 60 years. The table provides both the absolute number of cases and the corresponding percentages for each age group.

Table 1: Age wise incidence among study participants (n=100)

Age group (years)	Number of cases (%)
Below 20	2 (2)
20-30	8 (8)
30-40	25 (25)
40-50	53 (53)
50-60	9 (9)
Above 60	3 (3)
Total	100

Table 2: Percentage of pre- and post-menopausal patients among study participants (n=100)

Patients	Number of cases (%)
Premenopausal	72 (72)
Post-menopausal	28 (28)

In this table (no 2), the study participants are classified based on their menopausal status. Out of the total 100 participants, 72 were identified as premenopausal, while 28 were post-

menopausal. The table provides the percentage distribution of pre- and post-menopausal patients among the study population.

The various chief complaints reported by the study participants. The complaints include pain in the pelvic cavity, pain accompanied by a palpable mass, pain with bleeding per vagina (PV), menorrhagia with menstrual irregularity, post-menopausal bleeding, primary amenorrhea, and infertility. The table presents both the absolute number of cases and the corresponding percentages for each complaint.(Table 2)

Table 3: Percentage of patients with different chief presenting complaints (n=100)

Symptoms	**Number of cases (%)**
Pain in pelvic cavity	36 (36)
Pain and palpable mass	16 (16)
Pain and bleeding PV	10 (10)
Menorrhagia and menstrual irregularity	14 (14)
Post-menopausal bleeding	9 (9)
Primary amenorrhea	7 (7)
Infertility	8 (8)
Total	100

In this table 3, the different types of cases identified among the study participants are listed. These include ovarian/adnexal masses, uterine masses, fallopian tube pathologies, and vaginal pathologies. The table provides the absolute number of cases and the corresponding percentages for each type of case, totaling to 100% of the study population.

Table 4: Different types of cases among study participants

Types of cases	**Number of cases (%)**
Ovarian/adnexal masses	25 (25)
Uterine masses	45 (45)
Fallopian tube pathologies	22 (22)
Vaginal pathologies	8 (8)
Total	100 (100)

This table presents the distribution of pelvic masses identified through ultrasonographic (USG) diagnosis, along with their corresponding histopathological diagnoses. The types of lesions include uterine fibroids, adenomyosis, uterine and cervical carcinomas, ovarian follicular cysts, luteal cysts, serous and mucinous cystadenomas, benign cystic teratomas, hydrosalpinx, tubo-ovarian masses, serous and mucinous cystadenocarcinomas, and endometrial sinus tumors. The table provides the percentage-wise distribution of each type of lesion based on both the USG diagnosis and histopathological diagnosis, with a total of 100% representation for each category.

Table 5: Percentage-wise distribution of pelvic masses and their histopathological diagnosis (N=100)

Types of Lesions	USG Diagnosis	Histopathological Diagnosis
UTERINE		
Fibroid	42	38
Fibroid with pregnancy	1	1
Adenomyosis	3	4
Adenocarcinoma of uterus	2	2
Carcinoma of cervix	1	1
OVARIAN		
Benign		
Follicular cyst	8	8
Luteal cyst	4	4
Serous cystadenoma	5	5
Mucinous cystadenoma	5	5
Benign cyst teratoma	3	4
Hydrosalpinx	0	3
Ovarian cyst torsion	0	3
Tubo-ovarian masses	15	11
Malignant Lesion		
Serous cystadenocarcinoma	7	7
Mucinous cystadenocarcinoma	2	2
Endometrial sinus tumor	2	2
TOTAL	100	100

DISCUSSION:

Our study aimed to assess the utility of ultrasound in delineating the characteristics of pelvic masses, including their site, size, nature, and consistency, while also examining the efficacy of conservative management through serial sonographic evaluation. With a cohort of 100 cases, each meticulously studied sonographically and confirmed histopathologically, we aimed to address the pressing need for accurate diagnosis in pelvic masses, given the anxiety associated with potential malignancies. Our focus extended to the clinicopathological spectrum of gynecological pelvic masses, encompassing both uterine and adnexal lesions. Particularly challenging is the characterization of incidental findings, with the risk of missing malignancies looming large. Ovarian cancer's heterogeneity underscores the complexity of its diagnosis, prompting the exploration of various ultrasound-based scoring systems to distinguish between benign and malignant adnexal masses**. (10)**

The efficacy of scoring systems in distinguishing benign and malignant pelvic masses relies on specific parameters such as surface characteristics, wall thickness, cyst echogenicity, volume, septa presence, and solid area size within the cyst**. (11,12)** Notably, our study observed two cases initially misdiagnosed as

fibroids but later corrected to adenomyosis post-surgical biopsy, consistent with findings by Walsh et al., emphasizing adenomyosis's nuanced features. **(13)** Our study identified common sonographic features of adenomyosis, including uterine enlargement, cystic spaces, wall thickening, and heterogeneous echotexture. **(14)** Adenomyomas, exhibiting indistinct margins from adjacent myometrium, contrast leiomyomas. **(15)** Additionally, our study encountered carcinoma cases, including squamous cell carcinoma of the cervix and endometrial carcinoma, the latter identified through dysplastic endometrial thickening. Bezjian et al. stated that leiomyomas are prevalent pelvic masses often encountered during pregnancy**. (16)** Transvaginal sonography (TVS) emerged as valuable, particularly in distinguishing complex masses and aiding in the diagnosis of adenocarcinoma of the uterus. Remarkably, ultrasonography demonstrated high accuracy in diagnosing fibroids and adenomyosis, with 100% accuracy in identifying uterine and cervical malignancies, underscoring its clinical utility**. (17, 18)**

Our study shed light on distinct sonographic features characterizing ovarian cystadenomas. Notably, all observed cystadenomas appeared as anechoic masses with well-defined walls, consistent with previous findings by Fleischer et al., who noted septation in serous cystadenomas. **(19)** This suggests that cystic masses with septation and internal echoes are more likely to be mucinous cystadenomas. Regarding ovarian malignancies, our study detected 11 cases on ultrasound, all of which were confirmed malignant upon histopathological examination. Malignant ovarian tumors typically manifested as cystic masses with ill-defined walls and solid components, often accompanied by ascites, in line with findings by Outwater EK et al., indicating gross malignant changes**. (20)** In tubo-ovarian masses, distinct patterns were observed, with fusiform-shaped cystic masses representing fallopian tubes and rounded or ovoid masses with ill-defined walls. While well-defined cystic tubo-ovarian masses posed diagnostic challenges, clinical history and tenderness aided in differential diagnosis. Furthermore, ultrasound played a pivotal role in monitoring treatment outcomes, particularly in cases managed conservatively, facilitating assessment through serial sonographic examination. Notably, three cases of ovarian cysts were postoperatively diagnosed as torsion, with ultrasonography revealing large, anechoic cysts, underscoring its diagnostic value in such scenarios.

Our study demonstrates the remarkable accuracy of ultrasound (USG) in diagnosing various ovarian and tubo-ovarian pathologies. Benign cystic ovarian lesions were identified with 100% accuracy on USG, while ovarian malignancies were diagnosed in 11 patients, all of which were confirmed histopathologically, yielding a diagnostic accuracy of 100%. Tubo-ovarian masses were detected in 15 patients, with 11 cases accurately diagnosed by histopathology, resulting in a diagnostic accuracy of 73.33%. Notably, some false-positive diagnoses were observed, particularly in distinguishing hydrosalpinx, underscoring the challenges posed by overlapping sonographic characteristics of benign and malignant pelvic masses. Serial monitoring proved valuable, showcasing lesion resolution on subsequent sonographic examinations.

Luteal cysts, characterized by anechoic masses with well-defined walls, were consistent with previous findings. Ovarian cysts, a common finding especially in postmenopausal women, aligned with existing literature, emphasizing the significance of USG in their detection. Uterine fibroids emerged as the most prevalent uterine

masses, corroborating their status as a significant cause of gynecological pelvic masses. USG, both transabdominal and transvaginal, played a pivotal role in the initial evaluation of pelvic masses, leveraging its accessibility, cost-effectiveness, and non-ionizing nature. Leiomyomas, easily diagnosed on USG, showcased high sensitivity in preoperative detection, albeit with moderate specificity, as evidenced by previous studies. Our results aligned with the research conducted by Walsh et al. **(13)** Fleischer et al. **(19),** and Lawson et al. **(21),** which indicated accuracies of 94%, 91%, and 91% respectively. Moreover, Study by Eze JC et al. showed sensitivity of transvaginal scan (TVS) for diagnosis of uterine leiomyomas to be 94.5%, and specificity of 62.5% **(22)** our study affirmed the 100% accuracy of ultrasonography in diagnosing uterine and cervical malignancies, further underscoring its diagnostic utility in gynecological practice.

Ultrasound monitoring emerges as a valuable tool in the management of adnexal pelvic masses, particularly for borderline and type I tumors, given their low likelihood of ovarian cancer and propensity for spontaneous resolution. Tailoring the frequency of ultrasound reevaluations to individual patient needs and institutional protocols ensures timely detection and intervention. However, early screening for type II tumors poses challenges**.(23,24)** Ultrasonographic examination proves pivotal in identifying overlooked pelvic masses undetected during physical examination, though it may also raise concerns over incidental findings like small myomas and physiological cysts, potentially leading to unnecessary interventions. Despite its advantages, sonography has limitations, including technical constraints, operator dependence, and the inability to provide specific characterization. Integrating morphological parameters, Doppler study, CA-125 levels, and symptom indices enhances diagnostic accuracy. Nevertheless, preoperative differentiation between benign and malignant lesions remains elusive, underscoring the indispensability of pathological analysis as the gold standard for definitive diagnosis.

The study's retrospective design and single-center setting may limit its generalizability to broader populations. Additionally, the reliance on sonographic and histopathological assessments without considering other diagnostic modalities could introduce potential biases. Moreover, the relatively small sample size and lack of long-term follow-up data may restrict the comprehensive understanding of pelvic masses' clinical outcomes and prognostic implications.

CONCLUSION:

In conclusion, our study underscores the significance of sonographic evaluation in characterizing pelvic masses and guiding clinical management. By correlating sonographic findings with histopathological diagnoses, we enhance diagnostic accuracy and facilitate tailored treatment strategies. Despite limitations, this research provides valuable insights into pelvic pathology, paving the way for improved patient care and outcomes.

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