Original Research Article

Study to evaluate the sonographic morphology of pelvic masses and to correlate with the histopathological diagnosis of the patients who underwent surgical intervention

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Abstract

Aim: To evaluate the sonographic morphology of pelvic masses and to correlate with the histopathological diagnosis of the patients who underwent surgical intervention. **Material and Methods**: A cross-sectional prospective study was conducted in the Department of Radiology, Narayana Superspeciality Hospital, Howrah, West Bengal, India from March 2017 to February 2019. 200 female patients with gynaecological masses using high resolution ultrasonography and findings correlated with histopathology or serial sonographic examination. **Results**: The most common chief complaint of female patientsenrolledinourstudywaspaininpelviccavity 68 (34%) followed by pain and palpable mass 34(17%).Menstrual irregularity,menorrhagia, post-menopausal bleeding, infertility, and amenorrhea were the other less common complaints in the female patients of our study.Out of 200 patients evaluated by ultrasonography 54 (27%) were having ovarian pathologies and 87 (43.5%) were having uterine pathologies. **Conclusion**:USG is most commonly preferred imaging tool to evaluate gynaecological masses. It's important to differentiate gynaecological and non-gynaecological masses on sonography for accurate management of the patient.

Keywords: Gynaecological pelvic mass, uterus, ovary, adnexa, ultrasonography, Histopathological diagnosis.

Introduction

The female pelvis is an anatomic region which is quite complex, because it contains some organs and systems accomplishing different and independent functions. The urogenital system represents the main part of the female pelvis but there are also portions of other organs and systems such as some important blood vessels, gastrointestinal tracts, lymphatics, nerves and parts of the musculoskeletal system. All these structures might house or generate pelvic masses even in para-physiologic conditions, and not necessarily because of current diseases, or congenital alterations, inflammatory illness and tumours[1].

Due to the wide use of pelvic and transvaginal ultrasound for routine gynaecological evaluation, during the reproductive years and after menopause, the incidental finding of adnexal masses has been observed in a growing proportion of women, leading to discussions on the approach to be used in asymptomatic patients[2]. One of the main concerns of the gynaecologist is the identification of risk markers for the development of ovarian cancer, which may lead to early surgical treatment and prevent progression of the disease during the expectant conservativetreatment[2].Ultrasonography has many advantages over the other imaging modalities like conventional X-ray, computed tomography, MRI and invasive procedures. Ultrasonography is a real time, non-invasive, safe, easy, quick tool, inexpensive, sensitive, scanning of patient involve no discomfort, results of scanning are apparent immediately on viewing screen and is a dynamic modality. Ultrasonography permits to distinguish correctly between a benign and a malignant adnexal mass and, within these groups of diseases, to give an accurate diagnosis in most of the cases. Nevertheless ultrasonography isn't free from errors and limitations. Diagnostic errors are probable in the identification of masses which appear solid at US. In these cases is

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difficult to evaluate the uterine or ovarian or the extra-gynaecologic origin of the lesion. These cases require CT or MRI scan. In particular MRI has proven to be useful in detecting and staging of gynaecological malignancies and in detecting the origin of extra-gynaecological pelvic masses[3].Pelvic ultra-sonography to visualize the adnexa and the uterus is commonly performed in symptomatic and asymptomatic women of reproductive and menopausal age. Although pelvic ultrasound is highly sensitive in detecting adnexal masses, its specificity in detecting malignancy is lower. In addition, the differentiation between functional ovarian masses that will resolve over time and non-functional masses has tremendous implications for patients' counselling and management. Other types of adnexal cysts (such as endometrioma, mature cystic teratoma, and paraovarian cysts) are also important to diagnose correctly since they may affect patients' fertility, may be associated with significant pelvic disease, or put the patient at risk for ovarian torsion. Thus, the correct use of pelvic ultrasonography has become an integral part of the gynaecologic evaluation and exam[4,5].The best examination in a clinical context is undoubtedly suprapubic and endovaginal ultra- sonography. In young patients, especially in those who are in the reproductive age, ultrasonography shows the best accuracy in the differential diagnosis of ovarian and hydrosalpinx cysts, of the ectopic pregnancy, of uterine fibroids[6]. Serial sonography is done to detect changes in size and appearance of a particularly monitoring of a cyst that are functional in nature, for any progressive increase in size or changes in internal components. Serial sonography is also done for assessment of change in size following therapeutic response of pelvic malignancies and ovulationtiming.Aim and objectives of this study were to evaluate the sonographic morphology of pelvic masses and to correlate with the histopathological diagnosis of the patients who underwent surgical intervention.

Material and Methods

A cross-sectional prospective study was conducted in the Department of Radiology, Narayana Super speciality Hospital, Howrah, West Bengal, India from March 2017 to February 2019.

Methodology

200 patients with complaints suggestive of a pelvic mass include in this study. The final diagnosis was correlated with histopathological diagnosis. The cytohistopathology diagnosis was considered as the final diagnosis.

Inclusion criteria

Female patients of all age groups with clinical suspicion of pelvic mass or chronic pelvic pain and gave written consent

Exclusion criteria

Post-operative patients and non-gynaecological female pelvic masses.

The current methods of pelvic sonography in use are transabdominal real time scanning and transvaginal real time scanning, in transabdominal scanning most often uterus and ovaries are visualized by using 3 MH transducer at a depth 10-15 cm through urinary bladder whereas with transvaginal sonography the same structures are visualized at depth 1-8 cm and 5-7 MH transducers are used. In every case, Transabdominal sonography was done and in some cases finding are correlated with Transvaginal sonography. In almost every case proper sonographic evaluation of uterus, endometrium, both adnexa, ovaries, bladder and anterior pelvic structure, pelvic walls, cul de sac, rectum, small bowel and posterior pelvic structures was done. Sonographic findings of each lesion were designed to assess echogenicity, shape, borders, size, composition, calcifications, septation, locularity, laterality, presence of invasion of capsule and fixation of mass. The presence or absence of ascites or other metastatic lesions were also noted in every case. Echogenicity categories included markedly hypoechoic, isoechoic, hyperechoic and anechoic. Size was defined as the maximal dimensions of the lesion. Composition was defined as solid, cystic and mixed. Borders were defined as smooth and irregular. Calcifications were divided into those located centrally within the nodule, peripherally, and none. Posterior shadowing of at least one of the suspected calcifications was required to consider the finding present. The detailed clinical history was taken and general and local pelvic examination was performed for all patients with various palpable pelvic masses on bimanual pelvic examination. Pathological evaluation was performed on all the lesions.

Results

USG scan was performed in 200 female patients who presented with history, symptoms, and signs of the pelvic mass. Majority of the patients were in the age group of 40-50 years with mean age of 35.7 years. The minimum number was in the age group of below 20 and below 60 years (Table 1)

Table 1: Age wise incidence among study participants n=200

Age group (years)	Number of cases (%)
Below 20	3 (1.5)
20-30	17 (8.5)
30-40	48 (24)
40-50	110 (55)
50-60	17 (8.5)
Above 60	5(2.5)
Total	200

Table 2: Percentage of pre- and post-menopausal patient among study participants n=200

Patients	Number of cases (%)
Premenopausal	139 (69.5)
Post-menopausal	61 (30.5)

Table 3: Percentage of patients with different chief presenting complaints n=200

Symptoms	Number of cases (%)
Pain in pelvic cavity	68(34)
Pain and palpable mass	34 (17)
Pain and bleeding PV	19 (9.5)
Menorrhagia and menstrual irregularity	29(14.5)
Post-menopausal bleeding	17 (8.5)
Primary amenorrhea	136.5)
Infertility	20 (10)
Total	200

The most common chief complaint of female patients enrolled in our study was pain in pelvic cavity68 (34%) followed by pain and palpable mass 34(17%). Menstrual irregularity, menorrhagia, post-menopausal bleeding, infertility, and amenorrhea were the other less common complaints in the female patients of our study (Table 3).

Table 4: Different types of cases among study participants

Types of cases	Number of cases (%)
Ovarian/adnexal masses	54(27)
Uterine masses	87 (43.5)
Fallopian tube pathologies	45 (22.5)
Vaginal pathologies	14 (7)
Total 200	200(100)

Out of 200 patients evaluated by ultrasonography 54 (27%) were having ovarian pathologies and 87 (43.5%) were having uterine pathologies. Eleven patients presented with localized collection in to the fallopian tube pathologies. Few cases there were involvement 14(7%) of vagina [Table 4]. In our study, the most common female gynaecological masses were that of uterine, followed by ovary/adnexa, fallopian tubes andvagina.Fibroids were the most common uterine masses in our study accounting for nearly 48%, i.e., 96 cases of total 200 cases of uterine masses and uterine fibroids also constituted 78 (39%) of total 200 cases in our cross-sectional study of female gynaecological masses evaluation. Thus, uterine fibroid is one of the most important and common cause of female gynaecological pelvic masses (Table 5).Majority of ovarian lesions were benign cystic lesion 80 (40%) in which Tubo-ovarian masses 27(13.5%) and follicular cyst were most common 21 (10.5%), followed by luteal cyst, serous cystadenoma, mucinous cystadenoma. Malignant ovarian masses found in 12% (24/200of patients), in which serous cystadenocarcinoma most common found in 58.33% (14/24 of malignant ovarian masses) followed by mucinouscystadenocarcinoma and endometrial sinus tumor (20.84% each) (Table 5).In the identification of the uterine pathology, 98.71% (77/78) of fibroid, 57.14% (4/7) of fibroids were diagnosed as adenomyosis correctly by ultrasonography after post surgical histopathological examination. Accuracy of ultrasonography in the diagnosis of uterine and cervical

malignancies was 100% in the presenting study [Table5].In various ovarian pathologies, benign cystic ovarian lesions were detected with 100% accuracy with USG. Ovarian malignancies were diagnosed in 25 patients USG, out of which 24 diagnoses were proved correct [96%], but 1 was corrected as ovarian torsion after postsurgical histopathological examination. 29 patients were diagnosed as tubo-ovarian masses out of which 27 were proved correctly by histopathology (93.10%). 2cases was diagnosed false positive and proved as hydrosalpinx after postsurgical histo-pathology. So accuracy of diagnoses of malignant ovarian masses and tubo-ovarian masses were found 96% and 93.10% respectively, in present study [Table 5].

Table 5: Percentage wise distribution of pelvic masses and their histopathological diagnosis N=200

Types of Lesion	USG Diagnosis	Histopathological Diagnosis
UTERINE		
Fibroid	78	77
Fibroid with pregnancy	3	3
Adenomyosis	04	7
Adenocarcinoma of uterus	05	5
Carcinoma of cervix	04	4
OVARIAN		
1. Benign		
Follicular cyst	21	21
Luteal cyst	8	8
Serous cystadenoma	8	8
Mucinous cystadenoma	8	8
Benign cyst teratoma	6	8
Hydrosalpinx	00	5
Ovarian cyst torsion	00	5
Tubo-ovarian masses	29	27
2. Malignant Lesion		
Serous cystadenocarcinoma	14	14
Mucinous cystadenocarcinoma	5	5
Endometrial sinus tumor	5	5
TOTAL	200	200

On histopathological examination, the most common finding was leiomyoma 77 (38.5%) followed by tubo-ovarian masses 27 (13.5%). Study also had 5 cases of adenocarcinoma of uterus and 4 case of carcinoma of cervix. Serous cystadenocarcinoma was themost common ovarian malignancy 14 (7%). There was 5 case of endometrial sinus tumor (Table 5).4 cases diagnosed as fibroid on USG were found to be adenomyosis on HPE. 25 cases of ovarian malignancy were reported on USG; however24cases were confirmed to be malignant on HPE (Table5)

Discussion

The present study was undertaken to evaluate the role of ultrasound in determining site, size, nature and consistency of pelvic masses and to evaluate the results of conservative management by serial sonographic examination. 200 cases were studied sonographically and histopathological confirmation of the diagnosis was obtained. The evaluation of pelvic masses assumes importance due to the fear and anxiety driven by the potential of missing a malignancy. This study focussed on the clinicopathological spectrum of gynaecological pelvic masses - both uterine and adnexal. A major problem in diagnostic clarification of incidental findings on ultrasound is the characterization of the malignant potential of the lesions. Ovarian cancer, being a heterogeneous disease, is composed of different types of tumors derived from different cell lines with different behaviors and clinical-pathological characteristics[7].Several scoring systems based on ultrasound morphology of adnexal cysts have been proposed to differentiate benign lesions from malignant

adnexal masses[8-12].These scoring systems are based on specific parameters such as surface, thickness of the wall, and cyst echogenicity; cyst volume; presence, thickness and number of septa; presence, size and number of vegetation, and presence and size of solid areas within the cyst. A false diagnosis of fibroid in two cases was corrected as adenomyosis after postsurgical biopsy. Walsh et al described characteristics features of adenomyosis but these cases of our study only showing enlargement of uterus with normal endometrial and myometrial echotexture and without any definite mass[13]. The common sonographic findings of adenomyosis in our study were globular uterine enlargement, cystic anechoic spaces in the myometrium, uterine wall thickening, heterogeneous echotexture and thickening of the transition zone[14].Adenomyoma usually has indistinct margin form adjacent myometrium unlike leiomyoma or fibroid which show distinct well-defined margin[15]. According to Bezjian et al. Leiomyma are one of the most common pelvic masses countered during pregnancy[16].In our study of female gynaecological masses, we included 3 cases of carcinoma. Only 4 case of carcinoma cervix in our study underwent cervical biopsy and histopathological evaluation. The case in our study was squamous cell carcinoma on histopathological examination. We included 5 cases of histopathologically proven carcinoma endometrium diagnosed on USG as dysplastic endometrial thickening and mass [17]. In 5 cases of endometrial carcinoma, TVS did revealed abnormal prominent endometrial echo, growth in the endometrial cavity which had to be confirmed by HPE. TVS with its better resolution can differentiate between a benign ovarian or adnexal mass and a complex mass. Lesions with echogenic solid areas, irregular walls, thick septations, mural nodule, papillary excrescences, bilaterality and ascites along with evidence of neoangiogenesis on colour Doppler are features suggestive of a possible malignancy[18]. Adenocarcinoma of uterus was diagnosed in 5 cases in our study, in which uterus was normal in size, it showed bulbar type of configuration of uterus with hypoechoic pattern and endometrial echo was prominent. Postsurgical histopathology confirmed the diagnosis as adenocarcinoma stage II. In the identification of the uterine pathology, 98.71% (77/78) of fibroid, 57.14% (4/7) of fibroids were diagnosed as adenomyosis correctly by ultrasonography after post surgical histopathological examination. Accuracy of ultrasonography in the diagnosis of uterine and cervical malignancies was 100% in the presenting study.All ovarian cystadenoma were anechoic with well defined walls. Fleischer et al found septation in all of their 18 cases of serous cystadenomas. Mucinous cystadenoma may in addition contain low level echoes due to their mucin content. This finding was observed in our case. Similarly Walsh, Taylor et al[19].also found week internal echoes occasionally in cases of mucinous cystadenomas. Hence it suggests that a cystic ovarian mass with septation and internal echoes is more likely to be a mucinous cystadenoma.25 cases of ovarian malignancy were reported on USG; however 24cases were confirmed to be malignant on HPE. In presenting study, all malignant ovarian tumors were showing cystic mass with ill defined walls and solid component. All cases present with ascites. Outwater EK et al.[20] suggested that irregular and solid component in a cystic mass suggested gross malignant changes. None of the malignant ovarian tumor was purely cystic. In our study 5 out of 25 malignant ovarian tumors (20%) was shows liver metastasis with ascites and peritoneal seeding.

In the tubo-ovarian masses two types of patterns were seen, the first consisting of large fusiform shaped cystic masses representing fallopian tubes and second type was that of a rounded or ovoid mass with ill defined walls. Well defined cystic tubo-ovarian masses were indistinguishable from other types of ovarian cysts, however clinical history and tenderness on physical examination helped in differential diagnosis. Ultrasound was especially helpful in cases treated conservatively since it gauged the results of treatment by serial sonographic examination. 5 case of ovarian cyst postoperatively diagnosed as torsion of cyst. Ultrasonographically cyst was anechoic and very large in size.

In various ovarian pathologies, benign cystic ovarian lesions were detected with 100% accuracy with USG. Ovarian malignancies were diagnosed in 25 patients USG, out of which 24 diagnoses were proved correct (96%), but 1 was corrected as ovarian torsion after postsurgical histopathological examination. 29 patients were diagnosed as tubo-ovarian masses out of which 27were proved correctly by histopathology (93.10%). 2 case was diagnosed false positive and proved as hydrosalpinx after postsurgical histopathology. So accuracy of diagnoses of malignant ovarian masses and tubo-ovarian masses were found 96% and 93.10% respectively, in presenting study. The low specificity of ultrasound is due to the overlap in the sonographic characteristics of benign pelvic masses like endometriomas, pedunculated leiomyomas, borderline tumours and ovarian malignancies. Serial monitoring was helpful in these cases, which shows resolution of the lesion on subsequent sonographic examination.

Luteal cyst appeared as an anechoic mass with well defined walls. In our study we were found 21 follicular and 8 luteal cyst, which was consistent with the findings of Fleischer et al[21] Ovarian cysts are relatively common finding on ultrasound, especially in postmenopausal women, with an estimated incidence of up to 21% in this population[2].Our findings were consistent with study of Lawson et al[22], Fleischer et al[21] and Walsh et al[19], reported accuracy of 91%, 91% and 94% respectively. In the present study, fibroids were the most common uterine masses in our study accounting for nearly 48%, i.e., 96 cases of total 200 cases of uterine masses and uterine fibroids also constituted 78 (38%) of total 200 cases in our cross-sectional study of female gynaecological masses evaluation. Thus, uterine fibroid is one of the most important and common cause of female gynaecological pelvic masses.USG, both transabdominal and transvaginal have a well-established role in the initial evaluation of a pelvic mass. USG has many advantages being easily available, relatively inexpensive and nonionising. Leiomyomas are easily diagnosed on USG. In study by ShobhaS. Pillai[23], 42 cases of leiomyomas were diagnosed preoperatively by physical examination and USG and 44 cases were confirmed by histopathological examination (HPE), showing a sensitivity of 95.5% and specificity of 61.4%[23]. 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%[24].Accuracy of ultrasonography in the diagnosis of uterine and cervical malignancies was 100% in the presenting study.Due to the low likelihood of ovarian cancer in incidental findings of adnexal pelvic masses, and because of the high rates of spontaneous resolution, ultrasound monitoring can be performed with good early diagnosis rates for borderline and type I tumors. The frequency of these revaluations should be established individually and according to the routine of each service. However, early screening of type II tumors remains a challenge. Pelvic masses that are overlooked on physical examination will be identified by Ultrasonographic examination. Conversely the identification of small myomas, ovarian enlargement and physiological cysts may lead to increased patient concern and even operations that might be unnecessary. However the drawbacks of sonography include technical limitation caused by patient habitus, operator dependence and techniques inability to provide specific characterization.The combined analysis of morpho-logical parameters on ultrasound and Doppler study, CA-125 levels, and the assessment of a symptom index composed of abdominal bloating and/or increased abdominal size, pelvic and/or abdominal pain, and inability to eat normally and/or rapid feeling of fullness may increase diagnostic rates. Even with all the current technology and knowledge on the subject, it is not clinically possible to fully differentiate benign and malignant lesions pre-operatively. Thus, pathological analysis remains the gold standard for definitive diagnosis[25,26].

Conclusion

The US is highly accessible, relatively inexpensive, does not use ionizing radiation, and is generally well tolerated by patients. Use of endovaginal US improves the diagnostic accuracy in the assessment of gynaecological masses by better resolution of the image. By studying the various features of histopathology specimen of particular gynaecological mass and correlating with imaging features of sonography we can classify, diagnose and evaluate various female gynaecological diseases presenting as mass lesion and increased the diagnostic accuracy of sonographic examination. Serial sonographic monitoring of the function lesions were helpful in the management and helps to avoid unnecessary surgical procedures. Hence sonography is real time, non invasive, safe, easy, quick, devoid of any radiation hazard and high accuracy; it must be use first line modality for the evaluation of gynaecological pathologies. In case of incidental finding of adnexal mass pelvic, transvaginal ultrasonography remains the modality of choice for evaluating suspicious characteristics. In the presence of any abnormality detected during a screening test or when there are doubts about the interpretation of the images obtained, a second opinion from a sonographer with extensive experience in oncology imaging is recommended.

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