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Original Article

Transabdominal Ultrasonographic Evaluation of Adnexal Mass with Histopathological Comparison

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Abstract

Background: Background: Transabdominal ultrasonography (TAUS) is a key diagnostic tool in gynecology, providing crucial insights into adnexal masses. These masses, including ovarian tumors and cysts, present a wide range of pathologies from benign to malignant. Accurate characterization is vital for determining appropriate management strategies, with TAUS offering advantages such as non-invasiveness, cost-effectiveness, and real-time imaging.

Objective: To evaluate the diagnostic performance of Transabdominal ultrasonography in the diagnosis of adnexal mass.

Materials and methods: This cross-sectional analytical study was conducted in the Department of Radiology and Imaging of Sir Salimullah Medical College and Mitford Hospital, Dhaka, Bangladesh in collaboration with the respective department of Gynecology and Obstetrics and Pathology. Total 65 patients were enrolled during the period from January, 2018 to December, 2019 to assess the diagnostic value of transabdominal USG scan in comparison with the histopathological comparison. All the relevant collected data were analyses performed by using the Statistical package for Social Science (SPSS) version 23.0

Results: Mean age of the study subjects was 36.96 years. Majority Study Subjects belonged to age group 25-34 years (32.30%). Around 69.23% study subjects had abdominal pain and tenderness as clinical feature and 12.30% had abdominal lump. 10.76% study subjects were irregular menstruation and 9.23% had weight loss. Majority of masses had homogenous echogenicity (63.08%) and mixed echogenicity (36.92%). Majority of masses had thin septations (73.84%), others had thick septations (26.15%). Majority masses had posterior acoustic enhancement (90.65%) and 9.35% masses didn't have posterior acoustic enhancement. Majority study subjects were diagnosed as benign ovarian tumour (65%) and (35%) were diagnosed as malignant ovarian tumour according to USG. Majority of study subjects were diagnosed as benign ovarian tumour (69.2%) and 30.8% were diagnosed as malignant ovarian tumour according to Histopathology. USG had 90% sensitivity to correctly diagnose malignant lesions as malignant ones but much lesser specificity (88.89%) to differentiate benign as benign. Overall, the accuracy is 89.23%.

Conclusion: The study findings suggest that when compared to the gold standard, transabdominal ultrasonography. Consequently, transabdominal ultrasonography proves to be a valuable imaging method for diagnosing adnexal masses. In resource-rich settings, it could serve as a supplementary diagnostic tool. Further research with larger sample sizes across multiple centers is warranted to enhance result precision.

Keywords: Transabdominal ultrasonographic, adnexal mass, histopathological

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Introduction

Adnexal mass is a common clinical presentation in gynecologic practice and can be of gynecologic or non-gynaecologic origin. The common diseases includes benign lesions like tubo-ovarian abscesses of different origin especially PID, endometriosis, ectopic pregnancy, uterine tumors when pedunculated, polycystic ovaries, benign ovarian neoplasm and malignant lesions.[1] The term adnexal mass is most often used for masses involving the ovary because of the high propensity of the ovary for neoplasia.[2,3] Fewer neoplasms occur in the fallopian tube, which are generally involved in the inflammatory process.[4] The disease burden of ovarian tumour is higher in comparison with other gynaecological masses and the consequences are more fatal.[5]

Ovarian tumors represent the most common lethal gynecologic neoplasms for women of reproductive age and older.[6] Nearly two thirds of all ovarian carcinomas have progressed to disease stage III or IV at the time of first diagnosis because they may remain clinically asymptomatic for extended periods.[7] Factors to consider when evaluating patients with adnexal masses are symptoms of pelvic pain (which may point to adnexal torsion but also to endometriosis, pelvic inflammatory disease or an acutely hemorrhagic corpus luteum cyst.[8] Abdominal distension accompanied by gastro intestinal complaints and weight loss (which may arise from an advanced ovarian malignancy). The reason to find early detection of adnexal mass is, ovarian cancer carries the worst prognosis among all gynecological cancers mainly due to the lack of effective screening methods for early detection of the disease. Accurate pre-operative prediction of the benign or malignant nature of an adnexal mass is essential for proper management.[9] Ultrasonography is the primary modality used for detection and characterization of the mass. Many screening tests are being actively investigated at present, but there is no sufficient evidence to support the routine use of pelvic ultrasound to screen for ovarian cancer in the general population.10 Histopathology is still taken as gold standard for the evaluation of benign and malignant adnexal masses.[1]

Ultrasonogram is the first line method for evaluation of malignancy in an adnexal mass. The cost is reduced compared with other investigations. The main advantages are reproducibility, standardization and reduced costs compared with other investigations.[11] Study in tertiary care hospital in northern India found that, by USG, 27.7% cases were diagnosed as malignant while remaining 72.3% were diagnosed as benign. On evaluating the diagnostic efficacy of USG with respect to malignancy with histopathology as the gold standard, USG was found to have the sensitivity of 75% and specificity of 96.5%. The positive predictive value (PPV) and negative predictive value (NPV) of USG for malignancy were 91.7% and 88.3% respectively. The accuracy of USG to differentiate between benign and malignant masses was 89.2%.[12] Another study suggested the overall sensitivity, specificity, positive and negative predictive values of ultrasound score at cut-off value of 3 were 78%, 80%, 47% and 94 % respectively.[13]

In the United States each year 13–21% of exploratory surgery for a pelvic mass is diagnosed as cancer. In pre-menopausal women, approximately 10% of masses are malignant, whereas in postmenopausal women 20% are malignant.[14] In addition, Ovarian cancer is the second most common cancer of the female reproductive system and the leading cause of death from gynecologic malignancies throughout the globe including Bangladesh.[13,15] The annual mortality rate per 100,000 people from ovarian cancer in Bangladesh has increased by 40.3% since 1990, an average of 1.8% a year. Globcan predicts a change in the reported incidence of ovarian cancer from 2912 in year 2012 to 3132 in 2015. Recurrent high-grade ovarian cancer is usually associated with short term survival.[16]

METHODOLOGY

In was cross-sectional analytical study carried out Department of Radiology and Imaging, Sir Salimullah Medical College & Mitford Hospital from January 2018 to December, 2019. Patients attending at the emergency or Gynecology and Obstetrics OPD with clinically suspected adnexal mass, were referred to the respective Radiology and Imaging department and subsequently underwent USG, followed by surgery and histopathological evaluation. Total 65 patients were considered for final analysis. Before starting the data collection and other procedures of the study, ethical clearance was taken from the Ethical Review Committee (ERC) of SSMC. All women having adnexal mass attending in the outdoor and indoor department of Gynecology and Obstetrics, SSMC & MH were referred to the department of Radiology and Imaging for USG evaluation of the mass were approached to take participate in the study. All of the women were described about the study purpose and benefits of the study. It was clearly informed that they did not get any financial benefits from the study and refrain from participation of the study was not an issue of their further management. The interview started following given informed written consent.

The researcher conducted the interview. The topics of interview were made from the insight of previous studies relevant topics. Data was collected and recorded into separate data collection sheets. The researcher performed all USG and were confirmed by another experienced consultant radiologist. These patients were followed up to surgical intervention. Histopathological samples were sent for diagnosis and type of the lesion. Final diagnosis was collected from the histopathological report. After completion of data collection and entry then compare. After informing all the necessary information regarding the research study data were collected in pre-designed structured data collection sheets. Data were collected from primary source starting from clinical findings; sonographic findings for diagnosis of benign and malignant adnexal masses, finally histological report for confirm diagnosis. Patient was assessed by 3.5 MHz transducer is used in this study. The procedure start with the patient lying in supine position. Apply coupling agent to the abdomen. The scan was performed with the patient holding the breath in for well visualization of adnexa and surrounding structure. Scanning start with longitudinal scan then transverse scans & then turn the patient on to the left side & make oblique scan at different angles. Patient of adnexal mass detected by ultrasonogram were subsequently underwent surgical operation followed by histopathological evaluation. Tissue was sent for histopathology. Histopathology reports of the patients were collected. Sonographic findings were compared with histopathology report.

All the relevant collected data were compiled on master chart first and statistical analyses were performed by using the Statistical package for Social Science (SPSS) version 23.0 for windows 10. Continuous variables were expressed as mean ± standard deviation and categorical variables as frequencies and percentages. The results were presented in tables and diagrams. The diagnostic value of USG in the diagnosis of adnexal mass were determined by calculating sensitivity, specificity accuracy, positive and negative predictive values. In all cases, p value less than 0.5 were considered statistically significant.

RESULTS

Among 65 patients showing features of Adnexal mass were included in the study. Mean age of the study subjects was 36.96±6.7 years. Age ranged from 18 years to 55 years. Majority of the study subjects (32.30%) were from age group 25-34 years (Table I). Around 69.23% study subjectshad abdominal pain and tenderness as clinical feature and 12.30% had abdominal lump. 10.76% study subjectswere irregular menstruation and 9.23% had weight loss. Other study subjects 15.38% had vague and ill-defined symptoms like nausea and vomiting pelvic or abdominal discomfort, bloating, and difficulty eating or feeling full and urinary symptoms (urgency and frequency) (Table II). Out of 65 study subjects with adnexal mass examined by USG reveals majority size 5-10 cm (58.46%) followed by <5 cm (23.07%) and >10 cm (18.46%) (Table III). Regarding echotextural appearance, most of the adnexal masses were hypoechoic (40.00%), and rest of the masses were anechoic (18.46%) mixed echogenic (35.38%) and hyperechoic (6.15%) (Table IV). Among all study subjects 65.00% showed benign features on sonography and (35.00%) showed malignant feature (Table V). Out of 65 patients USG shows majority (64.61%) are benign and (35.38%) are malignant. among benign lesion (16.92%) simple cyst, (13.84%) chocolate cyst, (7.69%) dermoid cyst, (15.38%) hemorrhagic cyst, (10.76%) ectopic pregnancy (Table VI). Histopathological diagnosis of the study subject, it was observed that majority (69.235) are benign and (30.76%) are malignant (Table VII). Out of 20 total truly malignant cases USG examination could identify 18 as malignant and the rest as benign while among the 45 benign lesions USG could identify 40 correctly as benign and the rest 5 falsely as malignant lesions (Table VIII). USG had 90% sensitivity to correctly diagnose malignant lesions as malignant ones but much lesser specificity (88.89%) to differentiate benign as benign. Overall, the accuracy is 89.23% (Table IX).

Table I: Distribution of study subjects according to their age(n=65)

Age group	Frequency(n)	Percentage(%)
18-24	10	16.92
25-34	21	32.30
35-44	13	20.0
45-55	14	21.53
>55	7	9.25

Table II: Distribution of study subjects by clinical features (n=65)

C/F	Frequency (n)*	Percentage (%)*
Lower Abdominal pain	45	69.23
Lower Abdominal Lump/distension	8	12.30
Irregular menstruation	7	10.76
Nausea and vomiting	10	15.38
Weight loss	6	9.23
Urinary symptoms	7	10.76

** multiple response*

Table III: Distribution of adnexal mass according to size in ultrasonography

Size of adnexal mass	Number (n)	Percentage (%)
< 5 cm	15	23.07
5 -10 cm	38	58.46
>10 cm	12	18.46

Table IV: Pattern of sonographic echogenicity (n=65)

Echogenicity	Frequency(n)	Percentage(%)
Hypoechoic	26	40.0
Anechoic	12	18.46
Hyperechoic	4	6.15
Mixed	23	35.38

Table V: Sonographic diagnosis of adnexal masses with its frequency (n=65)

Sonographic diagnosis	Frequency	Percentage (%)
Benign	42	65.0
Malignant	23	35.0

Table VI: Distribution of the study subjects by USG diagnosis.

USG Diagnosis	Number (n)	Percentage (%)
Benign		
Simple cyst	11	16.92
Chocolate cyst	9	13.84
Dermoid	5	7.69
Hemorrhagic cyst	10	15.38
Ectopic pregnancy	7	10.76
Malignant		
Complex adnexal mass	23	35.38

Table VII: Histopathological diagnosis of adnexal masses with its frequency (n=65)

Histopathological diagnosis	Number (n)	Percentage (%)
Benign	45	69.23
Simple cyst	5	7.69
Corpus luteal cyst	3	4.61
Par ovarian cyst	6	9.23
Chocolate cyst	7	10.76
Dermoid cyst	5	7.69
Hemorrhagic cyst	5	7.69
Ectopic pregnancy	7	10.76
Serous cystadenoma	6	9.23
Mucinous cystadenoma	1	1.53
Malignant mass	20	30.77
Serous cystadenocarcinoma	13	20.0
Mucinous cystadenocarcinoma	4	6.15
Dysgerminoma	1	1.53
Immature Teratoma	2	3.07

Table VIII: Comparison of ultrasonographic and histopathological diagnosis of adnexal masses (n=65)

Test result	Histopathologic diagnosis (Standard diagnosis)		Total
USG diagnosis	Malignant	Non-malignant	
Malignant	True positive (TP)* 18	False positive (FP)* 5	Patients with malignant diagnosis on USG (TP+FP) 23
Non-malignant	False Negative (FN)* 2	True Negative (TN)* 40	Patient with non-malignant diagnosis on USG (TN+FN) 42
Total	All patients with true malignant mass (TP+FN)	All patients with true benign mass (FP+TN)	
	20	45	

**malignant lesions considered positive and benign lesions negative*

Table IX: Performance of USG in differentiating malignant and non-malignant adnexal masses on validity tests.

	Percentage (%)
Sensitivity	90%
Specificity	88.89%
Accuracy	89.23%
PPV	78.26%
NPV	95.23%

DISCUSSION

A comparative cross sectional analytical study was conducted among 65 patients with clinically suspected adnexal mass who subsequently went for surgery were taken for this study who were selected conveniently. The participants were from Department of Radiology and Imaging, Sir Salimullah Medical College & Mitford Hospital. The study was carried out to evaluate the diagnostic performance of transabdominal ultrasonography in the diagnosis of adnexal mass. Proper pretests were done prior to data collection. Ethical clearance was obtained from Internal review board.

Majority study subjects belonged to age group 25-34 years (32.30%), 21.53% study subjects belonged to

45-54 years, 20% study subjects belonged to 35-44 years, 16.92% study subjects belonged to 18-24 years and 9.25% study subjects were more than 55 years old. Mean age of the study subjects was 36.96 years. Regarding reproductive cycle it had been found that majority study subjects belonged to reproductive age (69.23%) followed by in decreasing order premenopausal age 21.53% and post-menopausal age 9.23%. The age group distribution of patients in a similar study done by Priya et al.[17] ranged from 11 to 73 years with a mean age of 42 years. 62.83% of women were in reproductive age group and 10.62% in postmenopausal age group. About 4 cases were reported in pubertal age group and no cases in pre- pubertal period.

Around 69.23% study subjects had abdominal pain and tenderness as clinical features and 12.30% had abdominal lump. 10.76% study subjects were irregular menstruation and 9.23% had weight loss. Other study subjects 15.38% had vague and ill-defined symptoms like Nausea and vomiting pelvic or abdominal discomfort, bloating, and difficulty eating or feeling full and urinary symptoms (urgency and frequency). Similar findings were found in the study done by Givens et al.18 regarding pain and other symptoms. In another study, Ramadini and Akhila[4] found that the most common complaint was pain abdomen in 83% of cases followed by mass abdomen in 14% of cases. The most common symptoms reported by women with ovarian cancer are pelvic or abdominal pain; increased abdominal size; bloating; urinary urgency, frequency, or incontinence; difficulty eating; and weight loss. Abdominal fullness and pressure; back pain; lack of energy may also be prominent symptoms.[19,20]

Size of the majority masses 5-10 cm (58.45%) than <5 cm (23.07%) and >10 cm (18.46%) similar findings observed in M. Terzic et al).[9]

Majority masses had clear, well-defined border (72.31%). Others had ill-defined border (27.69%). Regarding echotextural appearance, most of the adnexal masses were hypoechoic (40%) and rest of the masses were anechoic (18.46%), mixed echogenic (35.38%) and hyperechoic (6.15%). Majority masses had homogenous echogenicity (63.08%) and mixed echogenicity (36.92%). Majority masses had thin septations (73.84%), others had thick septations (26.15%) Satoskar et al.[21] found contrarily thick septations as a prominent finding in their study. Majority masses had posterior acoustic enhancement (90.65%) and 9.35% masses didn't have posterior acoustic enhancement.

Out of 20 total truly malignant cases USG examination could identify 18 as malignant and the rest as benign while among the 45 benign lesions USG could identify 40 correctly as non-malignant and the rest 5 falsely as malignant lesions.

Among all patients 65.00% showed benign features on sonography and (35.00%) showed malignant features. Among the benign lesion (16.92%) simple cyst, (15.38%) hemorrhagic cyst, (13.84%) chocolate cyst, (10.76%) ectopic pregnancy, (7.69%) dermoid cyst, and rest of the (35.38%) showed complex adnexal mass suggestive of malignant lesion. Similar finding also observed A Testa et al.[3]

On histopathology majority of masses were diagnosed as benign (69.2%) and 30.8% were malignant. These findings are comparable with Sharadha et al.[22] and Jha and Karkiwhere[23] they found majority of the cases were benign. Among the benign lesion histopathology showed simple cyst (7.69%), corpus luteal cyst (4.16%), par ovarian cyst (9.23%), chocolate cyst (10.76%), dermoid cyst (7.69%), hemorrhagic cyst (7.69%), ectopic pregnancy (10.76%), serous cystadenoma (9.23%), mucinous cystadenoma (1.53%) and among the malignant lesion serous cystadenocarcinoma (20%), mucinous cystadenocarcinoma (6.15%), dysgerminoma (1.53%), immature teratoma (3.07%),Similar study done by Nahar and Shamsuddin[13] revealed among their study subjects 18% were malignant adnexal mass and82% benign adnexal mass. Among the benign masses 22% functional cyst, 50% serous cystadenoma, 8% mucinous cystadenoma, 6.5% par ovarian cyst and among malignant adnexal masses 7.5%, serous cyst adenocarcinoma, 2.5% mucinous cystadenocarcinoma, 2.5% dysgerminoma, 2.5% granulosa cell tumor.

In this study, USG had 90% sensitivity to correctly diagnose malignant lesions as malignant ones but much lesser specificity (88.89%) to differentiate benign as benign. Overall, the accuracy is 89.23% which is similar to studies by Wasim et al.[24] Topuz et al.[25] and Pourissa et al.[26] In another study, out of 113 women studied ovarian mass diagnosed clinically as benign in 78%and malignant in 21%. USG prediction of ovarian cancer was 88.00% sensitivity, 80.68% specificity Priya F. et al.[17]

Another study by Radhamani and Akhila4 found incidence of ovarian masses around 93% with the majority (84%) being neoplastic. When both clinical and sonological diagnosis were combined, the overall sensitivity, specificity, positive and negative predictive value for diagnosis and discriminating benign and malignant ovarian neoplasms were 87.5%, 96.7%, 70%, and 98.88%, respectively. Their combined accuracy was 96%.[4]

CONCLUSION

It can be concluded from the study that the overall sensitivity, specificity, PPV and NPV are around 90% when it was compared with gold standard. Thus transabdominal ultrasonography is a useful imaging modality for diagnosis of adnexal masses. In resource rich center it could be used as an adjunct tool. Further research work could be done using larger study sample involving multiple centers to get more precise results.

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