



The efficacy of transvaginal ultrasonography and colour doppler in evaluation of adnexal masses

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Abstract

Objective: The objective of this study is to evaluate the transvaginal ultrasound and colour doppler sonography for differentiation between benign and malignant adnexal masses.

Methods: In this study total 100 patients were selected from gynaecology OPD. At the end of this study there were 84 patients left and with some having bilateral adnexal masses, so total of 112 adnexal masses were evaluated. The transvaginal ultrasound (TVS) was used to study morphology of the adnexal masses and scoring was assigned using De Priest scoring system. The colour doppler study (CD-study) evaluates the presence or absence of blood flow within the adnexal mass, whether the flow is central or peripheral and the resistance index of the flow. The combined TVS morphological scoring and colour doppler study (TVS+CD) were used for evaluating the adnexal masses. The confirmatory diagnosis was made either by histopathological examination or fine needle cytological examination. The accuracy of TVS-morphological study and colour doppler sonography for differentiation of adnexal masses were assessed by calculating sensitivity, specificity, positive predictive value and negative predictive value.

Conclusion: TVS-morphological scoring is one of the best tools for adnexal mass evaluation but when it is combined with colour doppler sonography its diagnostic accuracy increases.

Keywords: transvaginal ultrasound, colour doppler sonography, adnexal masses.

Introduction

The adnexal mass is one of the commonest clinical presentations in gynaecological practice. The differential diagnosis of adnexal mass varies from simple cyst to malignant mass of various abdominal and pelvic organs¹. The differentiation between benign and malignant adnexal mass is a great diagnostic challenge for gynaecologists; as

adnexal structures are relatively inaccessible and there is non-specific symptomology². The surgery is often required solely to exclude the possibility of malignancy. The ovarian malignancy is the second most common malignancy and the leading cause of death. The one third of the patient subjected to surgery turned out to have benign mass. An accurate diagnosis is essential to

establish optimal treatment of these patients. There is need for non-invasive tool to differentiate between benign and malignant adnexal masses. The different non- invasive tools are tumor markers, transvaginal ultrasonography, colour doppler sonography, other radiological modalities and multimodal diagnostic tools³.

Materials and Methods

This is a prospective cohort study. Total 100 patients with adnexal masses were selected from gynaecological OPD register from April 2019 to April 2020 in the department of obstetrics and gynaecology of Patna medical college and hospital, Patna.

The exclusion criteria are-

- Pregnant women
- Patients having H/O ovarian malignancy
- Patients having H/O uterine malignancy

De Priest scoring system

Scores	0	1	3	4
Volume (cm ³)	<10	10-50	>50-200	>500
Cyst wall structure	Smooth, <3mm thickness	Smooth,>3mm thickness	Papillary projections>=3mm	Predominantly solid
Septal structure	No septa	Thin septa <3mm	Thick septa3mm-1cm	Predominantly solid

According to this scoring system score was given to each mass and mass was classified into benign mass if score is <5 and malignant if score was >=5.

According to morphological features of adnexal mass the masses were classified into groups as follows-

1. Unilocular
2. Unilocular solid
3. Multilocular
4. Multilocular solid
5. Solid

Colour doppler ultrasonography-after having an idea about morphological feature of adnexal mass blood flow evaluation of mass was done and parameters that are taken into consideration are-

1. Blood flow-present or absent
2. Localization of blood flow-peripheral or central

- Patients having H/O endocrinological abnormality

Each patient was subjected to proper history taking with emphasis on age, signs and symptoms, menstrual status, parity and past or family history of malignancy. The general examination was done for each patient. Bimanual pelvic examination was done for each patient.

Transvaginal ultrasonography (TVS) was done for each patient by Siemens -Sonoline USG machine with transvaginal probe (7.5 MHZ). The parameters that were taken into consideration are-

1. Volume of the mass-width x height x thickness
2. Cyst wall structure
3. Septa structure

According to above three parameters morphological scoring was done using De Priest scoring system⁴.

3. About blood flow-scanty, moderate or abundant
4. Resistance index- defined as difference between the peak systolic and end diastolic flow velocities, divided by the peak systolic velocity measured.

The adnexal mass was differentiated into benign mass if the doppler study were as follows-

1. No flow detected in colour doppler ultrasonography
2. If flow was present the resistance index is <=0.40

The adnexal mass was differentiated into malignant mass if doppler study was as follows-

1. Presence of either central or peripheral flow with resistance index > 0.40

Histological diagnosis- The confirmatory diagnosis was made by histopathological

examination of the adnexal masses after laparotomy. The accuracy of transvaginal ultrasound and colour doppler ultrasonography were evaluated by calculating sensitivity, specificity, positive predictive value and negative predictive value for each method.

Results

In this study total 100 patients were selected. A total of 16 patients were excluded from the study

because in 8 patients adnexal masses vanished in 3 months of follow up, 5 patients did not turn up for follow up 3 patients died during the course of study. In 84 patients, 71 patients underwent laparotomy and histopathological examination of the laparotomy specimen and in 13 patients fine needle aspiration cytology of mass was done. There were bilateral adnexal masses in 28 patients, so total numbers of adnexal masses evaluated were 112.

Table 1 Age wise distribution of benign and malignant adnexal masses

Age	Total no. of Benign masses	Total no. of malignant masses
<20 years	40%	60%
20-44years	85.2%	14.7%
>45 years	58.5%	41.46%

The adnexal masses were more common in 20-44 years of age group. The mean age for benign

masses is 35 years (SD-2.3 years). The mean age for malignant masses is 48 years (2.6 years).

Table 2 Distribution of adnexal masses according to menopausal status

	Premenopausal patients	Postmenopausal patients
Benign mass	91.5%	8.5%
Malignant mass	56%	44%

In this study benign masses and malignant masses both are common in premenopausal patients.

Table 3 Statistical analysis of TVS-morphological scoring in evaluating adnexal masses

TVS-morphological score	Histological Malignant masses	Confirmation Benign masses	Total
Malignant masses	24(true positive)	12(false positive)	34
Benign masses	10(false negative)	68(true negative)	78
Total	32	80	112

The sensitivity of TVS-morphological scoring is 68.75%, specificity is 85%, positive predictive

value is 64.7%, negative predictive value is 87.17%.

Table 4 Statistical analysis of colour doppler sonography in evaluating adnexal masses

Diagnosis on basis of Colour doppler sonography	Histological Malignant masses	Confirmation Benign masses	Total
Malignant mass	25(true positive)	15(false positive)	40
Benign mass	7(false negative)	65(true negative)	72
Total	32	80	112

The sensitivity of colour doppler sonography is 78.12%, the specificity is 81.25%, positive

predictive value is 62.50%, the negative predictive value is 90.27%.

Table 5 Statistical analysis of combined TVS-scoring and colour doppler sonography in evaluating adnexal masses.

Diagnosis by combined TVS -scoring and colour doppler sonography	Histological Malignant masses	Confirmation Benign masses	Total
Malignant masses	29(true positive)	15(false positive)	44
Benign masses	3(false negative)	65(true negative)	68
Total	32	80	112

The sensitivity of combined method is 90.6%, the specificity is 81.25%, the positive predictive value

is 65.90%, the negative predictive value is 95.58%.

Table 6 Comparison of TVS-study, CD-study, TVS+CD-study in evaluating adnexal masses

	Sensitivity	Specificity	Positive predictive value	Negative predictive value
TVS-study	68.75%	85%	64.70%	87.17%
CD-study	78.12%	81.25%	62.50%	90.7%
TVS+CD-study	90.6%	81.25%	65.90%	95.58%

This table shows that TVS+CD-study has the highest sensitivity, positive predictive value and negative predictive value whereas specificity is highest in TVS-study group.

Discussion

In this study the adnexal masses were more common in 20-44 years of age but malignant masses were more common in >45 years of age. In this study malignant masses were more common in premenopausal women whereas in De priest et al study the malignant masses were more common in postmenopausal patients. This may be due to the fact that the sample size is small and maximum number of patients was in age group of 20-44 years.

The efficacy of TVS-morphological scoring for differentiation of benign and malignant masses is reflected by the sensitivity of 68.75%, specificity of 85%, and positive predictive value of 64.70% and negative predictive value of 87.17%. In the study of Alcazar et al the sensitivity is 100%, specificity is 81.4%, the positive predictive value is 73.8%, and negative predictive value is 100%⁵. Thus in this study it is seen that sensitivity is low, this may be because the parameters that were used in scoring system were not evaluated by univariate or multivariate analysis. Thus it was not

certain that that how much each parameter was predictor of malignancy. The other reason may be that the USG is highly operator and equipment dependent.

In present study the colour doppler study shows the sensitivity of 78.12%, specificity of 81.25%, the positive predictive value of 97%, negative predictive value of 90.7%. In the study of Weiner et al study the sensitivity is 94%, specificity is 97%, positive predictive value is 97% and negative predictive value is 94%⁶. The reason behind difference in accuracy of both studies of colour doppler are due to the cut-off value of resistive index, the phase of menstrual cycle when the study was undertaken and the vessel which was studied i.e ovarian vessel or intratumoral vessel.

The combined TVS-morphological scoring and colour doppler sonography shows sensitivity of 90.6%, specificity is 81.25%, positive predictive value is 65.90% and negative predictive value is 95.58%. While the Alcazar et al shows the sensitivity of 100%, specificity of 94.9%, positive predictive value of 91.2% and negative predictive value of 100%⁵.

The study done by Ozcan et al combined transvaginal ultrasound and CA125 tumor marker, along with menopausal status and ascites is used

to distinguish adnexal masses. In this study TVS shows the positive predictive value of 94.19% and negative value of 98.22%.⁷

This study suggests that colour doppler sonography increases the sensitivity and negative predictive value with slight decrease in specificity and positive predictive value. This is due to the fact of that there were high false positive results but low false negative results. When both TVS-morphological scoring and colour doppler sonography were combined the sensitivity and negative predictive value increases due to further decrease in false negative results. The specificity and positive predictive value are almost similar to TVS-morphological scoring and colour doppler sonography.

Conclusion

The advances in non-invasive evaluation of adnexal masses by transvaginal and colour doppler sonography decreases the morbidity and mortality of patients suffering by adnexal masses. The TVS-morphological scoring is one of the best non-invasive tools for differentiation of benign and malignant adnexal masses. When colour doppler study is combined with the morphological scoring the diagnostic accuracy increase. The treatment modality should be decided according to the clinical parameters and sonography evaluation.

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