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A study to compare the sensitivity of ultrasonography, color Doppler and MRI in diagnosing ovarian masses

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Abstract
Background: Ultrasound (US) and magnetic resonance imaging (MRI) both are most commonly used diagnosis techniques as well as to find the stage of cancer of ovaries. The studies related to comparison of these two methods diagnostic value are sparse in India.
Objectives: The current study was undertaken to compare the sensitivity of ultrasonography, color Doppler and MRI in diagnosing ovarian masses.
Methods: The present study involved 50 patients within the age group of 30 to 60 years of age were included. Data was collected using standard methods mentioned in the literature.
Results: The study compared the diagnostic value of ultrasonography analysis, Color Doppler ultrasonography and MRI in the prediction in cases. The diagnostic accuracy was 94%, 86% and 98% respectively.
Conclusion: The study results showed that the ovarian masses are most common in the age group of 30-40 years. The first choice can be given to ultrasonography in context of cost factor as it is relatively cheaper. However ultrasonography alone may not be sufficient so it is better to add CDS and ultrasonography together which has high diagnostic accuracy. However, MRI is the highest diagnostic accuracy when compared to ultrasonography and CDS. The study recommends further detailed studies in this area.

Keywords: Ovarian cancer, ultra sound, diagnostic value

Introduction
The most common cases of malignancies observed in the gynecology department are cancer of ovaries, endometrium and cervix [1]. The cancer to ovaries was reported as second most dangerous cancer out of all cancers of gynecology [2]. As per the statistics of USA, the mortality caused by the ovarian cancer occupied fourth place out of all other cancers. More than forty percent of cases there is serious malignancy and especially the epithelium of the ovaries is involved. Further, the most common type of cancer is epithelial cancer when compared to serous or mucinous cancers [3]. There is drastic advancement in the medical field so that the mortality was brought down in recent years [4]. However, there is a strong need to diagnose the ovarian cancer at early stages. That is in stage 1 itself the diagnosis should be made. This helps to manage the condition in effective way and prevent mortality. But there is only thirty percentage of cases diagnosed in stage 1 as per the statistics. Ultrasound (US) and magnetic resonance imaging (MRI) both are most commonly used diagnosis techniques as well as to find the stage of cancer of ovaries [5]. The studies related to comparison of these two methods diagnostic value are sparse in India. Hence, the current study was undertaken to compare the sensitivity of ultrasonography, color Doppler and MRI in diagnosing ovarian masses.

Materials and Methods
Study Design: Observational study
Sampling Method: Convenient sampling

Study population: The present study involved 50 patients within the age group of 30 to 60 years of age were included. Thorough clinical evaluation was conducted to all the patients. Voluntary informed consent was obtained from all the patients before the study. Willing participants, who are not having any severe complications, were included in the study. Unwilling patients with severe complications were excluded from the study.

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Method of data collection

Data was collected using standard methods mentioned in the literature [6]. The method used for diagnostic accuracy was ultrasonography analysis (by Sasssone scoring), Color Doppler Sonography (by Caruso scoring) and MRI (by Steven criteria).

Ethical consideration

The study proposal was approved by an institutional human ethical committee. Informed consent was obtained from all the participants. Confidentiality of data was maintained.

Data analysis

Data was analyzed using SPSS 20.0 version. Demographic data was presented as frequency and percentage. Student t-test was used to assess the significance of the difference between the groups.

Results

Table 1 presents the age wise distribution of cases. Table 2 presents the size wise distribution of cases. Table 3 presents the comparison of ultrasonography analysis, Color Doppler and MRI in the prediction in cases. The diagnostic accuracy was 94%, 86% and 98% respectively. Ovarian masses are more common in age group 30 to 40 years. The current study assessed a total of 50 patients of ovarian masses. Out of the fifty 40 cases were benign and 10 cases were malignant.

Table 1: Age wise distribution of cases

Age group in years	Number of patients (n=50)	percentage
20-30	18	36
30-40	20	40
41-50	10	20
51-60	2	4

Data was presented as frequency and percentage

Table 2: Size wise distribution of cases

Size in CMS	Number of patients (n=50)	percentage
1-5	8	16
6-10	21	42
11-15	6	12
>15	5	10

Data was presented as frequency and percentage

Table 3: Comparison of ultrasonography, Color Doppler Sonography (CDS) and MRI in the prediction in cases.

Technique	Sensitivity	Specificity	Diagnostic accuracy (%)
Ultrasonography	82.2	96	94
CDS	80	90	86
MRI	100	98	98

Discussion

The current study was undertaken to compare the sensitivity of ultrasonography, colour Doppler and MRI in diagnosing ovarian masses. Table 3 presents the comparison of ultrasonography analysis, Color Doppler Sonography and MRI in the prediction in cases. The diagnostic accuracy was 94%, 86% and 98% respectively. Ovarian masses are more common in age group 30 to 40 years. The current study assessed a total of 50 patients of ovarian masses. Out of the fifty 40 cases were benign and 10 cases were malignant. The study used assessment using three modalities which includes ultrasonography analysis, Color Doppler Sonography (CDS)

and MRI. For initial screening, it is fine to include only the ultrasonography. As ultrasonography is cost effective, it can be affordable for the patients and at the same time it has high diagnostic accuracy as well [9, 12]. However, when it goes further analysis there is requirement to add the CDS along with the ultrasonography.

MRI is always superior to ultrasonography and CDS. MRI has highest contrast of tissues when compared with ultrasonography and CDS [13]. Also MRI comes with multiple planar mechanisms. These will ensure that the lesion can be very much accurately located and also its characterization can be well assessed [14]. Further, in context of ovarian masses, the internal structure of mass can be visualized which help to differentiate the stage and type of mass [15]. Earlier studies reported and suggested MRI as most accurate method in the diagnostic role of ovarian mass [16, 17]. The present study agrees with earlier studies as the same result was observed in our study also.

Conclusion

The study results showed that the ovarian masses are most common in the age group of 30-40 years. The first choice can be given to ultrasonography in context of cost factor as it is relatively cheaper. However ultrasonography alone may not be sufficient so it is better to add CDS and ultrasonography together which has high diagnostic accuracy. However, MRI is the highest diagnostic accuracy when compared to ultrasonography and CDS. The study recommends further detailed studies in this area.

Conflicts of interest: None-declared

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