

# Comparison of USG and CT Scan in Ovarian Lesions: A Prospective Study

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## A B S T R A C T

**Introduction:** One of the most common types of cancer among the women is the ovarian cancer. As many of these masses are associated with mortality, it is imperative that they are diagnosed as early as possible. There are many methods to identify the masses based on morphology, demographic details, biomarkers, by imaging etc. Imaging can be by Ultrasound or CT scan or even MRI. This present study was undertaken to compare ultrasound and CT scan in the diagnosis of pelvic lesions.

**Materials and methods:** This prospective study was done on 67 women of all ages with ovarian lesions. Other than regular biochemical and hematological tests, all the patients were subjected to USG and CT scan.

**Results:** 31.3% were of the ages between 21-30 years, 28.4% were between 31 to 40 years, 16.4% were between 41 to 50 years. 77.6% of the patients had benign masses and 19.4% were malignant. While 3% had metastasis. The overall sensitivity of Ultrasound was 79.2% and specificity was 85.5%. The positive predictive value was 91.3% and the negative predictive value was 89.3%. In comparison, the sensitivity of CT scan was 97.6%, sensitivity 91.4%, positive predictive value 93.7% and negative predictive value was 96.5%.

**Conclusion:** Though, USG is more useful in detecting the neoplasms and large ovarian cysts, CT is more sensitive and specific in diagnosing the smaller ones. Thus, USG can be used as the primary diagnostic tool for women suspected with ovarian cancer and CT can be used to stage it.

**Keywords:** Ovarian Lesions, Ultrasound, CT Scan

## INTRODUCTION

One of the most common types of cancer among the women is the ovarian cancer and the fifth most common cause of death of women globally.<sup>1-3</sup> It has been estimated that about 20% of the women will have some kind of pelvic mass in their lifetime. Most of the women may be unaware of the masses unless they undergo physical gynecological examinations for other complaints.<sup>4</sup> In United States alone, around 300,000 women are diagnosed with a pelvic mass every year.<sup>5</sup>

When the pelvic masses are detected, it is essential to identify the origin and evaluate what type they are, whether benign or malignant. Most of the masses are benign, but around 5 – 10% of them are diagnosed as ovarian cancers.<sup>1-3</sup> Of these malignant tumors, 90% of them are epithelial and 10% result from metastasis.<sup>6</sup> The incidence of the ovarian cancer seems to be rising every year due to the increase in stress and pressure in the lifestyle.<sup>7</sup>

As many of these masses are associated with mortality, it is imperative that they are diagnosed as early as possible. There are many methods to identify the masses based on morphology, demographic details, biomarkers, by imaging etc. Imaging can be by Ultrasound or CT scan or even MRI.<sup>8</sup>

Presently, Ultrasound is considered to be the first line of investigation for ovarian lesions. It is fast, cheap and mainly, free from radiation. It is also easy to perform and accurate. It helps to identify the morphology as well as the vascularity of the lesion. CT scan on the other hand identifies the density of the lesion and helps in staging the malignancy of the lesion.

This present study was undertaken to compare ultrasound and CT scan in the diagnosis of pelvic lesions.

## MATERIAL AND METHODS

This prospective study was done by the department of Radiology at RVM Institute of Medical science and Research center for a period of one year from December 2018 to November 2019. 67 women of all ages with ovarian lesions were included in the study. This study was cleared by the Institutional Ethical Committee. The nature of the study was explained to the patients and their relatives and informed consent was taken from them. In case of minors, the informed consent was taken from the parent/ guardian. All the women were presented with suspicion of ovarian lesions to the hospital and were referred to our department for further investigation. Those who were positive for ovarian

lesions were included into the study. Even those patients who were referred to the department for other ailments and were found to have lesions were also included in the study. All those who were not willing to take part in the study, those who did not have any lesions after the investigation were excluded from the study.

A detailed demographic data was collected from all the patients. All of them were subjected to extensive physical and medical examination. Regular investigations such as complete blood picture, hemoglobin estimation, ESR, random blood sugar levels, cholesterol levels, renal function tests such as urea and creatinine, and tests for HBsAg, HCV and HIV were done for all them. Ultrasonography was also done for all of them. They were told to come with full bladder. In case that was not so, they were asked to drink water or juices and return after the bladder is full. USG was done with 3.5 MHz. For CT scan of the pelvis and abdomen, Siemens and Toshiba express Scan machine was used on all the patients.

### RESULTS

Out of the 67 women who were included in the study, 21 (31.3%) were of the ages between 21-30 years, 19 (28.4%) were between 31 to 40 years, 11 (16.4%) were between 41 to 50 years. We had no patients below 10 years of age (fig:1).

52 of the 67 patients (77.6%) had benign masses and 13 (19.4%) of them were malignant. 2 (3%) had metastasis (Fig: 2).

Majority of the patients had abdominal pain (82.1%), while 47 (70.1%) presented with general weakness, 47 (70.1%) with dysmenorrhoea, 34 (50.7%) had backache also long with other symptoms. 14 (20.9%) of them were infertile (table:1). On radiological examination, the masses were categorized in 15 patients (22.4%) as hemorrhagic cyst, abscess in 8 (11.9%), simple cyst in 8 (11.9%), PCOD in 7 (10.4%), Endometriosis in 6 (9%). Among the malignant ovarian masses, 6 (9%) were serous cystadenocarcinoma, 5 were mucinous cystadenocarcinoma (7.5%) (Fig: 3)

The overall sensitivity of Ultrasound was 79.2% and specificity was 85.5%. The positive predictive value was 91.3% and the negative predictive value was 89.3%. In comparison, the sensitivity of CT scan was 97.6%, specificity 91.4%, positive predictive value 93.7% and negative predictive value was

| Presentation           | Number (%) |
|------------------------|------------|
| Abdominal Pain         | 55 (82.1%) |
| Menstrual irregularity | 17 (25.4%) |
| Dysmenorrhoea          | 47 (70.1%) |
| Weakness               | 41 (61.2%) |
| Backache               | 34 (50.7%) |
| Infertility            | 14 (20.9%) |

Table-1: Clinical presentation

| Parameter                 | Ultrasound | CT scan |
|---------------------------|------------|---------|
| Sensitivity               | 79.2%      | 97.6%   |
| Specificity               | 85.5%      | 91.4%   |
| Positive Predictive Value | 91.3%      | 93.7%   |
| Negative Predictive Value | 89.3%      | 96.5%   |

Table-2: Comparison of Ultrasound and CT scan

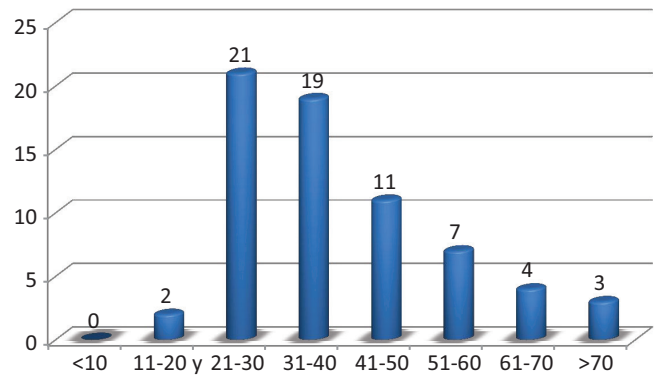


Figure-1: Age-wise distribution of patients

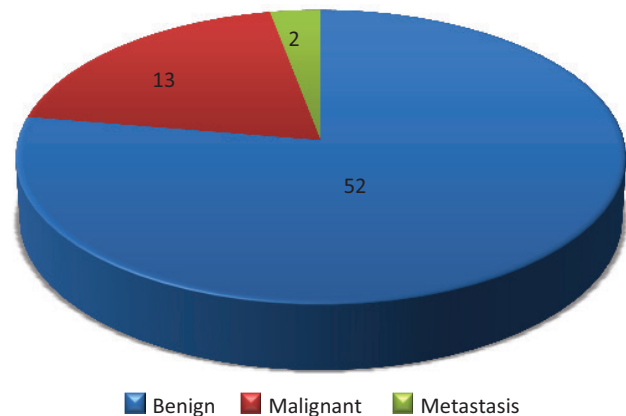


Figure-2: Disease types among the patients

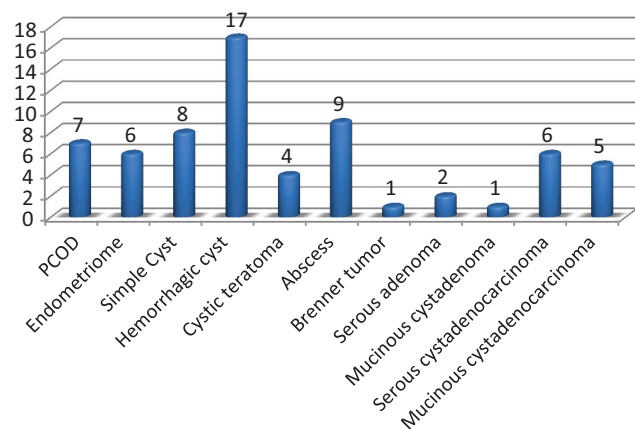


Figure-3: Categorization of ovarian masses

96.5% (Table:2).

### DISCUSSION

Ovarian masses are one of the major causes of mortality due to gynecological reasons in women. The reason for this is, most of the times the disease goes unrecognized and is diagnosed by accident while investigating other diseases. These masses most of the times are at an advanced stage that it is more or less impossible to treat.<sup>9</sup> It is therefore important to identify the masses at the earliest so that ovarian cancer can be prevented and the person can be saved. Therapy for these masses can be chemotherapy, hormonal therapy, radiation, targeted therapy or surgery.<sup>10,11</sup> Ultrasound is an easily repeatable process which is widely used. In our study, most of the women with ovarian lesions were in

the 21-30 (31.3%) and 31 to 40 (28.4%) age group amounting to nearly 60% of the total cases. Most of these women had benign ovarian tumours. More than 80% of the malignancy was seen among the women of 50 years and above. In a study by Bhimani et al, it was observed that most of the benign lesions were seen in below 40 years and malignant ones were seen above 40 years, corroborating our study.<sup>12</sup> Age was found to be one of the risk factors of cancer, with increasing rates seen in the increase of age of the women. Multiparous women and women who gave birth at early age have a lower risk while persons with a family history and personal history are more at risk.<sup>13</sup> Menopause also plays a role in the increased rates of ovarian cancer as was reported by Koonings et al, in 8.75% of cases in premenopausal women and 32.4% in post menopausal women.<sup>14</sup>

In the present study, 52 out of 67 patients had benign tumors (77.6%), 19.4% were malignant and 2 cases (3%) had metastasis. Around 5-15% of the malignant tumors are metastasis. They occur from neoplasms of breast, stomach, lung, which get metastasised into the ovaries.<sup>15</sup> Out of the 67 cases, 22.4% had hemorrhagic cysts, 11.9% had abscesses and simple cyst each, 10.4% had PCOD, 9% had endometriosis. In a similar study by Ozasa et al, out of 25 cases, 12 were of ovarian neoplasms, out of which 7 were malignant, 5 were of endometrial cyst, 4 were abscesses.<sup>16</sup>

The overall sensitivity of Ultrasound in our study was 79.2% and specificity was 85.5%. The positive predictive value was 91.3% and the negative predictive value was 89.3%. In comparison, the sensitivity of CT scan was 97.6%, sensitivity 91.4%, positive predictive value 93.7% and negative predictive value was 96.5%. A study by Theodoridis et al observed that ultrasound has a lower sensitivity of 50% and a 92% specificity in detecting borderline tumours.<sup>17</sup> Another study by Fizoorabadi et al reported a similar sensitivity of 59% in USG and specificity of 87.9% while the sensitivity of CT scan was 79.2% and specificity was 91.6%.<sup>18</sup> Liu et al compared the USG and CT scan with combined diagnosis of both and reported that there was a higher sensitivity and specificity when both were used rather than when used independently.<sup>19</sup> A study by Nayak et al reported a sensitivity of USG in detection of benign tumors to be 86% and specificity to be 62%, while in the detection of malignant cells sensitivity was 62% and specificity was 89%. In case of CT scan, the sensitivity for benign cases was 97% and for malignant ones it was 84%, while the specificity was 92% for benign cases and specificity was 89%.<sup>20</sup>

USG can be used to identify benign neoplasms and large ovarian cysts. Tumors greater than 10cm are said to be more likely to be associated with ovarian cancer.<sup>14</sup> The advantage of USG is the colour Doppler blood flow readings are due to the high speed and the low impedance blood flow which can be detected in the lumps. The disadvantage is that the solid lumps which are of <1cm in diameter are not detected.<sup>21</sup>

In contrast, the CT scan has a high spatial and density resolution, which is capable of locating specific sites and easily locates the lumps.<sup>22,23</sup> So, CT is used more in women with malignancies to identify the extent of the disease usually before a surgery or a laparotomy. It is very useful in identifying peritoneal implants and lymphadenopathy.<sup>24</sup> CT

scan was more proficient in detecting adhesions such as that in adenocarcinoma compared to the ultrasound. This was corroborated in the study by Ozasa et al.<sup>16</sup>

## CONCLUSION

USG is more commonly used as primary diagnosis and is useful in detecting the neoplasms and large ovarian cysts. The smaller ones are easily diagnosed by CT. CT is more sensitive and specific when compared to USG. Thus, USG can be used as the primary diagnostic tool for women suspected with ovarian cancer and CT can be used to stage it.

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