

# Role of Doppler Ultrasound in Detection of Malignant Lesions in Patients Presenting with Ovarian Masses Taking Histopathology as Gold Standard

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## ABSTRACT

**Aim:** To determine the accuracy of doppler ultrasound in patients presenting with ovarian masses.

**Methods:** A total of 110 female cases who were referred to the department of radiology for evaluation of ovarian masses, aged 30 to 70 years were included. The study was conducted from Feb-2020 to Oct-2020 in radiology department of Ib-nae Sieena hospital. Doppler US was done for determining the nature of lesions. The US was suggestive of malignancy when RI was <0.4 at any point. Final diagnosis of malignancy was made using histopathology evaluation of resected biopsy samples.

**Results:** Mean age was 43.21±8.61 years. On doppler US, RI <0.4 was found in 86 cases, and in remaining 24 cases the RI was >0.4. On histopathology, malignancy was diagnosed in 91 patients and remaining 19 patients had benign lesions. The overall sensitivity of doppler US RI was 92.3%, specificity 89.5%, PPV 97.7% and NPV 70.8%.

**Conclusion:** Doppler US is a highly effective tool for initial evaluation of ovarian masses and for differentiation of malignant from benign masses.

**Keywords:** Ovarian Masses, Doppler Ultrasonography, malignancy.

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## INTRODUCTION

Ovarian cancer is at seventh position among all malignancies in female patients and is at fourth position regarding cancer related mortality, causing 5% of all these deaths.<sup>1</sup> The mortality is high if there is concomitant involvement of both cervix and endometrium. More than 15% patients with ovarian masses lesions have malignant lesions.<sup>2</sup>

The diagnosis of ovarian malignancy is always challenging. The fate of ovarian malignancy depends on timely and accurate diagnosis. MRI has the highest accuracy in differentiation of benign and malignant lesions. The major problem of using MRI is its limited availability in gynecology centers.<sup>3,4</sup> The other non-invasive imaging technology is ultrasonography (US). Using the US findings different score systems and prediction models and software analysis programs are developed to differentiate malignant from benign lesions in cervical cancer patients. Out of these risk of malignancy index (RMI) is the commonest used scoring system which was initially proposed by Jacobs et al. The RMI use various ultrasound, CA-125 levels and women menopausal status to diagnose malignancy.<sup>5</sup>

This study was aimed to determine the accuracy of doppler ultrasound in patients presenting with ovarian masses. As little work is published regarding diagnostic

accuracy of Doppler ultrasound and with heterogeneous results. This study results can add in existing knowledge and can help to determine the diagnostic accuracy of Doppler ultrasound for diagnosis of malignant lesions in patients of ovarian masses in our local population.

## METHODS

A total of 110 female cases who were referred to the department of radiology for evaluation of ovarian masses, aged 30 to 70 years were included. Patients presenting with non-ovarian lesions (e.g. pedunculated fibroid, paratubal cyst) or already known cases of adnexal tumors were excluded. The study was conducted from Feb-2020 to Oct-2020 in radiology department of Ib-nae Sieena hospital after taking approval from IRB.

Sample size for this study was calculated by taking estimated prevalence of malignant lesions 10% patients of ovarian masses,<sup>2</sup> sensitivity of color Doppler 92.6%, and 88.8% specificity.<sup>6</sup> By taking desired precision level of 14% for sensitivity and 5.5% for specificity.

General information regarding patient like name, age and gender was documented for data collection.

Doppler US was done for determining the nature of lesions. The following parameters were evaluated on doppler US; presence/absence of flow, vessels location, resistive index (RI) at all points of lesions, the US was suggestive of malignancy when RI was <0.4 at any point.

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After surgical resection, biopsy specimens were evaluated by histopathologist for confirmation of malignancy.

Data was analyzed through SPSS v25. 2x2 table was formulated to determine the accuracy of doppler US with reference of histopathology reporting.

## RESULTS

Mean age was 43.21±8.61 years and majority was those aged >40 years. The chief presenting complaints were cervical pain (62.0%) cases and abdomen pain in 38% cases.

On doppler US, RI <0.4 was found in 86 cases, and in remaining 24 cases the RI was >0.4. The frequency of malignancy was more in nulli-para(64%) women and the frequency was reduced with increase in parity. Out of total malignant cases 67% women were pre-menopausal.

On histopathology, malignancy was diagnosed in 91 patients and remaining 19 patients had benign lesions.

The overall sensitivity of doppler US RI was 92.3%, specificity 89.5%, PPV 97.7% and NPV 70.8% (Table 1).

Table 1. Accuracy of Doppler US based RI.

RI	Malignancy on Histopathology		Total
	Yes	No	
<0.4	84	02	86
≥0.4	07	17	24
Total	91	19	110

Sensitivity: 92.3%, Specificity: 89.5%  
 Positive Predictive Value (PPV): 97.7%  
 Negative Predictive Value (NPV): 70.8%

## DISCUSSION

There is a wide variety of origin, size, type, and location of masses in female ovarian system and mixed symptoms that mimic the normal physiologic cycles the diagnosis of these masses is very challenging and majority of these present in late stages.<sup>7,8</sup> One in 70 females have chances of cervical lesions at some age stage. This cancer is even more lethal than the breast one. The high mortality is due fact that the disease in majority cases is diagnosed at last stages. In patients with early diagnosis is prognosis is very good with 5 years survival of >90%.<sup>9,10</sup> So early identification and treatment is the key stone of better prognosis. US is the highly used imaging modality in gynecology clinics. So doppler US can provide a very early and vital data regarding the presence and types of lesions during routine screening.

In this study the sensitivity of US based RI was 92.3%, specificity 89.5%, PPV 97.7% and NPV 70.8%.

A study conducted by Khurana et al. concluded that Doppler ultrasound (Resistive index R1) is 46.67% sensitive, 94.74% specific, and have positive predictive value (PPV) 87.50% and negative predictive value (NPV) 69.23% for diagnosis of malignant lesions in patients presenting with ovarian masses.<sup>11</sup>

While another study by Shah et al. reported that Doppler ultrasound is 92.6% sensitive, 88.8% specific, and

has 97.4% PPV and 93% NPV. The authors included 50 patients. On doppler US 39 patients had malignant lesions and 11 patients had benign. On histopathology, 41 patients had malignant and only 9 patients had benign lesions<sup>6</sup>.

Sehgal N in a similar study containing 60 patients reported malignancy in 33 patients on histopathology and benign pathology in 27 patients. On doppler US, they found malignant pathology in 31 patients and benign in 29 patients. The sensitivity of US RI was 81.48%, specificity 93.93%, PPV 91.0% and NPV 86.11%<sup>12</sup>.

So initial doppler US assessment should be done in all females who present with some atypical symptoms such as continuous abdominal pain and irregular bleeding to rule out cervical malignancy in suspected patients.

## CONCLUSION

Doppler US is a highly effective tool for initial evaluation of ovarian masses and for differentiation of malignant from benign masses.

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