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Original Research Paper

Study of Doppler Scan Parameters for Ovarian Masses

Medical Science

KEYWORDS : ovarian mass, colour Doppler, spectral Doppler, resistive index, pulsatility index

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ABSTRACT

Ovarian mass represents a common problem in clinical practice. Colour Doppler imaging with pulsed Doppler spectral analysis improves the characterization of ovarian masses by means of blood flow measurements obtained from tumour vessels. Total 150 patients were included in the study. Parameters taken in Colour Doppler were flow study, vessel arrangement, and vessel morphology and vessel location. Parameters considered in spectral Doppler were resistive index (RI) and pulsatility index (PI). Only 114 (76%) ovarian masses showed colour flow Out of total patients 52% belong to reproductive age group. Out of 114 ovarian masses 44.7% have normal flow, vessel morphology was noted normal in 65.8% and abnormal in 34.2% cases and vessel arrangement was seen regular in 63.2% while random in 36.8% ovarian masses. ovarian masses with RI ≤ .40 was recorded in 34.2% while PI ≤ 1.0 was recorded in 76.3% cases.

Introduction:

Ovarian mass represents a common problem in clinical practice. The majority of these ovarian masses are benign accounting to 80% while rest 20% masses are malignant. Ultrasonography (USG) is considered the primary imaging modality for screening and diagnosis of ovarian mass. In addition to USG, colour Doppler imaging with pulsed Doppler spectral analysis improves the characterization of ovarian masses by means of blood flow measurements obtained from tumour vessels. Ovarian malignancy has the highest fatality to case ratio of all the gynecological cancers, so it is must to have a diagnostic tool for early detection of these ovarian masses [1]. The aim of present work is to study various colour Doppler and spectral Doppler parameters in ovarian masses.

Material and methods:

The study was conducted in radiology department at tertiary teaching medical college center from March 2009 to March 2011. Ethical approval for this prospective study was obtained from local ethical committee. The patients included in the study were those referred with either palpable adnexal mass or incidentally detected adnexal masses, irrespective of age or menstrual status of the woman. Total 250 women were screened with ultrasonography and 150 patients underwent Doppler scan. These patients were examined with a real time sonography equipment- Colour Doppler USG SSA 350A/31 and or Aloka prosound SSD-4000SV, using sector transducer of frequency 3-5 MHz through a transvesical approach. Parameters taken in Colour Doppler were flow study, vessel arrangement, and vessel morphology and vessel location. Parameters considered in spectral Doppler were resistive index (RI) and pulsatility index (PI).

Results:

Total 150 women, from 10 years to 80 years age, were included in present study. Out of these 52% belong to the age group of 21 years to 50 years, i.e. reproductive age group (Figure1).

Out of 150 women flow on colour Doppler was present in 114 (76%) ovarian masses.

Out of 114 ovarian masses 51 (44.7%) have normal flow while rest were having abnormal flow. Vessel morphology was noted normal in 75 (65.8%) and abnormal in 34.2% cases. Vessel arrangement was seen regular in 72 (63.2%) while random in 42 (36.8%) ovarian masses (Table 1). Most common vessel location on colour Doppler scan was septal + central in 42 (36.8%) cases followed by peripheral only in 36 (31.6%) cases (Figure 2). On spectral Doppler scan ovarian masses with resistive index (RI) ≤ .40 was recorded in 39 (34.2%) while Pulsatility index (PI) ≤ 1.0 was recorded in 87 (76.3%) cases (Table 2).

Discussion:

The pre operative imaging features of an ovarian mass directly affects surgical decision. In our study reproductive age group (21-50 years) was most commonly affected, accounting for more than half of the women. Similar results were shown in study conducted by Lynch et al (2). Colour Doppler scan was done in all 150 patients. Out of these only 114 (76%) ovarian masses showed colour flow. Out of these 114 ovarian masses 44.7 % were having normal flow while remaining was having abnormal flow. Normal flow was characterized by fine branching vessel, no evidence of hot spots and presence of peripheral flow. Flow was classified as increased if dilated prominent parenchymal vessels, hot spots and aliasing were seen on colour flow. Brown et al (3) and Taori KB et al (4) showed presence of vascularity in 42.24% of benign and 92.59% of malignant ovarian masses. Out of 114 ovarian masses 65.8% showed normal intra tumoural morphology while 34.2% had abnormal vessel morphology. Out of 114 ovarian masses 63.2% were having regular arrangement while 36.8% were having random intra tumoural vessel arrangement. Regular vessel arrangement and normal intra tumoural morphology favour benign lesions while random vessel and abnormal intra tumoural morphology favour malignant lesions. This observation was also noted by Madan R et al who showed that these two criteria had the specificity of 96.8% and positive predictive value of 95.2 %(5). Vessel location was classified according to their location in the tumour as central, peripheral, septal and combination of all of these. Septal + central vessel location (36.8) was most common finding followed by peripheral vessel location. These findings correlate quiet well with Valentine et al (6) and Kurjak S et al (7). Pulsed Doppler vascular resistance to blood flow had been and still one of the major features in the assessment of tumour vascular characteristics. Out of 114 ovarian masses 34.2% lesions showed RI ≤ .40 while 65.8% showed RI > .40 similarly 76.3% lesions showed PI ≤ 1.0 while 23.7% showed PI > 1.0. On spectral Doppler scan RI ≤ .40 and PI ≤ 1.0 are suggestive of malignant pathology. In their study Stein SM et al obtained a sensitivity of 67%, specificity of 66% using cut off value of PI < 1.0 and they obtained sensitivity of 24% and specificity of 90% using cut off value of RI < .40(8).

Conclusion:

Early diagnosis of an ovarian mass is the most important

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objective for better prognosis l.USG and its different techniques are accepted as the primary imaging modality in the evaluation of ovarian masses. Research is thus focusing on the ability to distinguish between tumour neovascularization and angiogenesis in normal tissue. Investigator hope that these Doppler scan parameters will enable reproducible and reliable differentiation between various ovarian lesions.

Figure1. Bar chart showing age wise distribution of patients.

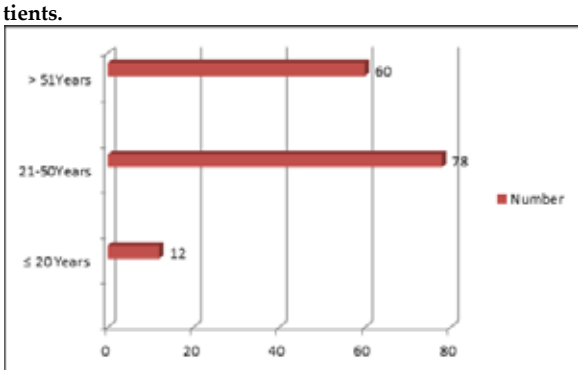

Figure 2. Doughnut Chart showing Vessel Location in ovarian masses

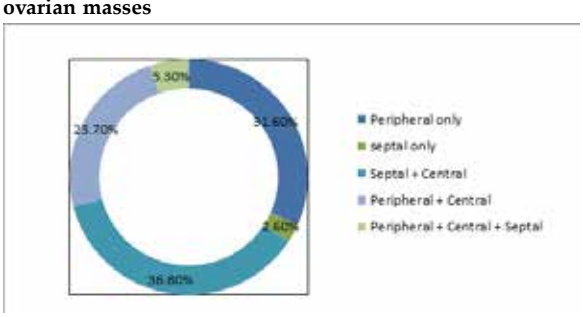

Image 1. Ovarian mass showing central as well as peripheral vascularity and low PI and RI

Table 1. Colour Doppler parameters in ovarian masses. (n = 114)

Parameters	Normal (%)	Abnormal (%)
Doppler Flow	51 (44.7%)	63 (55.3%)
Vessel Arrangement	72 (63.2%)	42 (36.8%)
Vessel Morphology	75 (65.8%)	39 (34.2%)

Table 2. Spectral Doppler Indices. (n = 114)

Resistive index		Pulsatility Index	
≤ .40	39 (34.2%)	≤ 1.0	87 (76.3%)
>.40	75 (65.8%)	>1.0	27 (23.7%)

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