ORIGINAL RESEARCH PAPER

Radiodiagnosis

# UMBILICAL ARTERY COLOUR DOPPLER IN PREDICTION OF IUGR AND ITS CORRELATION WITH HISTOPATHOLOGY OF PLACENTA.

**KEY WORDS:** Umbilical, Artery, IUGR, Doppler

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**ABSTRACT**

**OBJECTIVE:** Abnormal umbilical artery blood flow is associated with intrauterine growth restriction of foetuses and foetal demise. The present study was done to investigate the role of umbilical artery doppler to predict intrauterine growth restriction in foetuses and its correlation with histopathological finding of placenta.

**METHOD:** A total of 100 females having clinical suspicion of IUGR were subjected to obstetric USG and umbilical artery waveform and PI value was recorded. After delivery, placenta was sent for histopathological examination.

**RESULT:** Placental abnormalities on histopathological examination were more common in IUGR pregnancies with abnormal umbilical artery doppler. Sensitivity of umbilical artery doppler in prediction of IUGR was 90.9% whereas specificity and PPV was 100%.

## INTRODUCTION:

The foetuses with weight below the 10th percentile for gestational age are called as foetus with intrauterine growth restriction. In India, highest incidences for LBW and IUGR-LBW respectively are 28% and 21% [1].The Neonates born with IUGR have an increased risk of complications such as neural developmental complications, ICH, RDS, necrotising enterocolitis, chronic cardiovascular disorders and IUFD [2]. Placental insufficiency is the primary cause of intrauterine growth restriction in normally formed foetuses and can be identified using umbilical artery doppler velocimetry [3-5]. Severe early-onset intrauterine growth restriction (IUGR) is characterized by absent or reversed end-diastolic flow velocity in the umbilical arteries, which is associated with more than 70% of placental arterial obliteration, indicative of an advanced stage of foetal compromise. Late onset IUGR on the other hand, is more likely to be associated with normal umbilical artery doppler waveforms. Abnormal umbilical artery doppler waveforms have been associated with an increased risk of foetal acidosis. Foetal growth and viability depends on the maternal supply of nutrients and oxygen through the placenta into the umbilical circulation. Early diagnosis of intrauterine growth restriction helps in reducing perinatal and neonatal complication, mortality and morbidity. The present study was done to investigate role of umbilical artery doppler to predict intrauterine growth restriction in foetuses and its correlation with histopathological finding of placenta.

## AIMS AND OBJECTIVES:

1) To determine the role of umbilical artery colour doppler in screening of high-risk mothers for detection of IUGR.
2) To understand the histopathogical changes in the placenta of an IUGR.
3) Correlation of umbilical artery colour doppler with histopathological changes in placenta of IUGR cases.

## MATERIAL AND METHOD:

This prospective study was conducted in the Department of Radiodiagnosis, MGM Medical College Indore (M.P.).Written and informed consent was taken from every patient. Study was done according to the regulations of the Institutional Ethics Committee. A total of 100 females with singleton pregnancy having clinical suspicion of IUGR based on findings such as insufficient weight gain, decrease in abdominal girth and decrease or no increase in fundal height were sent to Radiology department for ultrasonography. Umbilical artery was identified by colour doppler and spectral waveform pattern & PI value was recorded on free floating loop. Placenta, after delivery was sent to pathology department for histopathological examination. Female with multiple pregnancies, foetus with congenital anomalies, refusal for consent for study were excluded from the study.

## RESULTS:

In our study the incidence of IUGR was higher (65%) in younger age group.Malik Rajesh et al.[6] found similar results in their study. Most of females were primipara (55%). This was followed by para 1 mothers (28%). In our study (Figure 1), 34% cases of IUGR showed normal umbilical artery doppler pulsatility index. 50% cases of IUGR showed increased umbilical artery doppler pulsatility index which leads to decrease blood flow in umbilical artery, suggestive of uteroplacental insufficiency. 16% cases of IUGR showed reversal of blood flow in umbilical artery which is an ominous sign for foetus and risk of sudden IUD. Tannindron et al[7] found similar results in their study. In our study middle cerebral artery doppler pulsatility index was normal in 34% cases of IUGR, while decreased in 66% cases of IUGR which leads to increase blood flow in middle cerebral artery, indicative of early foetal hypoxia. Oligohydramnios had significant correlation with IUGR. 65% cases of IUGR associated with moderate oligohydramnios (AFI 5-8 cm) [9] was found in the study. This marks oligohydramnios as a screening tool for IUGR. Most of IUGR babies (54%) were delivered by LSCS whereas 46% by vaginal route [6]. In our study 85% of newborns had birth weight less than 2.5 kg and 15% of newborns had birth weight of 2.5 kg or more. In the study, weight of placenta was significantly lower than 500gm (maximum cases were between 300-400 gm), constitutes 48% cases of IUGR. Ghomian Nayereh et al [8] found similar results in his study. Centric cord insertion was seen in 88% and eccentric cord insertion in 12% of cases. Severe placental infarctions were seen in 38 % of IUGR cases. In our study, grade 2 calcifications were present in 59% cases and grade 3 calcifications were present in 41% cases. In the study, (Figure 2), placental abnormalities on histopathological examination were more common in IUGR pregnancies with abnormal umbilical artery Doppler. Most common was syncytial knot (85%), followed by intervillous fibrin deposition (67%), basement membrane thickening (66%),cytotrophoblastic hyperplasia and squamous metaplasia (61%), placental calcification and infarction. Mardi Kavita et al [9] found almost similar results in their study. Areas of stromal fibrosis (60%) and stromal calcification (58%) were significantly increased in IUGR babies.In our study, histopathological changes in placenta were goldstandard for detection of IUGR. Sensitivity of umbilical artery doppler in

prediction of IUGR is 90.9% and specificity is 100%. The positive predictive value is 100% and negative predictive value is 85%. The accuracy is found to be 94%.

**CONCLUSION:**

Abnormal umbilical artery doppler waveform (Absent or reversed) is more predictive for IUGR, and is strongly associated with abnormal histopathological finding of placenta in IUGR pregnancies. Feto-placental weights and placental dimensions were significantly reduced in IUGR babies. Placental involvement was observed in more than two third cases histologically. Absent and reversal of end diastolic flow in umbilical artery is an ominous sign for foetus. The abnormal umbilical artery end-diastolic flow is an indication for enhanced foetal surveillance or delivery. Umbilical venous double pulsations, in the presence of abnormal umbilical artery doppler waveforms, necessitate a detailed assessment of foetal health status. Thus, all foetuses with suspicion of intrauterine growth restriction should undergo umbilical artery doppler evaluation so that timely action can be taken for better foetal and maternal outcome.

**Figure 1: Abnormal umbilical artery waveforms:**

Decreased end-diastolic velocity(A), absent end-diastolic velocity(B), reversed end-diastolic velocity©

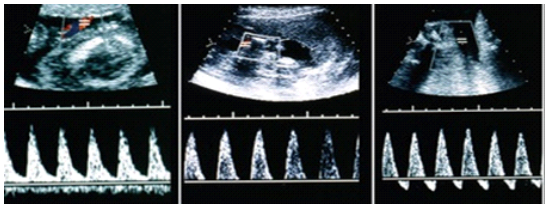
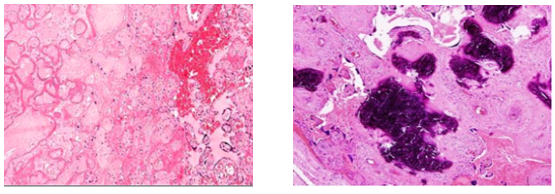


**Figure 2: Microscopic Picture Of Placental Infarction (a) And Calcification (b)**



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