



Role of Doppler Sonography in Clinically Suspected IUGR Pregnancies – A Descriptive Study

KEYWORDS

pulsatility index, Resistive index, Systolic / Diastolic ratio, Middle cerebral artery, Uterine artery, Umbilical artery

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ABSTRACT To evaluate the usefulness of uterine artery, umbilical artery and middle cerebral artery Doppler values as predictors of adverse perinatal outcome in clinically suspected IUGR pregnancies

INTRODUCTION

Every newborn has the right to be born undamaged mentally and physically. The fulfillment of this goal plays a pivotal role in materno-fetal medicine^{1,2}, whose sole objective is that every pregnancy should culminate into a healthy baby and a healthy mother. The growth of human fetus is a complex process resulting in an increase in size over time has been the subject of extensive study. Before the advent of ultrasound evaluation physicians are interested in the growth process of fetus^{3,4}, the prospective assessment of fetal growth during pregnancy has been limited to measuring the uterine size and guessing the fetal size by palpation and could only look at the infant at delivery and infer at what happened in-utero. This lead to increasing perinatal mortality and morbidity. The very objective of obstetrics was getting defeated. But now, in the Era of sophisticated modality of real-time ultrasound, antenatal diagnosis of intrauterine growth restriction has become very easy, thus minimizing the future catastrophe.

By definition the term Intra Uterine Growth Restriction (IUGR) is a term used to describe the condition of a fetus whose size or growth is subnormal⁵. The most common definition of intrauterine growth restriction is that "a fetus is growth restricted if its weight is less than the tenth percentile for it's gestational age.

The incidence of IUGR in a population where the mothers are generally healthy and well-nourished is estimated to be about 3-5%. In a population of women with hypertension or previous growth restricted fetus however the incidence increases to 15 -20% or higher.

This article titled **"ROLE OF DOPPLER SONOGRAPHY IN CLINICALLY SUSPECTED IUGR PREGNANCIES – A DESCRIPTIVE STUDY"** focuses on establishing the role of Umbilical artery, Uterine artery and Middle cerebral artery Doppler imaging in predicting adverse perinatal outcomes in clinically suspected IUGR pregnancies and to determine the role of Doppler velocitometry in clinical management of such pregnancies⁵.

MATERIALS AND METHODS

This study was approved by the Ethical Committee of our institution. The study was conducted for a period of two years from September 2013 to September 2015.

Data for the study was collected from patients attending

the department of Radio- diagnosis, referred by Department of Obstetrics and Gynecology at our college.

The study included 30 antenatal women who were diagnosed as having a fetus with intra uterine growth restriction based on grey scale ultrasound findings and referred for obstetric Doppler Ultrasound if the following inclusion criteria were met:

The LMP (Last menstrual period) of the patient was well known.

The gestational age of patient was between 31 and 41 weeks (derived from LMP).

The pregnancy was single.

The patient was a clinically diagnosed case of IUGR (based on findings such as Insufficient weight gain, decrease or no increase in abdominal girth and decrease or no increase in fundal height.)

One of the following risk factors was present in the patient: Known case of preeclampsia. Hypertension, oedema, proteinuria or any previous history of IUGR

DISCUSSION

Fetal growth and development is a natural process for each and every human kind, which has aroused the interests of all clinicians for many years, since not all fetuses grow or develop equally^{1,2}. Intrauterine growth restriction does not imply a specific pathophysiology but merely a result of a series of events occurring along several possible pathways. Hence, accurate antenatal diagnosis must decide whether the fetus is constitutionally small for gestational age or small as a consequence of impaired placental perfusion. Doppler flow velocity analysis can be valuable in solving this problem, by examining uterine arteries (utero-placental circulation), umbilical arteries (Feto-placental circulation) and middle cerebral artery (fetal-circulation)⁵.

Our study was done in 30 pregnant women, who were diagnosed as having fetuses with intrauterine growth restriction based on clinical suspicion and grey scale ultrasound examination.

Numerous studies with varying results have been published and difficult to compare. This controversy can partly be explained by small number of patients enrolled, vary-

ing sample sizes and techniques as well as different criteria used to define the adverse perinatal outcome. In addition some studies were performed in high risk and some in low risk population, similarly major and minor perinatal outcome.

As can be seen yet no universally accepted standard for defining an abnormal Doppler flow velocity waveforms as well as the pregnancy outcome measure, so conflicting observations might continue to emerge.

Age Incidence

It is observed that the maximum number of pregnant women were in the age group of 21-25 years (46.7%). This can be attributed probably for the increased pregnancy rate in these age groups. PIH is more common in primigravida due to first time exposure to chorionic villi. The age ranged from 19-31 years.

Distribution of gestational age

In this study all patients underwent Doppler study in the third trimester of their pregnancy with 76.6% being investigated between 31 - 35 weeks of gestation. The earliest study was done at 29th week of gestation. Hence most pregnancies were monitored between 31-35 weeks, when the fetus would have begun developing sufficient lung maturity to survive outside the uterus. Symmetrical IUGR accounts for 20-30% and asymmetrical IUGR accounts for 70-80%. In asymmetrical IUGR insult begins later than symmetrical IUGR, usually after 28 weeks of gestation. Hence 31-35 weeks of gestation probably could be more common.

Etiology of IUGR

Among women where a cause for IUGR was identified. 60 % had pregnancy induced hypertension (PIH), 10 % had anemia complicating pregnancy. This can be attributed to asymmetrical IUGR which accounts for 70 % in which uteroplacental insufficiency (PIH) was the most common cause. Bad obstetric history as a cause is seen in 10 %. Six patients (20 %) of the study group had no detectable cause for IUGR^{4,5}.

CONCLUSION

The umbilical-placental and cerebral vascular bed share directly involved in the hemodynamics adjustments of fetal growth restriction. A Doppler index that reflects both of these areas can be useful for identifying fetuses with increased placental and/or decreased cerebral resistance

Assessment of both the utero placental circulation and the fetoplacental circulations together is more sensitive to predict to perinatal outcome, than assessment of each alone. In suspected IUGR, cerebro-umbilical ratio (MCA/UA PI) is a better predictor of adverse perinatal outcome than an abnormal MCA PI or Umb API. Best results are obtained when we use MCA/UA PI Ratio, rather than PI 's of middle cerebral artery and Umbilical artery separately⁵.

Absent / reversal of diastolic flow in Umbilical artery is an ominous sign since it carries a grave prognosis and high mortality.

Doppler imaging is of value for monitoring the pregnancy because it can provide indirect evidence of fetal compromise and is known to improve outcomes of high risk pregnancies with Intra-uterine growth restriction. Hence Doppler evaluation is complementary to all other surveillance modalities.

Uterine artery

In the present study, the persistent early diastolic notch beyond 26 weeks of gestation showed a sensitivity of 78.9%. This is slightly higher than the study by Colemann et al 65 who showed sensitivity of the uterine artery notch as 76% for adverse perinatal outcome. This may be because of the included women was with bilateral notches in Colemann study, whereas in present study presence of diastolic notch either left or right nor both were included. However, the analysis done by Farrell et al 62 for reliability of early diastolic notch in uterine artery as predictor for utero-placental insufficiency revealed a sensitivity of 88%. The following table compares the results of the present study with other studies⁵:

RESULTS

We studied about 30 pregnancies with clinical suspicion of IUGR. Mean birth weight at delivery was 2.18kg +/- 0.26 kg (2SD). 70% of neonates (n=21) had birth weight of less than 2.5 kg. 63 % (n=19) fetuses had at least one adverse outcome. Remaining 37% (n=11) fetuses had favorable outcome. There were 3 intrauterine deaths and 27 live births. Of the 27 live births 6 Neonates were admitted to NICU. 7 neonates had 5min APGAR score of less than 7 and 9 babies were born by emergency caesarian section.

The sensitivity of uterine artery Doppler study to detect adverse perinatal outcome was 83% when two Doppler parameters were considered.

The sensitivity of Doppler examination of the umbilical artery using PI in predicting perinatal outcome was 84.2 %. Doppler studies of the umbilical artery and uterine artery together had a better sensitivity than that of the individual vessels.

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