

Role of Antenatal Doppler Study in Prediction of Adverse Perinatal Outcome in Growth Restricted Fetuses

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ABSTRACT:

Ante partum fetal surveillance is the corner stone of preventive obstetric management aimed at reducing maternal and perinatal mortality and morbidity. Ante partum detection of fetus at risk of death or compromise in utero remains the major challenge in modern obstetrics. Specific and accurate methods for detection of fetus at risk can result in early appropriate intervention and hence reduce fetal loss.

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I. INTRODUCTION:

Antenatal test of fetal well being depends indirectly on changes in fetal physiology, an aspect of fetus, which until recently, has been relatively inaccessible to study by the paucity of techniques to measure the placental function - the critical organ through which the transfer of nutrients occur. New technologies have now become available in the clinical assessment of placental function. Doppler measurement of the pulsatile blood velocity in umbilical artery gives direct information on fetoplacental circulation and hence identifies placental circulatory failure. Diagnostic ultrasound is the main stay in the evaluation and management of obstetric patients. Fetal growth and development rely on normal uteroplacental and fetoplacental circulation to supply oxygen and nutrients from the maternal circulation. Doppler sonography offers a unique tool for the noninvasive evaluation of physiological hemodynamic fetoplacental blood flow information. There are specific abnormalities in Doppler parameters in asymmetric intrauterine growth retardation.

AIMS & OBJECTIVES:

1. To detect any abnormalities in fetoplacental unit and fetal circulation in IUGR.
2. To identify the hypoxemic fetus & timing delivery so as to precede acidemia.
3. To correlate the occurrence of adverse perinatal outcome with degree of abnormality in doppler indices.

II. Materials & Methods:

Two hundred documented IUGR cases confirmed by clinical evaluation and serial ultrasound biometry were selected for the study and it was done on singleton pregnant women with well- documented period of gestation beyond 34 weeks. Known congenital anomalies were excluded from the study.

III. Results

The study was conducted on 200 third trimester women with ultrasonologically confirmed IUGR cases and the following observations were made.

Among the 200 cases that were confirmed to be IUGR by B-Mode Ultrasound, 179 cases showed abnormalities in the Doppler wave forms. 21 cases revealed normal Doppler wave forms.

Grading Of Doppler Abnormalities

According to the increasing severity of altered Doppler indices in the 200 IUGR cases, we categorized the cases into six from grade 0 (normal Doppler) to grade 5.

Table showing details of Doppler abnormalities.

TABLENO.1

| GRADES | | No | % |
|--------|---|----|------|
| 0 | Normal doppler | 21 | 10.5 |
| 1 | Increased UA PI alone | 38 | 19 |
| 2 | CPR reversal | 93 | 46.5 |
| 3 | Absent/reversed EDF in UA with decreased MCA PI | 19 | 9.5 |
| 4 | Absent/reversed EDF in UA with increased MCA PI | 23 | 11.5 |
| 5 | Ductus venosus alteration | 6 | 3 |

Outcome

Out of the 200 cases, 169 were live born and 24 were neonatal deaths. There were 5 cases of intrauterine deaths of the fetuses and 2 were still born. Out of the live borns, 32 had increased perinatal morbidity characterized by poor apgar scores, development of necrotizing enterocolitis, hypoxic ischemic encephalopathy (HIE), meconium aspiration syndrome (MAS), hyperbilirubinemia and prolonged admission in Neonatal Intensive Care Unit for reasons like sepsis or birth asphyxia.

Outcome data was correlated with Doppler finding in the table given below.

TABLENO.2

| Perinatal Outcome | Number of Patients Grade | | | | | | Total |
|--------------------------------|--------------------------|-------------|-------------|-------------|-------------|------------|--------------|
| | 0 | 1 | 2 | 3 | 4 | 5 | |
| IUD | 0 | 0 | 0 | 0 | 2 [9%] | 3 [50%] | 5 [3%] |
| Stillborn | 0 | 0 | 0 | 0 | 2 [9%] | 0 | 2 [1%] |
| NND | 0 | 1 [3%] | 0 | 3 [16%] | 17 [74%] | 3 [50%] | 24 [12%] |
| Increased Perinatal Morbidity | 0 | 0 | 15 [16%] | 15 [79%] | 2 [9%] | 0 | 32 [16%] |
| No significant adverse outcome | 21 [100%] | 37 [97%] | 78 [84%] | 1 [5%] | 0 | 0 | 137 [68%] |

Most of the babies in the group 0, 1, 2 had a birth weight of 2 to 2.4 kgs.

Most of the babies in group 3 and 4 had birth weights ranging from 1.5 to 1.9 kgs.

In group5, 4 babies weighed less than 1 Kg and 2 babies weighed between 1.5 to 1.9kgs.

Perinatal mortality and morbidity was more in cases with low birth weights more so if birth weight was less than 1.5 k

IV. DISCUSSION

Fetometry by B-Mode Ultrasound is a reliable method of investigation to distinguish between IUGR and normal fetuses. This is probably because in IUGR fetuses, the earliest feature is reduced growth that is readily assessed by a measurement of abdominal circumference that will show consistently lower values than those expected for the particular gestational age. However the B- Mode ultrasound did not reliably detect the adverse perinatal outcome.

Predictive capability of Doppler of adverse outcome in USG confirmed IUGR cases, was analyzed.

Sensitivity of Doppler in predicting adverse perinatal outcome: 100 % Specificity of Doppler in predicting adverse perinatal outcome: 15.3% Predictive value of an abnormal Doppler study: 35.19% Predictive value of a normal Doppler study:100%

V. SUMMARY AND CONCLUSIONS

Diagnosis of IUGR was done by clinical assessment and serial sonography.

* The routine use of SFH measurement together with the use of serial ultrasound examinations in the 3rd trimester of high risk pregnancies detected majority of IUGR cases.

* With the use of Doppler of umbilical and middle cerebral arteries, it is possible to predict that an IUGR fetus is not hypoxic.

* With ductus venosus evaluation, detection of fetal acidemia is possible.

Predictive value of normal Doppler is 100%. It means that if the Doppler is normal in an IUGR fetus the possibility of an abnormal perinatal outcome is very rare. So, unnecessary intervention can be reduced in those pregnancies with normal Doppler and normal amniotic fluid volume.

There is a strict co-relation between abnormal umbilical Doppler velocimetry and an increased incidence of perinatal complications in an IUGR fetus.

Days of admission to NICU and incidence of perinatal mortality are increased with the worsening of Doppler velocimetry.

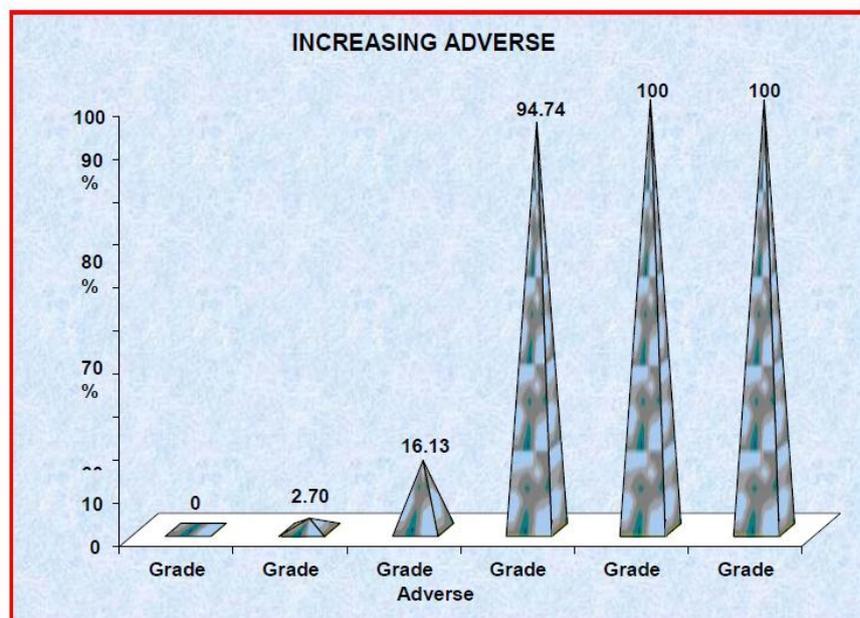
In cases with absent and reversed diastolic flow in umbilical artery the perinatal morbidity is nearly 100%. The perinatal mortality in cases of ductus venosus alteration is 100%. In cases with differential shunting of blood flow to the fetal brain, frequent monitoring and early delivery should be done.

The Doppler ultrasound finding of increased resistance of umbilical artery and decreased resistance of middle cerebral artery, detects the fetus at risk of complications 2 weeks earlier than the conventional methods like NST.

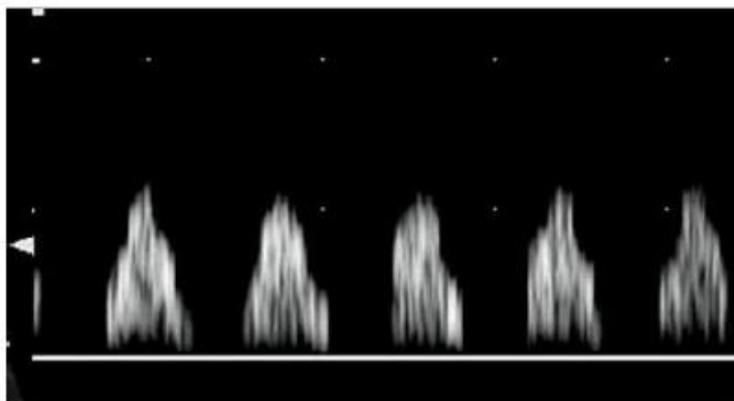
After identifying those fetuses at risk of complications, close monitoring is done by non stress test and biophysical scoring for planning the delivery so as to improve the perinatal outcome.

Since ductus venosus has been shown to cause irreversible fetal compromise and inevitably leads to fetal demise, close monitoring should be done so as to deliver before the fetus becomes acidotic which is shown by the increase in ductus PI values

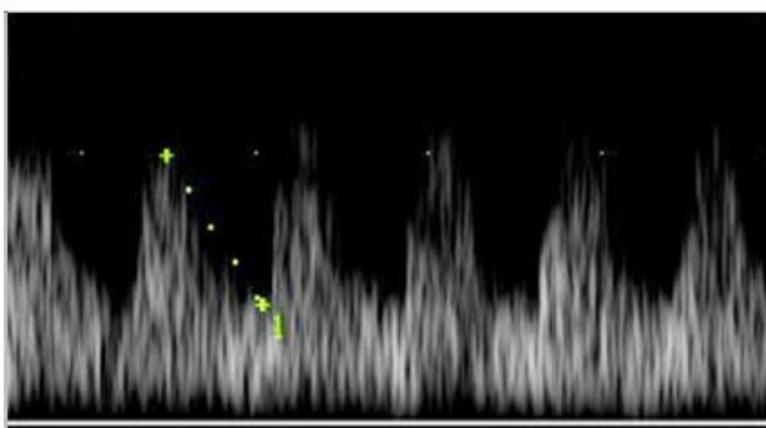
Thus Doppler can be used as a prognostic tool in IUGR fetus as it gives an accurate prediction of the potentially compromised IUGR fetus.



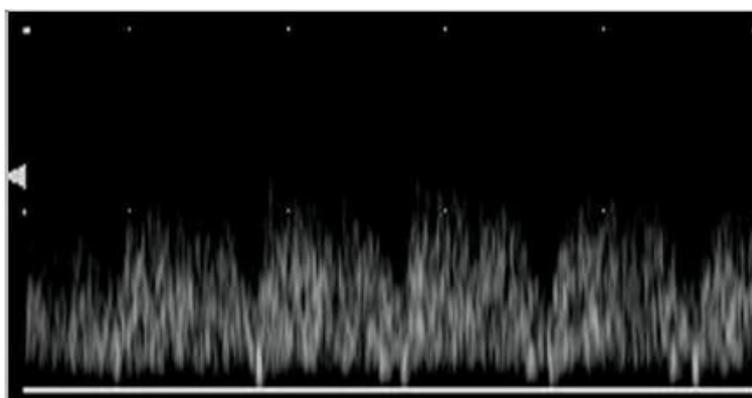
ABSENT / REVERSED EDF IN UA WITH DECREASED MCA PI



UMBILICALARTERY



MIDDLECEREBRALARTERY



DUCTUSVENOSUS

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