Parameteric estimation in doppler’s effect forecasts

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Abstract. In present study, we have attempted the Umbilical artery evaluation which will further help us to recognize the high risk IUGR cases by the AEDV or the REDV. Objective of this paper is to estimate the utility of the umbilical artery including mid cerebral artery (MCA) parameters in Doppler’s effect forecasts of perinatal negative effects in medically diagnosed IUGR pregnancies. PI of MCA was studied in all our 50 cases. It is found that PI of MCA had the sensitivity of 87.5% & the low specificity of 46% in forecasting negative perinatal outcomes. In this study it is observed that in contrast to 88% in UA-PI and 66% in MCA-PI, the diagnostic precision of the MCA / UATPI ratio (90 per cent) was higher when taken separately.

1. Introduction
An elevated risk of perinatal death, morbidity, and abnormal neuro development is correlated with Fetal Intra Uterine Growth Restriction (IUGR) [1-3]. The Ultra-sonographic (US) bio-metre helps to classify the heterogeneous community of small for gestational age foetuses that involve IUGR foetuses, small-constitution foetuses, as well as (misdiagnosed as small) foetuses with acceptable development. A primary goal of antenatal treatment is the proper diagnosis of the unhealthy IUGR foetus to allow for prompt intervention.

A statistical-analysis of controlled, randomized UA Doppler velocimetry trials in risky pregnancies (principally linked pregnancies as well as presumed IUGR) showed that its implementation is related to a prenatal and postnatal morning decrease pattern of Doppler velocimetry in highly risky (principally connected risky pregnancy and presumed IUGR) pregnancies. Doppler US human foetal circulation tests have demonstrated that there is a substantial drop in the Mid Cerebral Arterial (MCA) and umbilical arterial pulsatility index (UA-PI) in foetuses with IUGR relative to those in normal foetuses [4].

Findings from a set of interventions show that the Doppler Function of MCAP1 / UAPI is much more reliable than that of the US Doppler alone [5-7] when estimating poor pregnancy consequence. However, our study aims at identifying the function of UA as well as MCA Doppler US in predicting the negative impacts of prenatal and postnatal pregnancies and the role of Doppler velocimetry in clinical progress.

1.1. Aims and Objectives
To measure the utility of the umbilical artery including mid cerebral artery (MCA) parameters Doppler’s effect forecasts of perinatal negative effects in medically diagnosed IUGR pregnancies.
Prognosticate the outcome. To follow-up & monitor moderate & mild IUGR cases under obstetrician’s care.

2. Review of Literature
The cerebral & umbilical blood flow movements feature in healthy and prolonged pregnancies in development have been studied by Wladimiroff et al. [8]. They find that the cerebral-placental ratio only varies considerably from 26 and 38 weeks of GA. They also found that before the 25th week, there was no substantial variation between the cycles perceived in the comparative analysis of the blood speed types of the MCA and umbilical artery.

The study of FMC flow in 81 SMS foetuses (SSFs) using coloured-flow analysis including Pulsed Doppler tests by Vyas et al. [9]. The flow-pulsatility (PI) impedances were observed to be slightly lower as well as the blood supply rate averaging the corresponding benchmarks of the IUGR.

The ultrasound Doppler offered a tool that was not invasive to study foetal haemodynamic, as observed by Campbell, Vyas, Nicolaides [10]. In the samples collected from small cordocentesis for gestational age (SGA) foetuses, they analysed changes in foetal haemodynamics with respect to the foetal blood stress.

The findings of UA Doppler velocity were analysed in three classes of pregnancy cases by Karsdorp et al. [11] reported 214 cases with positive end-diastolic velocity (PEDV), 178 with absent fin-diastolic velocity (AEDV) and in 67 cases with a reverse-end-diastolic velocity (REDV). In their view, absence and REDV waveforms were more likely to evolve in the pregnancies that were complicated by IUGR. The gross perinatal mortality in their study was 28 percent. There have been considerably more neonates of the NICU of the AEDV flow community.

Soregaroli, Bonera & Danti [12] retrospectively studied 578 singleton pregnancies with the diagnosis of IUGR. From this population, they formed: 1) the normal NUAPI fetuses -334; 2) the increased PI of UA but with normal diastolic flow - AUAPI fetuses-137; 3) the absent end-diastolic flow AEDF fetuses -70; 4) the reversed end diastolic flow; REDV fetuses -37. Fetal biometry, amniotic fluid and fetal-maternal Doppler velocimetry were done in all the above patients.

3. Materials And Methods
This study was conducted for a period of two years from April 2007 to March 2009. The patients for this study were those who attended the department of Obstetrics of Shadan Hospital. The gestational Age of pregnancy was assessed by an accurate documentation of normal menstrual cycle & the last menstrual period (LMP). The antenatal patients were referred for Ultrasound Scanning (USG) with a clinical suspicion of IUGR by the Obstetricians initially. In most patients the USG biometry was performed before 20th gestational week for purposes of accurately assess the gestational age (GA) & Estimated Fetal Birth Weight (EFB.W).

4. Observation and Results
Appropriate wave modes of all the 50 patients have been collected out of the 50 pregnancies examined. Seven Doppler studies have been followed up. Among these 24 fetuses (48%) had abnormal outcomes, of those; 8 had more than one abnormal outcome. But 26 (52%) were born with no complications.
Table 1: Spectral Characteristics of Absent Vs Reversed End Diastolic Flow (EDF)

| Spectral Characteristics | No. of Cases | IUD | Post Natal Mortality |
|--------------------------|--------------|-----|----------------------|
| Absent EDF               | 09           | 03  | 33.33%               |
| Reversed EDF             | 04           | 4   | 100%                 |

As shown in table no. 1, the EDF had direct relationship to the post natal mortality rate of IUGR fetuses. It can be seen that all the 4 foeti with reversed EDF died (100%) of the 9 foeti with absent EDF only 3 died (33.33%). The Umbilical artery evaluation helped us to recognize the high risk IUGR cases by the absence of end diastolic flow (AEDV) or the reversed end diastolic flow volume (REDV).

Table 2: Adverse Outcomes

| Adverse Outcomes       | No. of Cases |
|------------------------|--------------|
| Emergency CS           | 12           |
| Intrauterine deaths    | 7            |
| Low APGAR score        | 7            |
| Admission to NICU      | 8            |

As seen in table no. 2, of the IUGR fetuses imaged, Seven intrauterine deaths have occurred and 43 live births were reported. Of these 43 live births, seven newborns had score less than 7 in the 5 min APGAR ranking. NICU was entitled to 8 newborns. 12 babies were delivered by emergency caesarian sections. There were 7 IUDs among the 50 IUGR cases in this study. Of these 7 cases, 4 had the reversal of diastolic flow and another 3 had absent diastolic flow ante mortem.

Table 3: Diagnostic accuracy of Doppler Indices

| Doppler indices        | Diagnostics reliability |
|------------------------|-------------------------|
| MCA PI                 | 66%                     |
| UA PI                  | 88%                     |
| MCA/UA PI ratio (CPR)  | 90%                     |

As shown in table no. 3, CPR value has more diagnostic accuracy (90%) than PI of Umbilical Artery or PI of MCA in Predicting the adverse outcome.

5. Discussion

If there has been intrauterine delay in development (IUGR) during the third quarter in pregnancy, the obstetrician must decide if the fetus is either short or "constitutional" as a result of defective placental infusion. When resolving this problem, Doppler flow velocity analysis could be reliable. Hemodynamic changes are implicated in fetal developmental retardation, particularly in the fetuses and the umbilical cord. A Doppler index which represents each of these areasvascular beds can be useful for detecting foetuses with enhanced placental and/or decreased cerebral resistance.
Table 4: Comparison of present study with different studies for mortality rate in case of absent/reversal of EPF

| Authors                  | No  | Mortality |
|--------------------------|-----|-----------|
| Battaglia etal [13](1993)| 26  | 58%       |
| Karsdorp et al [11](1994)| 245 | 50%       |
| Present study             | 13  | 53%       |

This table shows that our research findings are close to those of previously published reports on perinatal mortality in cases of absent/reversal EDV of umbilical artery.

6. Conclusions
An ominous symptom is the presence of absent/reversal EDV in the umbilical artery as it holds a severe prognosis and high mortality. This gives a sign for serious consideration of early delivery is the finding of AEDV or REDV in pregnancy with established IUGR. In managing pregnancies at increased risk, such as those with proven IUGR, the Doppler study has the greatest utilization. Umbilical artery tests have helped to identify at-risk foetuses for hypoxia and acidosis. UA-PI had a sensitivity of 91.6% and a specificity of 84.6%. The specificity of UA-PI was equal to specificity of CPR. PI of MCA had high sensitivity of 87.5% and low specificity of 46% in predicting adverse perinatal outcome. In contrast to UA-PI and CPR, PI of MCA had low specificity (46%) in prediction of adverse perinatal effect. In contrast with 88% for UA-PI and 66% for MCA PI, the MCA/UA PI proportion was 90% predictive precision. Moreover, 95.8% for CPR whereas 84.6% more for UA-PI & MCA-PI were diagnosis variable.

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