

## FETAL UMBILICAL ARTERY DOPPLER STUDY IN I. U. G. R. BABIES

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### SUMMARY

To investigate the ability of Umbilical artery Doppler findings to identify true cases at risk of fetal distress among clinically judged cases of IUGR, we at L. T. M. G. H. Bombay conducted a study of 30 cases clinically detected as IUGR for their umbilical artery Doppler wave forms. The ratio of peak systolic to least diastolic flow velocity was measured as an index of placental flow resistance. Cardiotocographic studies were also done. These findings were compared with the delivery outcome and Apgar scores.

### INTRODUCTION

The concept of Intra-Uterine growth retardation was introduced by Mc Burney in 1947, when he emphasised the relationship of maternal vascular diseases and presence of low birth weight of term babies. Because of lack of direct information on placental function, fetal growth is taken to reflect placental adequacy. (Reuwer et al 1987) Hence we at LTMGH, conducted a study to investigate the ability of umbilical artery doppler findings to identify true cases at risk of fetal distress among clinically judged cases compromised by IUGR.

### MATERIALS AND METHODS

30 patients with singleton pregnancies admitted for IUGR were studied, the criteria for sub-optimum fetal growth being fundal growth delay of 4 weeks. At hospital admission the gestational age ranged from 28 to 40 weeks. All pregnancies were well dated. Machine used was a sector scanner with a 3.5 MHz and 5 MHz with pulsed wave Doppler. Fetal umbilical artery studies were done. The ratio of peak systolic to least diastolic flow velocity was measured as an index of placental flow resistance, (S/D ratio).

### RESULTS AND ANALYSIS

Table I : Shows the breakup of the cases.

It was seen that a large percentage were pregnancy induced hypertension (40%), Anaemia

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(20%), BOH (16%). We also included one case of post term pregnancy, diabetes, and a known case of multiple fetal anomalies.

Table II : Shows the cardiotocographic results. It was seen that, of the hypertension cases only five (41%) had their NST non-reactive. Post term pregnancy had reactive NST and of Anaemia only 2(50%) were non-reactive.

Table I

## Case Break - Up

| Type                | No |
|---------------------|----|
| PIH                 | 12 |
| Anaemia             | 6  |
| Abruptio Placenta   | 2  |
| Diabetes            | 1  |
| Bad Obs. History    | 5  |
| Thr. Preterm Labor  | 2  |
| Fetal Anomaly       | 1  |
| Post Term Pregnancy | 1  |
| Total               | 30 |

Table II

## Cardiotocographic Findings

| Type                | Reactive | Nonreactive |
|---------------------|----------|-------------|
| PIH                 | 7        | 5           |
| Anaemia             | 4        | 2           |
| Abruptio Placenta   | 1        | 1           |
| Diabetes            | 1        | -           |
| Bad Obs. History    | 4        | 1           |
| Thr. Preterm Labor  | 2        | -           |
| Fetal Anomaly       | -        | 1           |
| Post Term Pregnancy | 1        | -           |

Table III : Shows the doppler findings of each of these types. The S/D ratio was considered significant if it was more than 3 or there was absent and diastolic flow or even reverse flow in diastole. Against 41% of hypertensive patients, who had their NST non-reactive, 7(51%) had their ratio significant. The post term pregnancy patient who had a reactive NST also showed a significant ratio. (absent end diastolic volume).

Table IV : Shows the mode of delivery. It was seen that the Caesarian rate was 11(36%) and forceps 6(20%) and vaccum 4(12%). Diabetes and post term pregnancy underwent a Caesarian section. Of the five BUH patients, 2 were posted for elective caesarian section, the chief indication being their Bad Obstetric history.

Table V : Shows the mode of delivery as per doppler findings. Amongst patients having ratio less than 3, there were 3 Caesarian sections, 2 being elective for BOH. Amongst patients having ratio more than 3, three patients underwent Caesarian section, one being case of abruptio and another being case of imminent eclampsia. Amongst patients having absent end diastolic volume, there was only one normal (10.4%) vaginal delivery, a case of multiple congenital anomalies, incompatible with life. Of the patients having reverse flow in diastole, there was a Caesarian section, baby was a fresh still birth, a case of abruptio placenta. The other patient was a case of PIH who refused admission and was lost to follow-up but returned a few days later with an intrauterine fetal death.

Table VI : This shows the perinatal outcome. There was not a single still birth in the group having the ratio less than 3. With elevated ratio more than 3, 30% had an Apgar less than 7 at the end of 5 minutes. Fetuses with absent end diastolic ratio, 4 babies (57%) had Apgar less than 7 at the end of 5 minutes. Fetuses with elevated ratios and absent end diastolic volume had significantly higher in-



Table III

Doppler Findings

| Type                | S/D < 3 | S/D > 3 | AEDV | REDV |
|---------------------|---------|---------|------|------|
| PIH                 | 5       | 4       | 2    | 1    |
| Anaemia             | 3       | 2       | 1    | -    |
| Abruptio Placenta   | -       | 1       | -    | 1    |
| Diabetes            | -       | -       | 1    | -    |
| Bad Obst. History   | 3       | 1       | 1    | -    |
| Thr. Preterm Labor  | -       | 2       | -    | -    |
| Fetal Anomaly       | -       | -       | 1    | -    |
| Post Term Pregnancy | -       | -       | 1    | -    |

Table IV

Mode of Delivery Type Wise

| Type                | Vaginal | Forceps | Vaccum | LSCS |
|---------------------|---------|---------|--------|------|
| PIH                 | 2       | 3       | 2      | 5    |
| Anaemia             | 2       | 2       | 1      | 1    |
| Abruptio Placenta   | -       | 1       | -      | 1    |
| Diabetes            | -       | -       | -      | 1    |
| Bad Obst. History   | 2       | -       | 1      | 2    |
| Thr. Preterm Labor  | 2       | -       | -      | -    |
| Fetal Anomaly       | 1       | -       | -      | -    |
| Post Term Pregnancy | -       | -       | -      | 1    |

Table V

Mode of Delivery S/D Ratio Wise

| Type | Vaginal | Forceps | Vaccum | LSCS |
|------|---------|---------|--------|------|
| < 3  | 5       | 2       | 1      | 3    |
| > 3  | 2       | 3       | 2      | 3    |
| AEDV | 1       | 1       | 1      | 4    |
| REDV | 1       | -       | -      | 1    |

Table VI

| Type            | Perinatal Outcome |         |           |          |
|-----------------|-------------------|---------|-----------|----------|
|                 | < 3               | > 3     | AEDV      | REDV     |
| Normal          | 4 (36.3%)         | 3 (30%) | 2 (28.5%) | -        |
| SGA             | 3 (27.2%)         | 6 (60%) | 4 (57.1%) | 2 (100%) |
| Meconium        | 3 (27.2%)         | 4 (40%) | 5 (71.4%) | 2 (100%) |
| SB              | -                 | -       | -         | 2 (100%) |
| APGAR < 7 1 min | 2 (18%)           | 2 (20%) | 5 (71.4%) | -        |
| 5 min           | 1 (9%)            | 3 (30%) | 4 (57.1%) | -        |

idence of adverse pregnancy outcomes as judged by small for gestational age, meconium at birth, fetal distress in labour, caesarian section, 5 minute Apgar less than 7. Fetuses with elevated ratios were delivered at earlier gestational age, were low birth weight and spent more time in intensive care units.

#### DISCUSSION

The clinical diagnosis of placental failure is still a presumptive diagnosis based on suspicion of IUGR and Cardiotocographic signs of fetal distress. However, inaccuracies may occur with intra uterine growth assessment (Villar and Belizah 1986) and fetal distress is an indirect and late sign of impairment of placental circulation. This occurs because the difference between sub-optimum fetal growth and adequate growth of genetically small infant is difficult to judge. Hence some true growth retarded fetuses remain undetected while some normally growing ones are unnecessarily treated because of an erroneously diagnosed IUGR. Doppler allows an early and accurate identification of those fetuses who will become distressed perinatally. Doppler helps to identify fetuses clinically suspected of IUGR, having adequate placental circulation.

Fetal placental vasculature is normally a low resistance with resistance decreasing with

increasing gestational age. (Trudinger and Warwick, 1985) In umbilical arteries, there is normally very low distal impedance to flow and as a result there is a forward flow in the vessel throughout the cardiac cycle. (Erskine et al 1985)

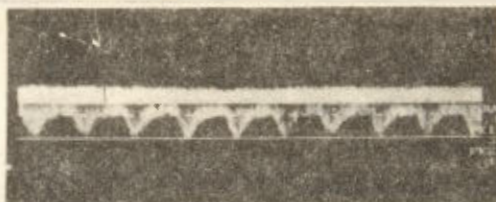


Fig. 1 : Normal S/D Ratio.

In victims of placental insufficiency it was observed that there was a high placental flow resistance, which increased in contrast to the expected decrease during the last trimester of pregnancy.



Fig. 2 : Absent end diastolic flow.



Moderately high placental resistance, as reflected by diastolic zero volume, may precede signs of fetal distress by several weeks or even months, the findings does not give guidance on the optimum time of delivery. Most infants are premature and could perhaps gain some weeks of gestation before cardiocotographic signs of fetal distress develop. Hence diastolic zero flow alone is an indication for intense cardiocotographic monitoring, but still allows expectant management

verse flow in diastole, it signifies impending fetal death and an emergency Caesarian Section should be performed.

**CONCLUSION**

The identification of those growth retarded fetuses at risk of perinatal morbidity and mortality is more important than the prediction of low birth weight. Moreover, doppler separates the true compromised infants from the uncompromised infants.

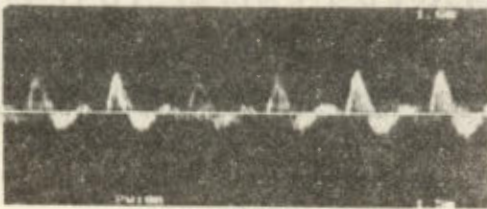


Fig. 3 : Reverse end diastolic.

taking gestational age into account. This is reflected in our study, where of the 30 cases studied, in only 36% of cases operative intervention was needed. In cases having extremely high placental resistance, as reflected by re-

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most prevalent genital pathogen found in pregnant women (Schacter, 1975). Fetal genital infection with C. trachomatis and subsequent maternal and fetal outcome is still controversial. The organism has been recovered from the cervix of 4.4 to 9.8% of asymptomatic or low risk females (Phillips et

**INTRODUCTION**  
Genital infection with Chlamydia trachomatis is reported to be the commonest sexually transmitted disease and is one of the most prevalent genital pathogens found in pregnant women (Schacter, 1975). Fetal genital infection with C. trachomatis and subsequent maternal and fetal outcome is still controversial. The organism has been recovered from the cervix of 4.4 to 9.8% of asymptomatic or low risk females (Phillips et