

ANTENATAL FETAL SURVEILLANCE IN IUGR AND ITS OUTCOME

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OBJECTIVES: To search out IUGR cases on the basis of clinical examination (symphysiofundal height) & to confirm them with USG at 32 weeks of gestation. To validate Modified Biophysical Profile in all confirmed cases of IUGR from 32 weeks of gestation & all cases where AFI is decreased, NST is reactive & pregnancy is less than 36 weeks of gestation. To validate Complete Biophysical Profile & Color Doppler in cases: When pregnancy is less than 36 weeks of gestation & both NST & AFI are abnormal. **STUDY DESIGN:** prospective study carried out over 100 confirmed IUGR cases. **MATERIALS AND METHODS:** The IUGR cases were identified first by screening with SFH then confirmation with fetal abdominal circumference by USG at 32 weeks. All the cases were initially monitored with MBPP and BPP and color Doppler of Umbilical and MCA were performed in cases with abnormal MBPP having a non reactive NST. **RESULTS:** The incidence of IUGR was 3.86% in present study. The MBPP proved to be an effective tool for initial monitoring of IUGR cases with high specificity of 70.83%. The BPP and PI indices of Umbilical and middle cerebral arteries had good correlation with perinatal outcome i.e. BPP with sensitivity and PPV of 92.3% and 85.71%, Umbilical artery PI with sensitivity of 69.23% & positive predictive value of 90% and MCA PI with high specificity of 83.33% and PPV of 93.33%. **CONCLUSION:** MBPP is an effective initial surveillance tool in IUGR cases. The Biophysical profile, umbilical artery Doppler and Middle Cerebral artery Doppler have good correlation with perinatal outcome but further guidelines are required to integrate these surveillance modalities with each other.

KEY WORDS: IUGR, MBPP, MCA PI, UA PI

INTRODUCTION: Intrauterine growth restriction is defined as inability of a fetus to achieve its genetic growth potential. Till date its etiology is obscure and despite of intense antenatal surveillance the perinatal morbidity and mortality is high. The present antenatal fetal surveillance modalities consists of daily fetal movement counts, NST, Modified biophysical profile, complete biophysical profile and Doppler study of uterine and fetal vessels. An effective protocol for integration of these diagnostic tests is yet to be defined. This study aims at diagnosis of IUGR in antenatal cases and validation of MBPP, BPP and umbilical artery & middle cerebral artery Doppler in these cases for prediction of adverse perinatal outcome.

MATERIALS AND METHODS: Present study was a prospective study over 100 confirmed IUGR cases. The cases were selected by screening antenatal case at 32 weeks of gestation by SFH¹ and

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then confirmation with fetal abdominal circumference² by USG. Cases with congenital malformation, placenta previa and multiple pregnancies were excluded. All the confirmed cases were monitored with MBPP weekly initially and MBPP was validated in all those cases. In cases with decreased AFI only, the frequency of performing MBPP was increased to twice weekly. BPP, umbilical artery Doppler³ and MCA Doppler⁴ were reserved for those cases which had a non reactive NST with or without decreased AFI. The indications of delivery were term pregnancy, BPP score ≤ 4 , absent or reversed flow in umbilical artery Doppler or reversal of cerebroplacental ratio. The cesarean delivery was preferred in all the cases where Bishop Score was unfavorable or severe oligohydramnios was present. Intrapartum monitoring was done by intermittent auscultation. The outcome parameters observed were APGAR < 7 at 5 min after birth, NICU admission and perinatal death. The sensitivity specificity, positive predictive value and negative predictive value were calculated for each test.

OBSERVATIONS AND RESULTS: A total of 2587 cases attending Antenatal OPD were screened with the help of symphysiofundal height and out of 324 screen positive cases 100 cases whose fetal Abdominal circumference is below 5th percentile (< 2 SD) were labeled as confirmed IUGR cases (**3.86% incidence**). Out of 100 cases, 32 cases were delivered vaginally and LSCS was done in 68 of cases. More than half of babies required NICU admissions. There were 10 early neonatal death and 2 intrauterine fetal demises in this study. Out of these two cases one patient has refused termination at 36 week of gestation when absent diastolic flow was observed and presented with IUD after 4 days. The efficacy of fetal abdominal circumference in diagnosing IUGR cases was reflected by, sensitivity of 94.44%, Specificity of 28.57%, positive predictive value of 77.27% & negative predictive value of 66.67%. The distribution of various parameters according to outcome is shown in **table I**:

Table I: showing distribution of demographic parameters, test results and fetal variable according to outcome

Characteristic	Good perinatal outcome(48)	Adverse perinatal outcome(52)	P value
Maternal age (years)	24.95 \pm 2.52	23.65 \pm 3.57	0.71
MEAN ABDOMINAL CIRCUMFERENCE (mm)	242.55 \pm 4.14	238.74 \pm 4.92	0.43
No of abnormal MBPP cases N (%)	14 (29.16%)	30 (57.69%)	-
BPP performed N (%)	6 (12.5%)	26 (50%)	
Score >6	2	2	
Score =6	2	6	
Score <6	2	18	
Umbilical artery Doppler performed	6	26	
PI > 2 SD above mean n/N (%)			
AERDF n/N (%)	2/6 (33.33%) 0/6	20/26 (76.92%) 15/26 (57.69%)	
MCA PI performed	6	26	
MCAPI >2 SD below mean n/N (%)	0/6	14/26 (53.84%)	
MEAN GESTATIONAL AGE(weeks)	37.125 \pm 0.797	36.23 \pm 0.992	0.36
Mean birth weight (kg)	2.33 \pm 0.178	2.048 \pm 0.361	0.78

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Antepartum fetal surveillance with Modified Biophysical Profile was done in all these 100 cases. There were total 44 cases with abnormal MBPP, 38 had decreased AFI and 32 cases had NR NST. All the 32 cases with NR NST were further monitored with Complete Biophysical Profile, Umbilical artery Doppler and Middle cerebral artery Doppler.

The outcome parameters were APGAR scores <7 at 5 min after birth, NICU admission and Perinatal death. The validity of MBPP was calculated in all the 100 cases. The validity of BPP, UA Doppler and MCA Doppler is calculated in 32 cases. The results of each test is shown in table II

Table II : Validity scores of each test for combined adverse perinatal outcome

Test	Outcome parameter	N	Sensitivity	Specificity	PPV	NPV
MBPP	APO	100	57.69%	70.83%	68.18%	60.71%
BPP	APO	32	92.30%	33.33%	85.71%	50%
UAPI	APO	32	69.23%	66.67%	90%	33.33%
MCAPI	APO	32	91.67%	16.67%	42.30%	75%

DISCUSSION: Antenatal fetal surveillance is of utmost importance in cases of IUGR where decision of time of delivery is very crucial. Incidence of IUD is high among these cases so intense fetal surveillance is helpful in decision making for time of delivery; still one has to keep in mind the cost and time expenditure associated with these procedures. In the present study diagnosing IUGR the validity of AC below 5th percentile were sensitivity 94.44%, specificity 28.57%, positive predictive value of 77.27% and Negative predictive value of 66.67%. On comparing the results the sensitivity and Positive predictive values are higher and specificity & negative predictive value are lower than other studies^{5, 6}. The reason of disparity may be the difference in the cut off AC percentiles values, size of study population and the test was applied to a population already suspected to have IUGR (on the basis of SFH) in the present study.

The validity of MBPP in present study was sensitivity 57.69%, specificity 70.83%, positive predictive value 68.18% & negative predictive value 60.71%. The sensitivity and specificity are comparable to Bardakci et al⁷ (60% & 87.1%). The variation in PPV and NPV was seen which can be attributed to difference in sample size and application of test in prescreened population (with SFH and AC) in the present study. The trend of results is similar to Jamal et al⁸ though they had found a very high validity scores.

There was good correlation of biophysical profile score with perinatal outcome reflected by sensitivity and positive predictive value of 92.3% and 85.71% respectively. The specificity and Negative predictive value were low i.e. 33.33% and 50% respectively. The sensitivity and PPV are comparable to Jamal et al⁸ (84.6% and 91.7%) but there is disparity in specificity and negative predictive value (97.4% and 95%). Performing of BPP in a population already having one or two abnormal components (NST & AFI) may be the reason of disparity.

There was poor correlation of Umbilical artery PI with perinatal outcome except for a high positive predictive value (sensitivity 69.23%, specificity 66.67%, PPV 90% and NPV 33.33%). The results are comparable to Dhand et al⁹ except for sensitivity (44%) which is higher in the present study. The difference may be due to performing of UA Doppler in the prescreened population in the present study. Turan et al¹⁰ had performed the UA Doppler in the prescreened population and the sensitivity and specificity (65% and 54% respectively) were comparable to the present study but the PPV and NPV differ from present study (37% and 79%

respectively). The reason may be Turan et al had used UA PI > 2 SD above mean as diagnostic criteria for IUGR and AREDF in UA as prognostic criteria whereas in present study UA PI > 2 SD above mean is prognostic criteria.

In the present study MCA PI has shown good specificity of 83.33% and positive predictive value of 93.33% which is comparable to Dhand et al⁹. The sensitivity (53.84%) and negative predictive (29.41%) value of the MCA PI of present study is lower than that of Dhand et al⁹ (94% and 65%). The difference in sensitivity and negative predictive value may be attributed to different sample sizes. Validity scores of present study are in accordance with the study done by Lakhrar et al¹¹ but differ totally from Turan et al¹⁰ due to previously explained reasons.

There are changes observed in the antenatal fetal surveillance in IUGR cases such as; use of UA PI > 2 SD above mean as diagnostic modality and reserving absent or reversed end diastolic flow for prognostic purpose. Recently Dhand et al stressed the importance of MCA PI in management of late onset IUGR cases and role of absent diastolic pulsation of MCA as indicator of adverse perinatal outcome.

MBPP is an effective initial surveillance tool in IUGR cases. Though it has a low sensitivity (57.69%) but it has good specificity, PPV and NPV. By using MBPP as initial surveillance method one saves time, resources and cost of monitoring. The 'at risk' population is effectively selected and resources can be directed to more needful cases.

The Biophysical profile, umbilical artery Doppler and Middle Cerebral artery Doppler have good correlation with perinatal outcome but further guidelines are required to integrate these surveillance modalities with each other.

Each day gained in utero is boon to fetus but in IUGR cases prolongation of intrauterine life should be carefully balanced with risk of intrauterine death. The selection of appropriate time of delivery is of utmost importance in management of intrauterine growth restriction.

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