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Research Article

Clinical study of modified biophysical profile (MBPP) as an antepartum surveillance test in high risk pregnancies

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Abstract: In most centres, nearly one-third to one-half of the prenatal deaths occurs in the antenatal period. The objectives of antepartum testing are to improve the prenatal outcome through the timely diagnosis and treatment of fetal compromise and to confirm the well being of the normal fetus, thereby preventing unnecessary intervention**.** This study was conducted at Apollo BGS Hospital attending the ante-natal outpatient department or admitted to the wards, during a period of 1 yr from November 2011 to October 2012. In this study, MBPP has been used as a primary antepartum fetal surveillance method for high risk pregnancies and an improved prenatal outcome has been achieved in the MBPP study group through timely intervention**.** A healthy newborn is the goal of every expectant mother and her physician. MBPP has been used as a primary antepartum fetal surveillance method for high risk pregnancies and an improved prenatal outcome has been achieved in this study. MBPP is an effective antepartum surveillance test and is easy to perform and interpret.

Keywords: Modified biophysical profile, High risk pregnancy, Antepartum fetal surveillance.

INTRODUCTION

In most centers, nearly one-third to one-half of the prenatal deaths occurs in the antenatal period. The objectives of antepartum testing are to improve the prenatal outcome through the timely diagnosis and treatment of fetal compromise and to confirm the well being of the normal fetus, thereby preventing unnecessary intervention. The assessment of fetal well-being in the 3rd trimester of pregnancy depends on many variables including fetal size, Amniotic fluid volume, fetal biophysical profile, the Non stress test, Umbilical cord arterial Doppler wave forms.

Modified Bio-Physical Profile (MBPP)

Clark and colleagues [1] Vintzilleous et al. [2] and Nageotte and colleagues [3] used the modification of bio-physical profile by combining Non-stress test and Amniotic fluid index. They claimed that MBPP being a combination of a short term marker of fetal status i.e., Non-stress test and a long term marker of placental function i.e., Amniotic fluid index is the best available test for primary fetal surveillance. The test has excellent negative and positive predictive values of 0.8/1000 and 1.5 % respectively. In this study, MBPP is used as the primary surveillance test in high risk pregnancy to study the effectiveness and outcome of pregnancy.

MATERIALS AND METHODS

This study was conducted at Apollo BGS Hospital, Mysore. In this prospective study 50 pregnant women with high risk factors attending the ante-natal outpatient department or admitted to the wards because of their high risk factors, during a period of 1 yr from November 2011 to October 2012 were considered as the "Test Group". Another 50 pregnant women record with similar high risk factors, from the period of November 2010 to October 2011 were scrutinized retrospectively and considered as the "Control Group".

The risk factors included in the study were pre-eclamptic toxaemia / eclampsia, anaemia, pregnancies beyond 40 wks, pregnancies with uncertain dates, bad obstetric history, clinically suspected IUGR, heart disease complicating pregnancy, gestational Diabetes, decreased fetal movements. Fetuses with congenital anomalies, multi-fetal pregnancies, previous LSCS for obstetric indications without any risk factor complicating the present pregnancy were excluded from the study.

The Non-Stress test was performed with Cardiootocogram(Huntleigh model-BD400XS-Sonicaid). Recording of the FHR, Uterine Contractions and fetal movements was done. The trace was designated reactive if more than two fetal movements

with acceleration of more than or equal to 15 beats lasting for more than or equal to 15 sacs, with good beat to beat variability and no decelerations. If reactivity criteria are not seen in this extended period, the trace was deemed nonreactive.

Real time ultrasound scanning was performed using a 3.5 MHz sector probe (Seimens-Sonoline 500). An AFI of more than 5 was considered normal and less than or equal to 5 was considered abnormal. If both parameters were normal the test was repeated weekly, biweekly or daily and if reactive earlier. Delivery was prompted if the test results were abnormal. Either a spontaneously labour awaited or labour induced depending on gestational age and Bishop's score. The details of the delivery noted.

The Control Group was selected by retrospectively scrutinizing the case sheets of 50 High risk cases with factors mentioned earlier from the period of November 2010 to October 2011 from the records section. During this period the MBPP was not used as a method of ante-partum surveillance. The details like name, age, I.P. No., risk factor, gestational age at delivery, mode of delivery, outcome of delivery, with the details of the prenatal events were noted down in proforma.The details in the proforma of both the study and control groups were entered into a master chart and various statistical analysis were done.

OBSERVATIONS

The study and control groups consisted of 50 high risk pregnant women each. Totally 72 MBPP tests were performed on 50 women in the study group and the following observations were made.

Patient Characteristics

Pregnancies with pre-eclamptic toxemia and decreased fetal movements formed the major risk factors in both the groups. Majority of the patients were primi gravidae in both test and control groups i.e. 56% and 52% respectively. The majority of women belonged to the 26-30 age groups in test and 21-25 age groups in control. The numbers of tests performed were 72 on 50 patients. The average number of tests per patient was 1.44. 68% of the patients had 1 test. Maximum number of tests was done from 38 wks onwards. The earliest test was done at 31 wks.

Test Results

The last test results which are given Table-1 in are considered for decision making and studying the outcome. The last NST results showed that 68% of the tests were reactive, 18% were non-reactive and 14% showed equivocal response. The last AFI results show 62% being above five and considered normal in this study. The MBPP results show that majority of them (50%) had both parameters normal.

Delivery Details

Majority of patients (88%) delivered within 24 hrs.

Table-1: Mode of delivery in both groups

Mode of delivery	Test (%)	Control (%)
Vaginal delivery	17 (34)	17 (34)
Vaccum extraction	03 (06)	04 (8)
Out-let forceps	04 (8)	02(4)
Low-segment caesarian section	26(52)	27 (54)

$\chi^2 = 0.828$, p = 0.843(NS)

The mode of delivery in test and control groups is as shown in Table-1. The incidence of spontaneous vaginal delivery and operative delivery in the test group is almost similar to that in the control group and there has been no increase in the operative intervention in the test group. The number of LSCS done for fetal distress is 19.2% in the test group as compared to 37% in the control group (p- value-0.04=S).

Table-2: Last test result Vs Mode of delivery

a) MBPP

Last MBPP result(No. of cases)	LSCS	Spontaneous delivery	Instrument
Both parameters normal (25)	11	11	03
Both parameters abnormal (10)	8	01	01
NST-Normal & AFI abnormal (9)	4	04	01
NST –Abnormal & AFI Normal (6)	3	01	02
Total (50)	26	17	7

$\chi^2 = 7.008$, p = 0.3201(NS)

b) NST

Last NST result(No. of cases)	LSCS	Spontaneous delivery	Instrument
Reactive (34)	15	15	04
Non-reactive (9)	5	02	02
Equivocal (7)	6	0	01
Total (50)	26	17	7

χ^2 = 6.285 , p = 0.179(NS)

c) AFI

Last AFI result (No. of cases)	LSCS	Spontaneous delivery	Instrument
> 5 (31)	14	12	05
3 -5 (13)	7	04	02
< 3 (6)	5	01	0
Total (50)	26	17	7
χ^2 = 3.151 , p = 0.533(NS)			

The last results versus mode of delivery are as shown in Table 2(a, b, c). The incidence of operative delivery is increased when both the parameters of the test were abnormal. Considering the individual parameters also the incidence of operative delivery is increased in the presence of non-reactive NST and an AFI of <5.

Outcome Details

It is observed that the presence of thick meconium which is of significance is increased whenever the test parameters were abnormal either considered individually or in combination.

The results of fetal APGAR at 5' which is an another parameter of fetal well being at birth with respect to the last test results is studied and the APGAR score of more than 7, which is considered normal, is seen in nearly 50% of the cases when both the test parameters were normal. Values of <7 which is considered abnormal were mostly seen when the test parameters were showing abnormality either considered individually or in combination.

Table-3: Prenatal Morbidity and Mortality in test group Vs Last MBPP

Mortality/Morbidity	Normal MBPP (P- value)	Both parameters normal	One parameter normal
Mortality	00	1	00
Resuscitation	0	02	01
NICU Admission	0	02	01

Prenatal mortality and morbidity in the form of need for resuscitation, presence of thick meconium, APGAR score of <7 and admission to NICU with respect to last MBPP results is shown in Table-3. The prenatal morbidity is increased whenever both the parameters of the test were abnormal and there was 1mortality in the 'both parameters abnormal' group. There was 8% mortality in the control group as compared to 2% in the test group. 12% of fetuses required NICU admission in the control group as compared to 6% in the test group.

DISCUSSION

One of the major goals of antepartum fetal surveillance is the appropriate and timely identification of the compromised fetus. There are various methods of antepartum fetal surveillance. The best method is the one, which aims at identifying the fetus, which is at risk, but still in an uncompromised state and requires immediate intervention. In the present study, the Modified Bio-Physical profile (MBPP), which is a combination of two parameters Non-Stress Test (NST) and Amniotic Fluid Index (AFI), is used as primary surveillance test for high risk pregnancies.

The test group and control group consists of 50 high risk pregnant women in each; the major risk factors being pregnancy induced hypertension and pregnancy with decreased fetal movements. Majority of the patients in our study had initiation of MBPP testing from 36 wks onwards. There were 72 MBPP tests performed on 50 patients with an average test per patient being 1.44. In the present study, number of patients undergoing one test constituted 68% and those undergoing 3 tests, constituted 12%. The last test done showed more than 50% of the MBPP test results are normal, 20% as abnormal and one parameter being abnormal in 28%. Of the 50 NSTs in last MBPP, 68% were reactive, 18% were non-reactive and 14% were equivocal traces. The AFI values >5 were found in 62%

of the tests. The earlier works by Miller et al. [4] (1996) and Eden et al. [5] (1998) also showed similar results. The mode of delivery in the MBPP test group with respect to last MBPP result showed that when the MBPP was normal with respect to both parameters, the incidence of LSCS and vaginal delivery in this high risk group were 44% (11) and 44% (11) respectively. When the MBPP was abnormal with respect to both parameters, 73% (8) of them had LSCS, whereas only 9% (1) had vaginal delivery. Totally we had 52% (26) LSCS in the test group and of these 19.2% (5) were for fetal distress. This shows that when the MBPP results were normal, the mode of delivery was not affected, whereas when it was abnormal, the operative intervention was increased showing the ability of the test to predict fetal compromise.

In the control group we had 54% (27) LSCS of which 37% (10) were for fetal distress. From this we can infer that with surveillance, the incidence of intrapartum fetal distress is reduced from 37% to 19.2%, nearly 20% reduction. In the study by Miller et al. [4], there was nearly 3 times higher LSCS rate for fetal distress with true positive test results than in women without abnormal MBPP before delivery (36% Vs 13.2%). Similar results were seen in the study by Eden et al. [5], who had 15.8% caesarian section rate when test results were abnormal, compared to 4.1% when the results were normal. The parameters used to assess the prenatal outcome in the present study, like Thick Meconium, APGAR scores, Need for resuscitation, NICU admission and any Mortality; when studied with respect to the last MBPP showed that whenever the test results were abnormal; the prenatal outcome was also abnormal. We had 88% (7 out of 8) showing thick meconium, when the test result was abnormal with respect to both parameters and 12% (1 out of 8) when one of the parameters was abnormal (p-value was found to be 0.034 suggesting significant prenatal morbidity). None had meconium when the test was normal with respect to both parameters.

In the control group 26% (13 of 50) cases had thick meconium. Hence from the above results it is seen that the incidence of prenatal morbidity with respect to meconium is increased in the Control group and also in the test group with abnormal MBPP.

The APGAR <7 was seen in only 10% in our MBPP group, whereas it was 34% in the Control group (p-value=0.004 – significant). This signifies the value of MBPP as an antepartum surveillance tool to predict prenatal morbidity. The MBPP group with both parameters normal had only 2 case with APGAR score of <7, whereas 3 when they were abnormal. Eden et al. [5] had overall 1.5% cases with APGAR score of <7, when test results were normal. The values were 1.9% and 3.2% when the results were abnormal.

In our study we had 1 (2%) prenatal death in the MBPP group, which had showed abnormal test results. It was a case of severe preeclampsia which developed intrapartum eclampsia at 36wks gestation with birth weight of 2.2kg.The prenatal mortality in control group was 4 (8%) which could have definitely been reduced if not prevented totally had antepartum surveillance done and pregnancy was intervened at proper time. A study by SK Patil et al. [6] showed a prenatal mortality of 8 out of 650 patients (1.2%) and Eden et al. [5] had 5.94%. Hence MBPP was predictive of prenatal morbidity and mortality.

CONCLUSION

The process of birth is the most dangerous journey an individual undertakes. A healthy newborn is the goal of every expectant mother and her physician. In this study, MBPP has been used as a primary antepartum fetal surveillance method for high risk pregnancies and an improved prenatal outcome has been achieved in this study. MBPP is an effective antepartum surveillance test and is easy to perform and interpret.

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