ORIGINAL ARTICLE

Diagnostic Accuracy of Biophysical Profile in Preterm Fetuses with Intrauterine Growth Restriction for Diagnosis of Birth Asphyxia

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ABSTRACT

Objective: To determine the diagnostic accuracy of biophysical profile in preterm fetuses with intrauterine growth restriction for diagnosis of birth asphyxia while keeping APGAR score as gold standard

Duration of Study: This study was carried out in the Department of Obstetrics and Gynaecology, Sandemen Provincial Hospital, Quetta from 1st January 2015 to 30th June 2015. A total of 105 pregnancies complicated with intrauterine growth restriction of duration from 32 to 36 weeks were included. The cases with fetuses with congenital anomalies, presenting in labour and presenting with antepartum haemorhage were excluded. Biophysical profile was done by using curvilinear real time ultrasound with a 3.5 MH transducer in growth restricted fetuses in labour room. For 8 and 10 profile score, test was considered normal. For score 6, test equivocal and score 2 and 4 are abnormal. After delivery APGAR score of fetus was assessed at 1 and 5 minutes. If at 5 min it is 10 then baby was considered well if it was less than 7, it showed birth asphyxia.

Results: In our study, 63.81%(n=67) were between 18-30 years and 36.19%(n=38) were between 31-35 years of age with mean was 27.52±4.69 years, diagnostic accuracy of biophysical profile in preterm fetuses with intrauterine growth restriction for diagnosis of birth asphyxia while keeping apgar score as gold standard was recorded, it shows 34.29%(n=36) true positive, 7.61%(n=8) had false negative, 6.67%(n=7) false positive and 51.43%(n=54) had true negative. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy rate was calculated as 81.82%, 88.52%, 83.72%, 87.09% and 85.71% respectively.

Conclusion: The higher diagnostic accuracy of biophysical profile in preterm fetuses with intrauterine growth restriction for diagnosis of birth asphyxia while keeping apgar score as gold standard. It is recommended that these high risk patients must be screened in their antenatal period for diagnosis of birth asphyxia so that proper treatment protocols may be followed.

Keywords: Preterm fetuses, intrauterine growth restriction, biophysical profile, diagnostic accuracy

INTRODUCTION

Asphyxia is a medical condition where placental or pulmonary gas exchange is decreased or they cease altogether typically producing hyupoxemia. Perinatal asphyxia is a recognized cause of perinatal mortality and morbidities e.g. cerebral palsy. In recent studies several risk factors are highly associated with birth asphyxia such as low APGAR score and low pH.[1] Intrauterine growth restriction(IUGR) represents the inhibition of growth of fetus and failure to attain its growth potential. The highest burden of prevalence of intrauterine growth restricted fetuses lies in Asia (75%).[2] It has been shown that 52% stillbirths are associated with growth restriction and 10% perinatal mortality is a consequence of growth restriction. Up to 72 percent of unexplained fetal deaths are associated with small for gestational age below the 10th percentile.[3]

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The birth of fetus with intrauterine growth restriction, in most cases is an obstetrical emergency and major complications occurring in the neonatal period: birth asphyxia, meconium aspiration syndrome, hypothermia, persistent pulmonary hypertension. os if intrauterine growth restriction is found, careful monitoring is needed to look for signs of fetal distress. These include various surveillance techniques by assessing fetal and placental circulation by using Doppler and assessment of fetal well being by biophysical profile. Studies have shown that perinatal asphyxia (APGAR score 5-7) occurs in 50% of cases of premature intrauterine growth restricted fetuses.[4]

As growth restriction is encountered in our population very frequently and it has associated risks of still birth, birth asphyxia, cerebral palsy and admission to neonatal intensive care unit which impose having financial as well as an emotional burden on parents and increases work load of neonatal intensive care unit. So we planned to explore validity of biophysical profile in intrauterine growth restriction for diagnosis of birth asphyxia as different studies showed variable results regarding

sensitivity and specificity of biophysical profile so that it can be recommended as a test of fetal well being in growth restricted fetuses.

METHODOLOGY

This study was conducted in Department of Obstetrics and Gynecology Sandemen Provincial Hospital Quetta from 1st January 2015 to 30th June 2015. A total of 105 pregnant females with IUGR of duration from 32 to 36 weeks were included in the study while the cases with fetuses with congenital anomalies, presenting in labour with antepartum haemorhage (APH) were excluded from the study. The patients were admitted through OPD and emergency department of the hospital. Detailed history, general physical and obstetrics examination was done. Biophysical profile was done by using curvilinear real time ultrasound with a 3.5 MH transducer in growth restricted fetuses in labour room by consultant on floor. Scoring was done according to criteria mentioned before. For 8 and 10 profile score, test was considered normal. For score 6, test equivocal and score 2 and 4 are abnormal. After delivery APGAR score of fetus was assessed at 1 and 5 minutes. If at 5 min it is 10 then baby was considered well if it was less than 7, it showed birth asphyxia.

RESULTS

Mean age was 27.52±4.69 years, mean gestational age was 33.99±1.42 weeks, mean parity was calculated as 2.67±1.20 paras, mean APGAR score was 2.67±1.20, biophysical profile score of the patients was recorded, 47.62% (n=50) had <8 score and 52.38% (n=55) had >8 biophysical score, mean±Sd was calculated as 6.44±2.45, frequency of birth asphyxia in premature fetuses with intrauterine growth restriction on gold standard was recorded in 58.10% (n=44) while 41.90% (n=61) had no findings of birth asphyxia.

Table 1: Diagnostic accuracy of biophysical profile in preterm fetuses with intrauterine growth restriction for diagnosis of birth asphyxia while keeping apgar score as gold standard (n=105)

Biophysical profile	APGAR score		Total
	<7	>7	
Positive	True +ve (a) 36 (34.29%)	False +ve (b) 7 (6.67%)	a + b 43 (40.95%)
Negative	False –ve (c) 8 (7.61%)	True –ve (d) 54 (51.43%)	c + d (59.05%)

The diagnostic accuracy of biophysical profile in premature fetuses with intrauterine growth restriction for diagnosis of birth asphyxia while keeping apgar score as gold standard was recorded, it shows 34.29%(n=36) true positive, 7.61%(n=8) had false negative, 6.67%(n=7) false positive and 51.43%(n=54) had true negative. Sensitivity, specificity and accuracy rate was calculated as 81.82%, 88.52%, and 85.71% respectively.
Sensitivity: 81.82%, Specificity 88.52%, Positive predictive value 83.72%, Negative predictive value: 87.09%, Accuracy rate: 85.71%

DISCUSSION

We planned this study to explore validity of biophysical profile in intrauterine growth restriction for diagnosis of birth asphyxia as different studies showed variable results regarding sensitivity and specificity of biophysical profile so that it can be recommended as a test of fetal well being in growth restricted fetuses.

Our findings are in agreement with a study showing sensitivity and specificity of 100% and 89.7%.[5] Another study[6] demonstrated that biophysical profile has sensitivity 75%, specificity 79%, negative predictive value 98.8% are also closely related to the findings of our study.

The BPP is usually performed to reduce the false positive rate of the NST; however, the BPP has a false positive rate ranges from 75% for a score of 6% to 20% for a zero score. Vibroacoustic stimulation, a noninvasive technique stimulating fetal activity during the BPP test is suggested as a means of reducing the false positive rate.[7] The main advantages of the BPP test include the direct assessment of behavior of the fetus and the technical ease while performing this test. The disadvantages are the performance time required (minimum 30 minutes), the dependence on visual interpretation of the NST, and the indirect provision of evidence of fetal cardiovascular status and perfusion. Further randomized trials comparing the BPP with other tests are lacking.[8]

In the USA, it is an acceptable method of noncontinuous fetal well-being assessment.[9-11] The individual components of BPP all reflect fetal well-being. When all other factors are within normal range, the need for an NST is questionable. Manning et al. revealed a high-risk pregnancy protocol, when routine NST was not performed when all other BPP parameters were normal.[12] Others view the NST and the BPP as an independent predictors of normal outcome.[13]

We are of the view that as growth restriction is encountered in our population very frequently and having associated risks of birth asphyxia, still birth, cerebral palsy and admission to neonatal intensive care unit which impose having financial as well as emotional burden on parents and increase work load of neonatal intensive care unit, biophysical profile may be a useful technique for prediction of neonatal outcome.

CONCLUSION

We concluded a higher diagnostic accuracy of biophysical profile in preterm fetuses with intrauterine growth restriction for diagnosis of birth asphyxia while keeping Apgar score as gold standard. It is recommended that these high risk patients must be screened in their antenatal period for diagnosis of birth asphyxia so that proper treatment protocols may be followed.

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