COMPARISON OF EARLY NEONATAL OUTCOMES FOR ASYMMETRICAL IUGR WITH NORMAL AND ABNORMAL UMBILICAL ARTERY WAVEFORMS

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ABSTRACT

Objective: To compare early neonatal outcome of asymmetrical IUGR fetuses with normal and abnormal umbilical artery Doppler waveforms.

Study Design: Cohort study.

Place and Duration of Study: Department of Obstetrics and Gynecology, Military Hospital, Rawalpindi from Jul 2010 to Dec 2010.

Material and Methods: Total of 66 patients with normal and abnormal Doppler umbilical artery waveforms with asymmetrical IUGR were included in the study. The study group consisted of 33 patients having asymmetrical IUGR with normal umbilical artery Doppler RI < 0.65 (Group 1) and 33 with abnormal umbilical artery Doppler RI> 0.65 (Group 2) These underwent serial Doppler umbilical artery study. Neonatal outcomes measured in terms of APGAR score, Birth weight, admission to NICU and number of still births.

Result: The mean gestational age at delivery of group 1 was 36 ± 2.0 weeks and mean gestational age of group 2 was 33 ± 2.9 weeks (*p*-value=0.002) The Birth weight in group 1 was 2078 ± 408 grams and group 2 was 1642 ± 426 grams (*p*-value=0.000). The APGAR score of neonate at 5 minutes in group 1 ranged 7.6 ± 2.2 and that in group 2 with abnormal Doppler waveforms ranged 5 ± 2.3. These differences are statistically significant. Neonates with APGAR of less than 7 were admitted to NICU.

In group 1, 24 neonates were having APGAR score of 7 or more and were not admitted to NICU while in group 2, 24 were admitted to NICU as the APGAR score were less than 7. Chi-square test was used and the difference was found significant. Still births in both the groups were compared. In group 1 there was only one still birth whereas there were 4 still births in group 2 *p*-value=0.355. There is no significance differences (*p*>0.05).

Conclusion: Abnormal umbilical artery Doppler is a better predictor of neonatal outcome in terms of APGAR score, Birth weight, NICU admission and probability of still births than normal Doppler study.

Keywords: Abnormal Doppler study, APGAR score, Birth weight, NICU admission.

INTRODUCTION

Intrauterine growth restriction is a common clinical sign of chronic fetal hypoxemia[1]. It is difficult to differentiate between suboptimal fetal growth due to intrauterine starvation and adequate growth of constitutionally small infants[2].

Assessment of fetal growth and well being is one of the major purposes of antenatal care. Fetal growth is dependent on genetic, placental, maternal and environmental factors. Small for gestational age fetus is either constitutionally small or has failed to meet its growth potential so is growth restricted. Constitutionally small fetuses are otherwise normal. Intrauterine growth restriction may be symmetrical or asymmetrical and has high risk of perinatal mortality and morbidity followed only by prematurity. Placental insufficiency is the leading cause of fetal growth restriction and is due to poor uteroplacental blood flow and placental infarcts[3].

There are various methods of diagnosis and surveillance of IUGR i.e clinical assessment, ultrasound biometry (abdominal circumference)

estimated fetal weight and Doppler velocitmetry. No single measurement helps secure the diagnosis; thus a complex strategy for diagnosis and assessment is necessary. Doppler ultrasound of umbilical artery is helpful than any other test of fetal wellbeing in distinguishing between normal small fetus and growth restricted fetuses and is a good predictor in these growth restricted fetuses at risk of antenatal compromise.

MATERIAL AND METHODS

Study was conducted after permission from ethical committee. An informed consent was

variables i.e. birth weight and APGAR score, while frequency and percentages were presented for categorical variables i.e. still births and NICU admission; using SPSS 16. Chi-square test is used to compare birth weights and admission comparing to NICU. Independent t-test is used for birth weights and APGAR score in both groups. p-value of less than 0.05 is considered significant.

RESULTS

The mean age of patients on group-1 was 28 ± 4.5 years and in group-2 was 28 ± 5.0 years.

Table-1: Frequency distribution for admission to NICU in both groups.

Group	N % (Percent) Apgar < 7
1(normal umbilical artery Doppler waveforms)	27%
2(abnormal umbilical artery Doppler waveforms)	73%

taken from all patients that were included in the study. Sixty six pregnant women with asymmetrical IUGR in antenatal clinic of Military Hospital Rawalpindi from July 2010 to December 2010 were included in study.

Patient information including age, parity, gestational age at delivery and neonatal outcome were endorsed in a specifically designed proforma. Neonatal APGAR, birth weight and admission to NICU.

Pregnant women were recruited in study after 24 weeks if fundal height was 3cm less than dates, from antenatal clinic in Military Hospital Rawalpindi. All these patients underwent serial growth scans and patients found to have discrepancy of three or more weeks between ultrasound measurements and menstrual dates underwent Doppler umbilical artery study. Women were allocated to group-1 with normal umbilical artery waveform (RI<0.65) and group-2 with abnormal umbilical artery waveform (RI>0.65).

Birth weights were recorded in grams. Neonates with APGAR score less than 7 at 5 minutes were admitted to neonatal intensive care unit. Mean and standard deviation for numerical

Seven women in group 1 and twelve in group-2 were primigravid.

The gestational age at delivery were 36 ± 2.0 weeks in group-1 and 33 ± 2.9 weeks in group-2.

Perinatal outcome

Birth weight in group-1 was 2078 ± 408 grams and in group-2 was 1643 ± 426 grams. Independent sample t-test was applied and this difference was found statistically significant (p-value=0.000)
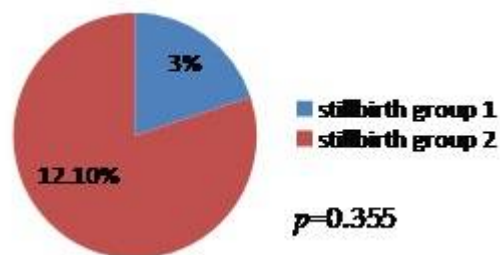
The APGAR score of neonates at 5 minutes

Figure-1: Distribution of still births in two groups.

in group 1 ranged 7.6 ± 2.2 and that in group 2, 5 ± 2.3. This difference is statistically significant (p-value=0.000).

DISCUSSION

Use of umbilical artery Doppler in modern obstetrics has guided the obstetricians in managing cases of IUGR. However there is controversy as to which vessel provides the best guide. Ductus venosus waveforms are time consuming and require a skilled sonographer whereas using middle cerebral artery waveforms diagnose only an advanced fetal hypoxic stage1. For these reasons umbilical artery is preferred in clinical setting.

Follow up of patients with IUGR using umbilical artery Doppler waveforms will help guide further management. Different surveillance patterns are adapted but the aim is to have good outcome.

Many studies found correlation between abnormal umbilical artery waveforms and poor fetal outcome. Present study also demonstrate this association. Compromised fetuses delivered at early gestation as compared to those with normal Doppler and required NICU care due to prematurity. IUGR is associated with significant morbidity in the form of meconium aspiration syndrome (MAS), hypoglycemia, hyaline membrane disease (HMD), early onset sepsis (EOS), intrapartum asphyxia, delayed milestones and stillbirths. Use of Doppler ultrasound has helped in better management of these patients 1. In this study more NICU admissions and still births seen in group-2 where Doppler umbilical artery is raised in compromised fetuses.

Malhotra N and colleagues conducted a study to evaluate role of umbilical artery Doppler in growth restricted fetuses. Delivery in pregnancies with abnormal Doppler was at early gestation 27 ± 3.5 weeks as compared to those with normal Doppler 37 ± 3.3 weeks. Birth weight in abnormal Doppler was 742 ± 126 grams and in normal Doppler was 1680 ± 259 grams[1]. This study supports our result.

Study conducted by Young Ji Byun and colleagues in 2009 to evaluate the merits of umbilical artery Doppler study as a predictive marker of perinatal outcome in preterm small for gestational age infants. This multivariate logistic regression analysis revealed umbilical artery Doppler study as a significant independent factor for prediction of poor perinatal outcome[4].

A prospective study by Spinillo and colleagues on prognostic value of umbilical artery Doppler studies in unselected preterm deliveries in 2008 showed that absent or reverse end-diastolic flow in the umbilical artery is an independent predictor of either neonatal death or cerebral palsy in preterm growth-restricted fetuses[5]. Hence strengthening our result.

CONCLUSION

A multidisciplinary approach is required for managing pregnancies including obstetrician, radiologist and neonatologist. Early detection, evaluation and combined care can result in better maternal and fetal outcome.

Doppler umbilical artery ultrasound is more helpful than any other test of fetal well being in distinguishing between normal fetus and growth restricted fetus. Absent and reverse diastolic flow velocities of umbilical artery are associated with poor perinatal outcomes. The current therapeutic goals are to optimize the timing of delivery to minimize hypoxemia and maximize gestational age.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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