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COMPARISION OF NON-STRESS TEST AND RANDOMIZED DOPPLER STUDIES IN HIGH-RISK PREGNANCIES

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present study is to evaluate role of Umbilical artery doppler study and Non-stress test in predicting foetal compromise in utero in high risk pregnancies. In Present study, Non-stress test and Umbilical artery color doppler study both carried out on all of 100 high risk pregnant patients, among them 35% patients had Abnormal doppler study, 46% patients had Non-reactive NST, 36% patients had both Normal doppler study and Reactive NST and 17% patients had Abnormal doppler study and Non- reactive NST. Among both Reactive NST and Normal doppler study, 80.5% patients delivered vaginally and 19.5% patients delivered by LSCS. Among both Non-reactive NST and Abnormal color doppler study, babies of 82% patients admitted in NICU for preterm care, IUGR care or for other risk factor.

Keywords: Umbilical artery; non-stress test; abnormal doppler; doppler velocimetry; foetal distress.

1. INTRODUCTION

With emphasis on "Small Family Norm", it is all the more necessary that every wanted pregnancy should end in the birth of a viable healthy baby. For this, close monitoring of foetal well-being is required especially for high risk pregnancies. One of the most current and non-invasive screening modalities for obstetricians is the Doppler test. Abnormal Doppler findings are associated with the restriction of fetal growth and were used as screening test for fetal stress. A loss of or reversed diastolic flow is a especially alarming finding that suggests severe downstream opposition, placental dysfunction and fetal compromising [1]. Significant changes to the Doppler occur with decreased fetal growth at a time when other fetal wellness tests are still normal. If the reduction of biophysical factors is gradual, Doppler

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detects a prodrome with foetal disease [2]. Through the simultaneous usage of ultrasonograph (USG) and Non-Stress test (NST) for fetal monitoring, acute and persistent insults of the fetus may be identified and effective treatment can be given for successful result [3].

2. AIM AND OBJECTIVES

To determine the role of the analysis of Umbilical Artery Doppler and Non-Stress test in predicting fetal in utero instability in high-risk pregnancies. To assess Distribution Style and Distribution mode.

3. REVIEW OF LITERATURE

The development of techniques of ante-partum foetal surveillance is a major revolution in obstetric care. Once we had only physical examination and auscultation of foetal heart to judge the foetal well-being. Now we have several sophisticated methods to confirm well-being.

Evory Kennedy [4] in 1833 wrote his famous work entitled "Observation on Obstetric Auscultation".

David Hills [5] in 1917 and J. B. Lee6 in 1922 suggested the use of foetoscope for monitoring foetal heart rate.

In 1885, Preyer [6] reported observation on foetal movements perceived by the mother. He noted the external stimuli like touch and temperature can affect foetal movements. He also noticed that spontaneous foetal movements occur prior to the time they are felt by the mother and these movements even continue sometime after shutting off of the oxygen supply to the foetus as seen with placental separation.

Sadovsky and Yaffe [7] in 1973 established the use of daily foetal movements count (DFMC) recording in evaluating foetal prognosis. Several workers have supported this technique (Mathews [8], Pearson and Weaver [9] in 1976). They showed that application of DFMC has the potential to reduce ante-partum foetal death rate.

In 1969, Ferugilo and Rieppi [10] demonstrated the inadequacy of foetal phonocardiography by comparing it with foetal electrocardiography. In the same year, Wahl demonstrated the computer recognition of phonocardiography. But it did not gain much popularity. In the United States, early ante-partum foetal heart rate techniques were derived from intrapartum observations originally described by Hon, Calcieyro-Barcia & others and were employed in the form of contraction stress test (CST). It was assumed that physiological mechanisms for control of FHR present in intrapartum period were also present in the antenatal period and late decelerations would be a similar and appropriate marker for the asphyxiated baby.

Latika Mehta, Monark Vyas et al 100 women with high risk factors were selected during the study period of 3 years, and a prospective randomized study was conducted. NST was performed in each patient and repeated NST according to present high risk factor. Duplex scanner performed USG for fetal assessment, liquor adequacy, Doppler analysis of umbilical artery, middle cerebral artery. S / D (Systolic / Diastolic) ratio, Resistance Index (RI) & Pulsatility Index (PI) were noted in both the umbilical and middle cerebral arteries. All patients were examined for symptoms of hypoxia intrapartum, and reported maternal and foetal result [9].

Keith P Williams et al was to determine the capacity of two separate types of antepartum prenatal monitoring to check for peripartum morbidity, as assessed by the caesarean delivery rate for prenatal labour pain. In this study, all patients who were referred to the Foetal Assessment Unit at BC Women's Hospital for a perceived increased risk of fetal antepartum at a gestational age of > or = 32 weeks of gestation were approached over a 36-month period [11].

In G Farmakides et al, one hundred and forty pregnant women who had been sent to the clinical research center for traditional non-stress monitoring (NST) have provided a Doppler examination of umbilical arteries. The results of 88 women with abnormal tests (NST or Doppler) were compared with the results of 52 women who had normal results in both tests. Results revealed that 50 percent of fetuses with reduced flow velocity that subsequently experienced irregular NST were growth-delayed, 75 percent needed a cesarean section, and 63 percent were admitted to the neonatal intensive care unit. The occurrence of irregular NST in the context of regular velocimetry trials occurred more often in post-dated pregnancy; 32% of the NST was needed for fetal distress. Knowledge of umbilical movement from Doppler tests may be useful when identifying NST patients and analyzing the findings [12].

4. METHODOLOGY

The prospective study was performed over a span of 2 years at our tertiary treatment center with all pregnant women visiting antennatal clinics of gestational

duration > 32 weeks with risk factors such as moderate preeclampsia, medium preeclampsia, medium preeclampsia with IUGR, Oligohydromnios, Anemia, Gestational diabetes, Rh isoimmunisation, overdue, etc. A comprehensive overview of women's age, parity and drug usage has been obtained. Women who wanted to engage in the study were included in the study.

4.1 Analysis Tests

All women were undergone Umbilical artery doppler velocimetry and Non-stress test. Umbilical artery doppler velocimetry was repeated weekly or twice weekly depending upon the severity of the compromise. NST was repeated daily or on alternate days depending upon severity of disease. If the NST was reassuring and the Doppler was also normal, the surveillance tests were repeated according to protocols mentioned above unless the maternal condition necessitated delivery.

5. OBSERVATIONS AND RESULTS

As seen in Table no. 1, among 100 High risk pregnancies most common high risk pregnancies observed are Oligohydromnios with IUGR (19%) and PIH (17%).

As seen in Table no. 2, there is a major correlation between age and frequency when using the Chi-Square test (p=0.0061). 53 high risk pregnancies lies under 21-25 years age group among them 31 were primigravida and 22 were multigravida. Among 100 high risk pregnancies 50 were primigravida and 50 were multigravida.

As seen in Table no. 3, there is no major correlation between gestational age and gravidity through using the Chi-Square method (p=0.5721). In the present study 100 high risk pregnancies undergone some interventions because of their high risk factors and delivered vaginally or by LSCS. Among them most no. of patients 59 (59%) were delivered in 37-41 wks gestational age group among them 29 were primigravida and 30 were multigravida.

As seen in Table no. 4, there is no major relation between the NST and the doppler analysis by using the Chi-Square method (p=0.8337). In this study all high risk patients undergone Non stress test and Umbilical artery color doppler study. Among them Normal doppler study and Reactive NST were found in 36 patients. Abnormal doppler study and Reactive NST were found in 18 patients. Normal doppler study and Non-reactive NST were found in 29 patients. Abnormal doppler and Non-reactive NST were found in 17 patients.

6. DISCUSSION

In present study all high risk pregnant patients had undergone NST and Color Doppler study. Results are obtained and compared with other studies. It is apparent that where both NST and Doppler are elevated, the baby's weight and gestational age at birth are small, whereas neonatal morbidity and perinatal mortality are high. While both experiments were successful in forecasting unexpected results, the major benefit of Doppler over NST being that Doppler reported improvements faster than NST allowing longer lead times.

Table 1. Distribution of high risk factors in present study

Risk factor	No. of cases	Incidence (%)
PIH	17	17%
PIH with IUGR	14	14%
IUGR	11	11%
Oligohydromnios with IUGR	19	19%
PIH with Oligohydromnios with IUGR	12	12%
Oligohydromnios	06	06%
Other high risk pregnancies- (Overdue pregnancy, Anemia in pregnancy, Gestational Diabetes Mellitus, Rh isoimmunisation, PIH with maternal heart disease, PIH with anemia, PIH with hypothyroidism, superimposed preeclampsia on chronic Hypertension)	21	21%
Total no. of cases	**100**	

PIH: Pregnancy induced hypertension
IUGR: intrauterine growth retardation

Table 2. Frequency of high risk factors in relation to age group and gravidity

Age group (years)	No. of patients	Primigravida	Multigravida
<20	**17 (17%)**	12 (70.5%)	05 (29.5%)
21-25	**53 (53%)**	31 (58.5%)	22(41.5%)
26-30	**24 (24%)**	06 (25%)	18 (75%)
31-35	**02 (2%)**	01 (50%)	01 (50%)
36-40	**04 (4%)**	0	04 (100%)
Total	**100**	**50 (50%)**	**50 (50%)**

Value of χ^2 = 14.411, significant, p=0.0061

Table 3. High risk pregnancies delivered in relation to gestational age and gravidity

Gestational Age (Wks)	No. of patients	Primigravida	Multigravida
32-36	40 (40%)	21 (52.5%)	19 (47.5%)
37-41	59 (59%)	29 (49.2%)	30 (50.8%)
>41	01 (1%)	00	01 (100%)
Total	100	50 (50%)	50 (50%)

Value of χ^2 = 1.117, not significant, p=0.5721

Table 4. Comparison between doppler study and NST

		Umbilical artery color doppler		Total
		Normal	**Abnormal**	
Non- stress Test	**Reactive**	36	18	**54 (54%)**
	Non reactive	29	17	**46 (46%)**
Total		**65 (65%)**	**35 (35%)**	**100**

Value of χ^2 =0.02883, not significant, p=0.8337

In Deshmukh et al. [13], all high risk pregnant patients undergone doppler study among them 55% shows normal doppler study and 45% shows abnormal doppler. In Patil et al. [14], all high risk pregnant patients undergone Non-stress test, among them 66.93% patients had Reactive NST, 14% patients had Non– reactive NST and 19.07% had suspicious NST. In Imam bano et al. [15], among all patients of non-reactive NST 25% were delivered vaginally and 75% were delivered by LSCS.

7. CONCLUSION

The study found that, in cases with normal color doppler study, sudden abnormal NST results in acute hypoxia. Because of its simplicity of operation and cost-effectiveness, NST also maintains its value in fetal tracking. Nevertheless, all studies are similar to one another in prenatal surveillance in high-risk pregnancy. The use of both Non-stress test and Umbilical artery color doppler study in high risk pregnant patients is complimenting each other and it is effective in deciding time of delivery with mode of delivery and reducing perinatal morbidity and mortality.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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