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Research Article

Doppler Ultrasound Study of Umbilical Artery in Clinically Suspected IUGR Pregnancies

Iqra Ilyas*

Department of Radiology of Mayo Hospital, King Edward Medical University, Lahore, Pakistan

***Corresponding Author:** Iqra Ilyas, Department of Radiology of Mayo Hospital, King Edward Medical University, Lahore, Pakistan.

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Abstract

Objective: Throughout gestation, a Doppler can be used to measure uteroplacental and fetoplacental circulation. It's a sensitive technique for detecting foetal impairment early on and allowing for necessary intervention. The goal of this study was to see if umbilical artery indicators might be used to predict poor perinatal outcomes in pregnancies with medically diagnosed IUGR. The research was carried out in the Mayo Hospital's Department of Radiology in Lahore. 50 patients were discovered to have probable IUGR via easy sampling. This research was conducted over a six-month timeframe. The diagnostic accuracy of IUGR was determined using its sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic performance. A total of 50 individuals with suspected cases IUGR were examined. We looked at the Doppler of the umbilical artery between 20 and 38 weeks of pregnancy. There were 26 with a regular consequence, 17 with a negative outcome, and 7 with an IUD. Doppler is a useful non-invasive method for identifying and assessing IUGR, whether the foetus is impaired, unfavourable, or has a normal outcome.

Keywords: Intrauterine Growth Restriction; Doppler Assessment; Umbilical Artery

Introduction

Intrauterine growth restriction (IUGR) is a term that describes a baby's inadequate development while being in the woman's womb throughout gestation. In 1994, MC FARLIN [1] established it. At the turn of the millennium, all tiny babies were considered preterm, but by the end of the century, the notion of the malnourished neonates had emerged, and neonates measuring less than 2500 g were categorised as decreased neonates by the Medical Community [2-4]. It was therefore proposed that low-birth-weight neonates be divided into three groups: Preterm newborns are infants that were born before the 37th week of pregnancy and are of normal size for their gestational (AGA) [5-7], Prematurity and development neonates are babies that were born before the 37th week of pregnancy and are small for gestational age (SGA). Term growth-restricted neonates (SGA) are newborns delivered after 37 weeks of gestation [8]. Several occurrences of growth restriction in SGA term newborns are due to the typical distribution of neonatal weight within an actual base group. In various research, the annual prevalence of growth limitation varies [9]. However, one out of every ten babies (5%) has a development restriction [10-14]. There are three risk factors such as maternal (maternal risk factor ranges from a young maternal age to chronic hypoxia and include (i) systemic hypertension (ii) smoking and (iii) certain drugs (alcohol and cocaine), fetal (the risk factors include (i) Structural abnormalities (ii) chromosomal abnormalities and (iii) infection), and placental (it includes (i) infarction (ii) abnormal umbilical cord insertion (iii) placenta prevail and (iv) abruption) [15]. "Doppler is a method by which information can be obtained by evaluating the change in waveform in which the speed and direction of an ob-

ject can be determined". The Doppler principle is used in foetal medicine to assess variations in sound waves that tell us about the direction and velocity of blood flowing through the heart and arteries [16]. Blood flow parameters in pregnant women and the foetus may be measured using this technique and plotted against time. There are three vessels in the umbilical cord: two arteries and one vein. The placenta receives blood from the umbilical arteries, which begin in the foetus [17]. The intensity of the foetal cardiac contraction and the health of the placenta determine the flow of blood through the artery. The foetus receives blood from the placenta through the umbilical vein. The blood flow velocity of the umbilical artery is measured at peak systole (maximal contraction of the heart) and end diastole (maximal relaxation of the heart) [18]. These numbers are then added together to get a ratio. The resistance index is one of the most commonly utilised ratios. This is calculated by multiplying the peak of systole by the total of measurements at peak systole an diasystole. The peak flow during diastole is lower in early pregnancy than later in pregnancy [20]. Following the acquisition and measurement of waveforms, the findings are displayed on graphs to assess if the quantity of blood flow during diastole is normal or pathological. If the Resistance Index rises over the top limit of normal, it indicates that the foetus is at danger or has IUGR [21]. It is abnormal if the Resistance Index calculated from the Doppler waveform is higher than the red line. A measurement of the Resistance Index that is abnormal [22] is depicted by the gold square. Because blood flow is missing during diastole, Type II is more severe than Type I. In a hospital environment, foetuses with this sort of discovery should be closely watched. When this happens, the placenta develops aberrant resistance, resulting in a significant reduction or absence of blood flow from the foetus to the placenta [23]. In the mid-to-late 1980s, when doppler equipment became more widely available, an avalanche of research examining the use of this technique in pregnant women arose. In 1987, Wladimiroff [24] investigated the umbilical artery blood flow velocity waveform in healthy and growth-restricted pregnancies. High-risk foetuses with weekly UA Doppler ultrasonography emaciation till birth were examined in a research [25]. They also looked at S/D, PI, and RI. When the umbilical resistance indices exceed the upper limit of the normal range, they are commonly linked to IUGR. Another study [26] looked at 120 pregnancies with normal outcomes at 20, 28, and 34 weeks of pregnancy. The data was utilised to calculate the normal range of different indices and to assess the study's specificity and negative predictive value. The sensitivity and specificity were calculated using pregnancies with aberrant outcomes. Another study [27-29] looked at foetuses whose based on incremental was below the 10th percentile of gestational age. The primary goal of this research is to determine the accuracy of IUGR identification at birth, the use of umbilical artery indices as a predictor in suspected IUGR, and the function of Doppler ultrasonography in IUGR. The goal of my research was to see if there was a correlation between Doppler evaluation and clinically diagnosed IUGR, or to see how accurate ultrasonography Doppler is in detecting IUGR. We can carefully strategy what steps management must take to treat or reduce the condition using this knowledge. This information may be used to determine which trimester and week IUGR is most prevalent, as well as what the most common presenting cause of IUGR is. With this knowledge, we can educate individuals about the risk factors and prevention of IUGR.

Methodology

Instruments/Equipment used

Doppler ultrasound.

Population and Sampling method/sample size

Population Will be 50 people with suspected IUGR between 2nd and 3rd trimester.

Sampling method

Non probability convenient study.

Sample size

50 people.

Study design

Descriptive/cross sectional survey.

Data collection method

Data will be collected through self designed performa,patient examination and following will be the main pointsof performa.

- Patient profile
- medical history
- Clinical examination
- Results of test.

Place of study

Radiology department of Mayo hospital lahore.

Duration of study

Six months after the submission of synopsis.

Inclusion criteria

- Age groups from 20 - 40 years
- Females
- Patients with suspected IUGR.

Exclusion criteria

- Patients with the history of IUGR
- Patients with the gestational week between 20 - 38 weeks.

Data analysis method

- Analysis of data by making graphs and tables
- For qualitative variables we use descriptive statistics which includes percentages and proportions with the help of SPSS.

Results and Discussion

Of the 50 pregnancies studied acceptable waveforms were obtained from all the 50 cases. Some cases were followed up with repeated Doppler. 28 patients had pregnancy induced hypertension, 11 were anaemic and 1 had diabetes mellitus and 10 had oligohydramios and have shown in table 1.

Sr. #	Maternal complications	Total Number of Patients (N = 50)	% age of Patients
1)	PIH	28	56%
2)	Anemia	11	22%
3)	Diabetes mellitus	1	2%
4)	Oligohydraminos	10	20%

Table 1: Maternal complications in pregnant women.

In the table 2, grading of placental maturity have been given. 38 patients had grade III maturity and 12 patients had grade II maturity.

In the figure 1 below, quarter period of preganancy has been defined in a included patients. Most of the patients were belonged to 1st quarter of pregnancy with 56% age. More details have given in the figure below.

Sr. #	Grade	No. of cases	%
1)	II	12	24%
2)	III	38	76%

Table 2: Grading of placental maturity in patients.

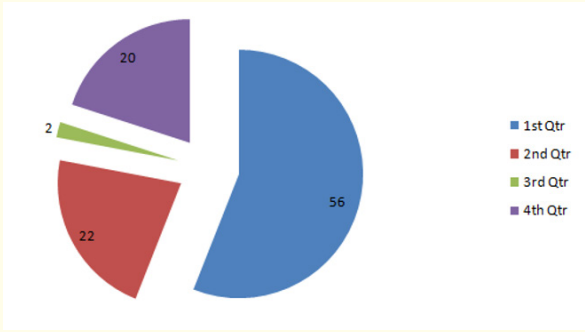

Figure 1: Period of pregnancy in patients.

In the table 3, 26 patients had normal outcome. 7 were IUD (4 were with reversal diastolic flow and 3 were with absent diastole flow). 17 were with adverse outcome (or IUGR) as shown in the table below.

NO.	Mode of outcome	%
26	Normal fetus	52
7	IUD	14
17	Adverse	34

Table 3: Mode of outcome in patients.

Conclusion

When foetal growth retardation is detected in the second or third trimester of pregnancy, the obstetrician must determine if the foetus is constitionally tiny or small as a result of poor placental perfusion. The use of foetal Doppler indices, specifically ratios derived from the umbilical artery, can aid in the identification of a growth-retarded foetus. The umbilical artery is a stronger predictor of unfavourable perinatal outcome in cases with suspected IUGR. The absence or reversal of diastolic flow in the umbilical artery is a warning indication, since it indicates a poor prognosis

and a high death rate. To reduce the chance of IUGR, we can advise the patient to reduce the risk factors that can cause IUGR, including keeping blood pressure at a normal level and eating a healthier diet.

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