

Abnormality in fetal biometry and correlation with disease

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Abstract

Introduction: Objective: This study is undertaken to assess the correlation of disease with abnormality in fetal biometry.

Methods: A prospective, observational study is conducted under the Department of Radiodiagnosis, MGM Medical College and Hospital, Navi Mumbai. Total 100 pregnant patients aged 18 to 40 years having abnormal fetal biometry and associated with diseases like Syndromic or isolated chromosomal aberrations, including skeletal dysplasia, infective, neoplastic or metabolic disorders.

Results: The study findings showed that the mean gestational age was 26 weeks. Out of 100 women undergoing ultrasound, 21% of women were in first trimester, 30% in second trimester followed by 49% in third trimester. Intrauterine growth Restriction is a major disease which can be assessed perinatally by

interval growth scans. Study showed 6% cases had Intrauterine growth Restriction. The study recommended that radiologist plays an important role in defining the clinical outcome of patient and awareness of abnormality in fetal biometry often helps in treating physician in making decision and avoiding possible complications The recognition of the fetal abnormality in terms of fetal abnormality at an early stage of pregnancy helps in improving fetal mortality and helps in making informed decisions to the patients by the clinicians.

Keywords: Fetal biometry, intrauterine growth restriction, fetal abnormality.

Introduction

Fetal biometry entails the gamut of measurements at antenatal USG involving the fetus and different parts of the visualized fetal anatomy as accepted by convention (e.g AIUM guidelines). While a great detail of the fetal

anatomy can be imaged and measured, the most accepted and reliable reproducible measurements commensurate with fetal age- appropriateness include the crown-rump length in early gestation, measurements of the fetal head (HC and BPD), abdomen (AC), femur (FL) etc. The most important tools needed for good clinical management of pregnant women include prediction of accurate Gestational Age (GA) and calculation of fetal weight. Routine sonographic estimation of GA by using the widely accepted parameters like crown rump length, Biparietal Diameter (BPD), Femur Length (FL), Abdominal Circumference (AC) and Head Circumference (HC) has assumed an important role in antenatal examination. While these biometric measurements can be used to estimate gestational age and fetal weight and thereby, to evaluate interval fetal growth, and identify fetuses who are either growth restricted or macrosomic, they can also help identify other disorders of varied etiology. These measurements thus can be prognostic indicators of peripartum outcomes and serve as useful predictors to guide antepartum and intrapartum management. Fetal biometry is therefore an integral and valuable element of obstetric practice. There is a plentitude of abnormalities which we can aim to identify at the right time to be able to counsel the pregnant lady appropriately whether to carry on with her pregnancy or not. The plethora of abnormalities of biometry could range from growth restriction due to any cause, (maternal or fetal) and other diseases with Syndromic or isolated chromosomal aberrations, including skeletal dysplasias and other foetal conditions which could include infective, neoplastic or metabolic disorders.

Objectives

Abnormality in fetal biometry and correlation with disease.

Methods

A prospective, observational study is conducted under the Department of Radiodiagnosis, MGM Medical College and Hospital, Navi Mumbai. Total 100 pregnant patients aged 18 to 40 years having abnormal fetal biometry and associated with diseases like Syndromic or isolated chromosomal aberrations, including skeletal dysplasia, infective ,neoplastic or metabolic disorders.



Fig1-Voluson Ultrasound Machine



Fig2-Convex Probe



Figure 3-TV_S Probe

Inclusion criteria

Pregnant females from 18 to 40 years old coming for antenatal scan strictly adhering to pcpnndt act.

Exclusion criteria

Pregnant females not willing to get sonography done.

Pregnant females not adhering to PCPNDT act.

All the patients will be registered strictly adhering to the guidelines of PCPNDT Act. Ultrasound scanning will be done on the patients in the study group. Patients who report for the first time in the first trimester will be told to follow up for the NT scan as per routine procedure. At the obstetric scan, if on careful targeted examination an abnormality in fetal biometry is detected a note of the same will be made and these patients will be followed up in their scheduled visits. Patients who report for the first time at the NT scan will be followed up at the anomaly scan. All these cases will be scanned for maternal and fetal parameters.

The subjects are scanned in supine position via Trans abdominal approach or transvaginal approach on voluson P8 machine probe of 2-7 MHz and transvaginal probe.

Anomaly scan at 18-22 weeks included detailed assessment of fetal organs. In case of doubt in cardiac analysis, fetal echocardiography was advised for dedicated evaluation. The fetuses with raised NT and absent or hypoplastic nasal bone were advised for triple marker test and follow up, if clinically indicated the cases underwent amniocentesis and chorionic villi biopsy

Statistical analysis

The data collected from 100 patients reported at MGM Medical College and Hospital is analyzed using statistical software (IBM SPSS, IBM Corporation, Armonk, NY, USA). The Numerical/Continuous data is analyzed by the 'Unpaired t test' and the Categorical data is analyzed by the Chi square test. P-value of less than 0.05 is considered as "statistically significant". Scatter plots are used for the presentation of the data.

Results

Total 100 pregnant females aged between 18-40 years are enrolled for the study. Out of the 100 women undergoing ultrasound, 21% of women were in the first trimester 30% in the second trimester followed, by 49% in the third trimester.

Among these the patient who presented in the first trimester- 42.8% presented in the first trimester, 9.5% presented in the 11th week, 42.8% in the 12th week and 4.7% in the 13th week. The percentage of patients that presented in the second trimester includes 3.3% who presented in the 13-17 weeks, 43.3% in 17-21 weeks, 30% in 21-25 weeks and 20% in 25-28 weeks. This is followed by 36.7% in 29-32 weeks, 36.7% in 32-35 weeks, 16.3% in 35-38 weeks and 10.3% in 38-40 weeks.

Intrauterine growth restriction is a major disease which can be assessed perinatally by interval growth scans scattered through the gestational period. In our study we found that 6% of cases had intrauterine growth restrictions. Anencephaly is a rare neural tube defect incompatible with life. In our study 100 patients were examined and 1 case of anencephaly was detected in first trimester during a routine NT NB scan carried out at 13 weeks. Down syndrome is the set of physical, mental, and functional abnormalities that result from trisomy 21, the presence in the genome of three rather than the normal two chromosomes. In our study one case was detected at 20 weeks in which the femur length was shortened along with echogenic bowel.

Discussion

Fetal biometry can be used in the assessment of abnormalities of the foetus and can be correlated to disease.

Intrauterine growth restriction is a major disease which can be assessed perinatally by interval growth scans scattered through the gestational period. In our study we found that 6% of cases had intrauterine growth restrictions similar findings were observed by Romo, A., Carceller, R., & Tobajas, J. et al who had reported the prevalence of IUGR to be precisely 5.13%¹. Similarly Mandruzzato, G., Antsaklis, A., Botet, F., Chervenak, F. et al in their study have cited the prevalence of IUGR at 8% in the general population². Bernstein, Gabbe et al have reported a prevalence of 4 to 7%³. IUGR caused mostly by inadequate maternal fetal circulation causes a decrease in growth of the fetus. In our study symmetrical and asymmetrical IUGR had equal preponderance. This condition can be properly diagnosed by the radiologist during the antenatal visits for interval growth scans and the treating physician can

be alerted to treat the same. These findings seem to suggest a positive correlation with fetal biometry.

Anencephaly is a rare neural tube defect incompatible with life. In our study 100 patients were examined and 1 case of anencephaly was detected in first trimester during a routine NTNB scan carried out at 13 weeks. Johnson, S. P., Sebire, N. J., Snijders, Et al⁴ in their study has reported an incidence of 1:1000 similarly Chatzipapas, I. K., Whitlow, et al in their study have reported a 1.1:1000 incidence which is slightly lower incidence than compared to our study⁵.

Down syndrome is the set of physical, mental, and functional abnormalities that result from trisomy 21, the presence in the genome of three rather than the normal two chromosomes. The average detection rate of structural fetal malformations in trisomy 21 predominantly involves short femur, increased nuchal fold thickening and an echogenic bowel. The nuchal fold thickening had the highest specificity (99.5%) mostly noted during an NTNB scan done predominantly at 12-14 weeks. In our study one case was detected at 20 weeks in which the femur length was shortened along with echogenic bowel. Similar finding was professed by Kagan, K. O., Wright, D., Baker et al in their study in which NT performed at 12 weeks, the estimated detection rates for increased NT had 94% specificity.

Conclusion

Sonographic measurements of fetal ultrasound parameters are the basis for accurate determination of gestational age and detection of fetal growth abnormalities. Fetal biometry is an important and essential parameter and a sensitive tool in the diagnosis, detection and accurate determination of disease in the fetus. Selection of the most useful single biometric

parameter depends on the timing and purpose of measurement and is influenced by specific limitations. CRL (crown-rump length) is the the most important parameter for early dating of pregnancy. Biparietal diameter (BPD) maintains the closest correlation with gestational age in the second trimester. In cases of variation in the shape of the skull, head circumference is an effective alternative. Abdominal circumference is the most useful dimension to evaluate fetal growth, and femur length is the best parameter in the evaluation of skeletal dysplasia. Use of multiple predictors improves the accuracy of estimates. An individual approach to each pregnancy is recommended for fetal growth assessment. Clinical application of fetal biometry in abnormal growth is discussed in cases of small- and large-for-gestational-age fetuses, chromosomal aberrations, and skeletal dysplasia. The radiologist often plays an important role in defining the clinical outcome of the patient. Awareness of abnormality in fetal biometry often helps the treating physician in making decisions and avoiding possible complication and helps in improvement of patient care and successful management strategy adoption. The recognition of the fetal abnormality in terms of fetal abnormality at an early stage of pregnancy helps in improving fetal mortality and helps in making informed decisions to the patients by the clinicians.

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