

Intrauterine Growth Restriction-A Review

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Abstract: The pain of childbirth is not remembered. It's the child that's remembered. Every child birth is a miracle. This event happens every second that the miracle is being taken for granted. Million things can go wrong in the process. One of the problem which can occur in foetal development is the Intra uterine growth restriction (IUGR). Intra uterine growth restriction represents foetal growth that is less than the potential, optimal rate of growth of a specific foetus , means an unborn baby is smaller than it should be because it is not growing at a normal rate inside the womb. Delayed growth poses health problems for the baby like low birth weight, decreased oxygen level, Hypoglycemia, breathing problems, trouble maintaining body temperature, high blood count and sometimes long term growth issues .The review discusses the various causes ,symptoms ,diagnosis ,Treatment and preventive measures.

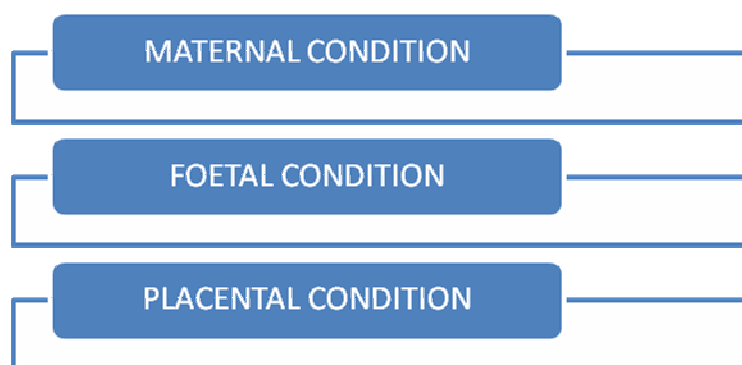
Key Words: IUGR, Placental Insufficiency, Ultrasound, Doppler Velocitometry.

Introduction:

Intra uterine growth restriction represents foetal growth that is less than the potential,optimal rate of growth of a specific foetus .¹ It may also be defined as a failure of the fetus to attain its growth potential.² IUGR is variable and the most common cause for IUGR is foetal under-nutrition due to placental insufficiency.¹ It may also be due to various conditions like congenital anomalies such as trisomy 21 and trisomy 18,cytomegalovirus and rubella, use of drugs,maternal alcoholism,chronic renal disease,systemic lupus erythematosus,gestational diabetes,hypertensive disorders^{3,4,5,6} It is associated with still birth,neonatal death,perinatal morbidity as well as mortality.⁷⁻¹¹ Some studies state that advanced maternal age ,nulliparity and black race are associated with increased risk of foetal growth restriction.^{4,5,12,13} IUGR discovered during the third trimester of pregnancy is most often due to placental insufficiency, though it has a good perinatal prognosis ,ante natal diagnosis is a challenge.¹⁴ When identified antenatally these foetuses survive only with intensive monitoring and neonatal care.^{14&15} The term small for gestational age is often used synonymously for IUGR. The higher the rate of SGA greater the chance that it is due to IUGR.The diagnosis, etiology,maternal management, foetal therapy of IUGR are still important issues to be resolved.

Etiology:

It is important to ascertain whether the foetus is constitutionally small or small due to abnormal conditions such as:



Maternal condition may be chronic hypertension, pre-gestational diabetes, cardiovascular disease, substance abuse, autoimmune conditions, malnutrition, prior history of pregnancy with IUGR, residing at an altitude above 5000 feet, smoking, alcoholism

Foetal condition may be infection like cytomegalovirus, toxoplasmosis, syphilis, rubella, Hepatitis B, HSV-1,2, HIV, malformation, chromosomal aberration-trisomy 21, trisomy 18, trisomy 13, Turner's syndrome

Placental condition may be chorioangioma, infarction, circumvallate placenta, confined placental mosaicism, obliterative vasculopathy of the placental bed.^{3&16}

Maternal Factors:

Various maternal illnesses including hypertensive disorders, diabetes mellitus, autoimmune diseases (such as anti-phospholipid syndrome and systemic lupus erythematosus) and infections increase the risk for IUGR by four fold.^{17,18}

Alcohol, tobacco, cocaine increase risk of IUGR. One study found a dose-dependent decrease in foetal weight with an increase in number of cigarettes smoked each day by the mother.¹⁹ Another study arrived at the conclusion that women who smoked 11 or more cigarettes per day gave birth to infants who weighed 330 g less than predicted and measured 1.2 cm shorter than control subjects.²⁰ Use of alcohol in the second or third trimester results in IUGR. Obesity and young and advanced maternal age also increase the risk of IUGR. IUGR occurs more frequently in twin deliveries than in single gestations.^{3&21}

Foetal Factors:

Turner's syndrome, Down's syndrome, trisomy 13 and 18, various other genetic factors are responsible for growth restriction.

Placental Factors:

Placenta determines the foetal growth by serving the respiratory, renal, hepatic function of the foetus. When the placenta does not work as well as it should, the baby gets less oxygen and less nutrients from the mother.²² Small placental size may be physiologic or pathologic. A small mother has a small uterus, hence a small placenta is produced. Sometimes, the size of the uterus may be small in a normal sized woman but a small amount of placenta may be produced when the mother is carrying more than one fetus.^{1,23,24}

Diagnosis:

Dating:

Earlier delayed foetal growth was correlated to low maternal weight gain, fundal height measurement etc.³ The important requirement for determining IUGR is precise dating of pregnancy. The accurate way to date the pregnancy are precise date of the last menstrual period, early uterine sizing and detection of foetal heart tones. If IUGR is suspected, assessment of the past medical and obstetric history, recent infections, occupational or toxic exposures and consumption of tobacco, alcohol, drug aids in diagnosis.

Ultrasonography:

The ultrasound examination at 8-13 weeks is reported to be most accurate. Maternal BMI screening has been proved to be effective in predicting foetal growth.²⁵ Maternal anthropometry helps to predict adverse perinatal outcomes including low birth weight and preterm birth.^{25&26} reviews by Kramer *et al* on protein energy supplementation during pregnancy had shown that balanced protein energy supplementation can reduce SDA occurrence by 32%.^{27&28}

With the help of ultrasonography, some important parameters like the foetal weight, head and abdominal circumference, femur length can be measured.^{3,29,30} The Hadlock formula is the most widely accepted method.³¹ These measurements are plotted on a standardized chart. When gestational age is questionable, the use of transcerebellar diameter (TCD) may be helpful.³²⁻³³ A study stated that symphysis-fundal height measurement every week can be used to monitor the growth of the foetus.³⁴ If the foetal weight is less than fifteenth percentile, it is suggestive of IUGR. Normally, the ratio of head circumference to abdominal circumference is one at 32-34 weeks and falls below one after 34 weeks, if it is greater than 1, it is suggestive of growth restriction of foetus.³⁵ About 85% of infants with IUGR show oligohydramnios (decreased amniotic fluid volume).³⁶ An amniotic fluid index of less than 5cm increases the risk of IUGR.³⁷ 80% of the IUGR cases have reported an increase in systolic/diastolic ratio.³⁸ & ³ Presence of a grade 3 placenta before 36 weeks increases the risk of IUGR by four folds.^{4 & 39}

Antenatal surveillance:

Antenatal surveillance is helpful in determining a specific etiology. Most of the foetal death due to growth restriction occurs after 36 weeks of gestation and before labor begins.⁴⁰

Foetal movement monitoring:

There were four randomized controlled trials assessing foetal movement counting. Out of which three were conducted in developed countries and one in a developing country.⁴¹⁻⁴⁴ A review by Imdad *et al* brought to light a trial by Neldam that showed a significant decline in antepartum stillbirth rates among women who monitored foetal movements and those who did not.^{45&46} Foetal movement can be felt by the mother from 16-20 weeks of gestation.⁴⁷ decreased foetal movement maybe a sign of foetal compromise or demise.⁴⁵

Doppler velocitometry:

Surveillance of high risk pregnancies using Doppler velocitometry of umbilical and foetal arteries with timely obstetric intervention lead to a reduction in stillbirths by 29%.⁴⁴

Patients with low serum PAPP-A, elevated alpha-fetoprotein or elevated inhibin are at a risk of IUGR from uteroplacental insufficiency. If abnormal uterine Doppler waveforms are identified it further intensifies the risk.⁴⁸⁻⁵²

Management:

IUGR, pre-eclampsia and placental injury are strongly associated with one another.⁵³ Hence women suspected or diagnosed with IUGR must be educated about the risk of hypertension in pregnancy.

Reduction or cessation of smoking, alcohol during pregnancy is mandatory thought it may not affect birth weight, they improve the foetal growth.⁵⁴⁻⁵⁷

Aneuploidy risk assessment and amniocentesis are other methods for management of IUGR.

Most severe preterm fetuses with IUGR cannot tolerate induction of labor, hence a planned caesarean section is advised. The mother and fetus must be monitored very closely every week for symptoms like proteinuria, hypertension etc since they have an increased chance of developing pre-eclampsia.

Biophysical Profile of Foetus:

Biophysical profile of foetus is done in order to assess foetal asphyxia.⁵⁸ It is based on parameters like foetal breathing, movement, amniotic fluid volume, heart rate, foetal muscle tone. BPP is evaluated most commonly in near term pregnancies.

Treatment:

Once etiology is established and the well being of the fetus is confirmed, various treatment modalities are followed like maternal oxygen administration⁵⁹, additional nutrient supplements⁶⁰, hospitalization for bedrest⁶¹, administration calcium channel blockers,⁶² Hormones,⁶³ Betamimetics,⁶⁴ Plasma volume expansion,⁶⁵ low-dose ASA and Heparin.⁶⁶

Maternal and neonatal care is very important to reduce the risk of further complications.

Prenatal Management:

In a study, nasal oxygen at 2.5 L/min administered to mothers at 27 to 28 weeks of gestation improved foetal blood gas measurements but resulted in an increased incidence of hypoglycemia and thrombocytopenia in the infants.⁶⁷ One report suggests that supplemental oxygen may have a role in short-term prolongation of pregnancy, while steroids can be administered to accelerate foetal lung maturity.⁶⁸ Aspirin along with dipyridamole administered to pregnant women at 15-18 weeks of gestation resulted in lower incidence of stillbirth.⁶⁹ Amnioinfusion may also have a role in these cases, especially in the presence of oligohydramnios.

Neonatal outcomes:

Some studies suggest that infants with IUGR have a higher risk of developing hypertension, abdominal obesity, type II diabetes as adults.⁷⁰ Diet, exercise, weight loss, blood pressure surveillance, smoking cessation after delivery may promote better long-term health.

Conclusion:

Detection and management of IUGR by maternal BMI screening, symphysis-fundal height measurement and targeted ultrasound could be effective method of reducing stillbirths that are related to IUGR. A thorough knowledge of IUGR can help in effective management of foetus with IUGR.

Acknowledgement:

The authors are grateful to the authors/editors of all those articles, journals and books from where the data for this article has been reviewed and discussed.

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