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Editorial

MANAGEMENT OF INTRAUTERINE GROWTH RETARDATION (I.U.G.R.)

I.U.G.R. is defined as a birth weight less than expected for a given gestation. It goes by variety of names e.g. small for dates, placental insufficiency, Dysmaturity etc. The length of the baby may also be reduced resulting in a baby who is light and short for dates. Antenatal diagnosis of I.U.G.R. improves the fetal salvage. It is important to realise that the growth pattern of the fetus varies from country to country, and race to race. Hence a normal growth curve of fetus should be plotted for every community before diagnosing I.U.G.R.

Criteria for diagnosis of I.U.G.R.

1. Infants whose weight fell below the 10th percentile for their gestational age (Battaglia and Lubchenco),
2. Infants with weight 2 Standard deviations (SD) from the mean values of birth weight (usher and Mclean).

Etiopathology of I.U.G.R.: It can be due to multiple factors, however in about 40 to 50% of cases etiology is unknown.

1. Environmental factors: (a) Country. This could be due to racial factor which may determine the fetal weight, (b) Maternal height: It is observed that tall women deliver heavier babies and short women deliver lighter babies. (c) Sex: Male fetuses are heavier than female fetuses for the same gestational period. (d) Smoking: Heavy smoking during pregnancy does reduce fetal growth. (e) Alcohol: More than 3 to 4 pegs of alcohol per day during pregnancy leads to I.U.G.R., often accompanied by physical malformation and subsequent mental impairment. (f) Pre-pregnancy weight: Mothers with pre-pregnancy weight less than 40 kg. have smaller babies as compared to mothers with more than 45 kg. pre-pregnancy weight. (g) Altitudes: Women delivering at high altitudes have small babies as compared to those delivered at sea level. (h) Socio-economic Status: Women from lower socio-economic class have smaller babies compared to women from higher socio-economic group for the same gestation period.
2. Chromosomal and genetic factors:

Genetic factors may account for small percentage of infants observed to be growth retarded. Chromosomal aberrations viz. Trisomies 13-15, 18 and 21 could be responsible for I.U.G.R.

3. Fetal infections: Chronic intrauterine infective processes viz. rubella, herpes simplex, syphillis, Toxoplasmosis, and Cytomegalic inclusion disease have been shown to cause I.U.G.R.
4. Abnormalities of the Placenta and umbilical Cord: Like Intervillous Thrombosis, extensive placental infarction, Chrioangioma, Circumvallate placenta, Placenta Praevia, velamentous insertion of cord, or marginal insertion of cord.
5. Multiple pregnancy: One or others may show effect of growth retardation.
6. Decreased Uteroplacental Blood flow: Chronic Vascular disease complicated with preeclamptic Toxaemia, Chronic renal disease, Cyanotic heart disease.
7. Maternal malnutrition: Maternal nutritional status before and during pregnancy influences birth weight and brain. Maternal anaemia especially sickle cell anaemia can cause I.U.G.R.
8. Teratogenic drugs: e. g. drugs like Heroin.
9. Ionised radiation: X-Ray studies or X-Ray therapy can cause intrinsic damage to fetus and cause hypoplastic fetuses.
10. Asymptomatic Bacteriuria: e.g. due to infection of urinary bladder or kidney.
11. Illegitimacy: Due to desire for concealment and inadequate antenatal care and nutrition.
12. Unknown causes: In about 40% of cases, etiology is unknown.

Types of I.U.G.R.: (1) First type in which placenta is of normal size, cell number is normal, but infant is small. Such a fetus is most likely to have congenital anomalies. Cause of growth retardation is in fetus itself and hence it is also termed as "Intrinsic Type", or also as "hypoplastic type". (2) Second type in which the placenta is small and the cell number is increased. Cause lies outside the fetus and hence known as "Extrinsic type", the extrinsic factor affects through the placenta either in the form of decreased blood supply or in the form of decreased nutrition inspite of adequate blood supply. In cases of decreased blood supply, the brain develops normally, but other organs especially liver is much smaller. The normal ratio of liver to brain is 1 : 3. But in I.U.G.R. resulting from vascular disorder the liver brain ratio may be as high as 1 : 6. The new born has a head larger in comparison to its body and hence this type of I.U.G.R. is termed as asymmetrical. In contrast to the asymmetrical baby of "Vascular disorder I.U.G.R.", the I.U.G.R. resulting from maternal malnutrition is Symmetrical. Thus maternal malnutrition causes poor development of all the organs thus affecting both brain and liver equally.

Possible causes of placental insufficiency: Placental insufficiency results in chronic hypoxia as well as chronic subnutrition. Normally placenta weighs about a sixth of weight of infant, but in dysmaturity it may weigh appreciably less and the villous surface area is much reduced. Four basic pathological mechanisms are responsible: (1) Faulty placentation: e.g. in extrachorial placenta (2) Reduced mass of functioning

villous disease (3) Abnormal villous development and (4) Diffuse villous damage—(i) infection—Villitis, (ii) Immunomedicated processes, (iii)Aging (iv) Toxic substances like nicotine in smoking (v) Reduced fetal perfusion e.g. in large or multiple haemangiomata of the placenta (vi) Uteroplacental ischaemia.

Work of Dr. C. S. Wallenburg on platelet life span appears to be a sensitive indicator of altered platelet behaviour in pregnancies complicated by insufficient fetal growth. In his experience a platelet life span of 7½ days or less is virtually always associated with insufficient fetal growth. The results of their study strongly suggest that platelets play a key role in the pathophysiologic mechanisms leading to chronic uteroplacental circulatory insufficiency resulting in inadequate fetal growth. Their investigations support the hypothesis of a disturbed prostacyclin-thromboxane A_2 balance in the uteroplacental vascular bed, leading to an increase tendency of platelets to aggregate with formation of occlusive thrombi in the uteroplacental arteries. On the basis of this hypothesis the aim of therapeutic measures should be to restore the disturbed prostacyclin-Thromboxane A_2 balance, either by stimulating vascular production of prostacyclin or by suppressing platelet thromboxane synthesis.

Clinical Evaluation and Investigations

If the patient is being followed up regularly in antenatal department from the first trimester of pregnancy, clinical observations are of some significance. Reliable menstrual history, early bimanual clinical examination to confirm gestational age, serial clinical examination during subsequent antenatal check ups, recording of Fundal Height, uterine girth, weight of the patient, abdominal palpations, give a fair idea regarding the proper growth of the fetus.

The movements of the fetus in utero are an expression of fetal well being. They depend mainly on the vascular state of the placenta. In cases of placental insufficiency, fetal movements show an appreciable decrease as felt by the patient. It is well known that intrauterine fetal movements are felt by the mother in about 5th month of pregnancy and are a positive indication of fetal life. Sadovsky's study showed that fetal movements increase from the 29th to the 38th week of pregnancy and then decrease until delivery. By proper explanation and cooperation Daily Fetal Movement Count (DFMC) is kept either counting for a 12 hour period or counting for shorter periods in the morning, afternoon, and evening. This is a useful non-invasive test for fetal wellbeing by which each pregnant patient can monitor her own fetus. It is fairly reliable and inexpensive. It helps the Obstetrician to identify at risk but healthy baby, and gives a warning signal when DFMC is lesser than normal.

Biochemical methods: Hormone assays as a means of judging fetal wellbeing has been disappointing. Two of these of importance are estimation of oestriol and human placental lactogen (HPL). Serial oestriol estimation in the maternal urine is of some significance in IUGR. Oestriol is selected for estimation as this constitutes more than 80% of the total oestrogen excretion in a pregnant mother during the third trimester. Range of urinary oestriol in normal pregnancy is between 30-32 weeks, oestriol excretion is 9-26 mgm/24 hours, between 33-35 weeks 9-30 mgm/24 hours and from 36 weeks and above 10-40 mgm/24 hours. Diurnal variation has also to be kept in mind. Acute fall by 40-50 per cent is considered abnormal.

Human placental lactogen (HPL) is estimated in maternal blood by Radio-immunoassay. HPL levels rise progressively with gestational age, reaching a plateau for the last month. The normal range is wide but serial sampling is required to determine the abnormality.

Amniotic fluid creatinine may be of value in the estimation of fetal maturity since levels greater than 2 mgm% are usually associated with fetuses of more than 37 weeks gestational age. The study of alpha fetoprotein (AFP) levels in the amniotic fluid has proved to be of good help to detect fetal anomalies and intrauterine death. The ratio of Lecithin to sphingomyelin (L/S) in amniotic fluid has proved useful in assessing the respiratory status of the fetus and thereby assisting in appropriate antenatal management of high risk pregnancies with I.U.G.R. Karyotyping is useful in suitable cases. Whenever indicated investigations to detect T strains of mycoplasma, and cytomegalo virus should be carried out.

Biophysical method of Investigation: Ultrasonography: The advantages of this method are noninvasiveness, repeated application, less time consuming. Moreover, serial assessment ensures a growth curve which in comparison with the normal one may precisely reveal the growth retardation with high degree of accuracy. The early gestational age is measured by crown rump length (CRL). The mean CRL increases from 10 mm at 7 weeks to 83 mm at 14 weeks. It confirms the expected growth pattern in the first trimester. In the second and third trimester, measurement of biparietal diameter is of great value. The rate of growth between 16th and 22nd week is 3.5 mm per week, gradually decreasing in the succeeding weeks as pregnancy advances. In the last month of pregnancy, the growth rate may be as little as 1 mm per week. With accurate dates, two or three BPD estimations at two weeks interval showing low growth rate will give substantial evidence of IUGR. An earlier identification of gestational sac and CRL measurement combined with serial BPD measurements may give better prediction. The other variables like fetal breathing activity, fetal movements, fetal tone (passive or abscence of flexion), qualitative estimate of amniotic fluid volume and nonstress testing are of prognostic significance. The other useful measurements done are of Trunk Circumference (TC), Trunk Area, and Total Intrauterine Volume (TIUV). Repeated serial section of the urinary bladder helps establishing the hourly fetal urine production (HFUPR), and fall in the same indicates IUGR. Placental texture is studied and placenta is graded 0-III sonographically. Grade III placenta is more frequently associated with IUGR. Amnioscopy may indicate fetal distress by visualising meconium stained liquor amnii.

All the above referred investigations are not possible in majority of the institutions in the developing countries. Hence in such circumstances the Obstetrician has to depend upon the clinical criteria and his clinical judgement, serial urinary oestriol estimation and daily fetal movement count.

Management of IUGR Cases

For improvement in fetal growth by physical, and mental rest by hospitalisation, left lateral position, breathing exercises, Yogic exercises, and change of environment are helpful. Administration of progesterone, oestrogens, tocolytic drugs, B receptor stimulant sympathomimetics (Isoxsuprine and Ritodrine), I.V. administration of glucose and aminoacids, anticoagulant drugs, have

been tried in suitable cases with varying success rate. Dennervation of Common Ililiac and internal iliac vessels is tried to increase the diameters of arteries by experts only in well selected cases with recurrent obstetric tragedies, if arteriograms can clearly demonstrate arterial insufficiency compared with well matched controls. By operative fetoscopy parenteral administration of some drugs etc. via umbilical cord is tried in some experimental studies.

Termination of Pregnancy at most appropriate time is of utmost importance to salvage fetal life and enhance its quality. Interruption of pregnancy will depend on the gestational maturity and also on the critical condition for survival of fetus in its intrauterine life. Judicious consideration of these two factors to balance each other favourably is very necessary.

The mode of delivery will depend on various underlying factors like fetal maturity, degree of IUGR, and danger to fetus, inducibility of patient, past obstetric history, availability of hospital facilities inclusive of neonatal care services.

Nonstressed Test (NST) a simple, non-invasive test, is good to monitor the cases. If NST is nonreactive OCT should be performed. This may increase the effectiveness of predicting perinatal morbidity, and perinatal outcome. Pretermination Corticosteroid administration to the mother has proved beneficial in reducing respiratory problems in the neonate of IUGR cases. It is also important to eliminate vaginal and cervical infection prior to termination of pregnancy in order to reduce fetal and neonatal infection.

If induction of labour is resorted to, rate of oxytocin infusion is closely observed, and if facilities are available continuous electronic fetal heart rate monitoring, as well as clinical monitoring is resorted to.

It seems reasonable that until further studies indicate differently, the growth retarded fetus should be maintained in utero till 37-38 weeks gestational age unless fetal surveillance testing indicates the need for delivery.

It is well documented that the growth retarded fetus especially the asymmetric type, is at a significantly increased risk of intrapartum asphyxia and acidosis. Depending upon the indication for delivery, caesarean section may be the initial choice of delivery route. When antepartum fetal testing has indicated a deterioration in the fetal status and uterine cervix is unfavourable, caesarean section is the proper mode of delivery. The incidence of intrapartum fetal distress with a previously positive CST has been reported as high as 75% in the presence of I.U.G.R.

If a vaginal delivery is contemplated intensive electronic fetal monitoring is mandatory, since intrapartum fetal morbidity and mortality is increased as much as ten-fold. If facilities are available fetal scalp blood sampling should be done, and if there is evidence of acidosis, caesarean section should be immediately performed. A combined suctioning of the oropharynx prior to delivery of the fetal thorax followed by endotracheal intubation and aspiration below the cords will reduce incidence of meconium aspiration. Other potential complications such as hypothermia, hypoglycaemia, and polycythaemia, which are common in the growth retarded fetus, must be anticipated, and managed properly by the neonatal team at the time of delivery and the early postnatal period. A lack of

attention to potential complications and their sequelae can quickly reverse anything gained by a thorough antepartum and intrapartum management.

Early detection of IUGR, proper fetal surveillance, and appropriate mode of delivery will improve the fetal salvage. In the developing countries it is always better to transfer a patient to better level care hospital which offers better intra-natal and/or neo-natal services while tackling IUGR cases.

Dr. R. D. Pandit