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Role of Doppler Examination at 36-42 Weeks of Pregnancy

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Annotation: Doppler ultrasound examination can be performed as a part of a more detailed ultrasound assessment that includes fetal biometry and anatomical survey, or as a separate ultrasound examination. Flow of the umbilical and fetal arteries is most often quantified either by pulsatility index or resistant index. These indices reflect the down stream vascular resistance by quantifying the differences between the peak systolic and the end-diastolic velocity within blood vessels of interest in each cardiac cycle.

Key words: doppler ultrasound, preeclampsia, pregnancies distress, cerebral artery, intrauterine growth restriction.

The significance of Doppler ultrasound in evaluating pregnancies that have the risk for preeclampsia, intrauterine growth restriction, fetal anaemia, and umbilical cord abnormalities has become indispensable. Recent findings aided in timing delivery of severely growth-restricted fetuses by promoting the use of ductus venosus Doppler. Primarily it appeared that abnormalities in ductus venosus waveform were the endpoint for pregnancies distressed with intrauterine growth restriction contrary to newer data proposing these abnormalities as plateau prior to further fetal deterioration as observed by changes in the biophysical profile. The majority of adverse perinatal outcomes in developing countries are placental-associated diseases and it is confirmed that uterine Doppler evaluation predicts most occurrences of early-onset preeclampsia and intrauterine growth restriction, and its use in these pregnancies improves a number of perinatal outcomes. Doppler investigation of middle cerebral artery in combination with umbilical artery seems to improve prediction of adverse outcome in near-term pregnancies. On the basis of abnormal Doppler results, obstetrical decision making might improve and prevent intrauterine death because hypoxic cerebral damage may begin before labor and intrapartum asphyxia is probably more damaging when superimposed on underlying hypoxia. Doppler assessment may lead to intervention that reduces the risk of fetal brain damage. The hypothesis that Doppler is effective in reducing mortality and major morbidity in high-risk pregnancy could only be tested with a massive randomized trial.

Doppler ultrasound is used to assess the flow in umbilical artery (UA) and fetal middle cerebral artery (MCA). The pulsatility index (PI) is used to calculate the cerebroplacental ratio (CPR), which is used for the assessment of fetal oxygenation. Abnormal Doppler findings in the third trimester are typically associated with adverse perinatal outcome. Most studies on the clinical use of Doppler and CPR have been focused on the assessment of small-for-gestational-age fetuses, who are at increased risk for adverse perinatal outcomes and long-term neurodevelopmental impairment. However, a large study of WHO et al. regarding singleton pregnancies at 30–34 weeks of gestation reports that the majority of cases for each type of adverse perinatal outcomes concerned fetuses that were appropriate-for-gestational-age (AGA). Consequently, prenatal care should identify hypoxemic rather than small fetuses, and screen for low CPR regardless of the fetal size. It was also reported that the prediction of an adverse perinatal outcome by low CPR was better if the time interval between assessment and delivery was ≤ 2 weeks and that the screening by CPR at 36 weeks may be more valuable than at 32 weeks.

One of the main aims of routine antenatal care is to identify babies who are not thriving in the womb. It is possible that medical interventions might improve outcomes for these babies, if they can be

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identified. Doppler ultrasound uses sound waves to detect the movement of blood in vessels. It is used in pregnancy to study blood circulation in the baby, uterus and placenta. Using it in high-risk pregnancies, where there is concern about the baby's condition, shows benefits. However, its value as a screening tool in all pregnancies needs to be assessed as there is a possibility of unnecessary interventions and adverse effects.

One of the main aims of routine antenatal care is to identify the 'at risk' fetus in order to apply clinical interventions which could result in reduced perinatal morbidity and mortalitya. The routine use of a screening test should be based on proven clinical effectiveness, to avoid subjecting a large group of normal women to anxiety and inappropriate intervention with subsequent risk of iatrogenic morbidity and mortality. In the majority of cases fetal death can be attributed to a 'known' cause such as maternal disorder (hypertension, diabetes and others), fetal pathology (congenital abnormalities, intrauterine growth restriction (IUGR)), placental pathologies or intrapartum complications. The rate of unexplained fetal deaths decreased from 3.5 per 1000 total births in the1960s to 1.1 to 1.9 per 1000 in the 1990s.

It is important to highlight that fetal growth restriction is often confused with the concept of being small-for-gestational age. Some fetuses are constitutionally small and they do not have increased perinatal mortality or morbidity. Inability to distinguish easily between small but healthy fetuses and those who are failing to reach their growth potential has hampered attempts to find appropriate treatment for growth restriction. Growth-restricted fetuses are at increased risk of mortality and morbidity. The serious morbidity includes intraventricular haemorrhage, bronchopulmonary dysplasia, necrotising enterocolitis, infection, pulmonary haemorrhage, hypothermia and hypoglycaemia. Early antenatal detection, treatment where appropriate, and timely delivery could minimise the risks significantly.

Doppler flow velocity waveform studies were performed with a continuous wave system (Medasonics SP25A, Mountain View, CA and a D10 bidirectional Doppler). The subjects were supine with lateral tilt provided by a wedge under one hip. The ratio of peak systolic (S) to least diastolic (D) Doppler shift frequency was calculated from waveforms obtained from an umbilical artery and from a maternal utero-placental artery within the placental bed. These ratios were not adjusted to standard fetal or maternal heart rates. Results of the waveform studies were placed in the hospital records and reported both as numerical values and graphically on reference ranges prepared with data published. The obstetrician in charge of each case was also informed about the result which was outside the reference range.

Alli in all, doppler studies in high-risk pregnancies are more beneficial in the management of perinatal as well as neonatal management but for each institution the role of Doppler studies in late pregnancy is being influenced by the usage of other tests of fetal welfare which are already well established in clinical practice.

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