

بسم الله الرحمن الرحيم





شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



جامعة عين شمس

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**ROLE OF DOPPLER ASSESSMENT OF THE
CEREBROPLACENTAL RATIO IN THE PREDICTION
OF FETAL AND NEONATAL OUTCOME
IN HIGH RISK PREGNANCY**

Thesis submitted for partial fulfillment of master degree in gynecology
and obstetrics

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ACKNOWLEDGEMENTS

- First of all Thanks **ALLAH** the Almighty the merciful I could complete this work. Without his guidance, and help, No thing could be done.
- I am deeply thankful to **Prof Dr. Moustafa Kamel Eissa** (professor of Obstetrics & Gynecology, Faculty of Medicine – Minia University). For without his kind supervision, generous advice and encouragement, this work would not have come to light. Really, I am greatly admired by his endless enthusiasm, his inexhaustible efforts and his creative critical mentality.
- I am deeply indebted to **Dr. Daa Ahmed El-Maghazy** (Assistant professor of Obstetrics and Gynecology, Faculty of Medicine- Minia University) who supported, encouraged and directed my efforts throughout this work. His generosity kindness and humanity are unique.
- I am very grateful to **Dr. Mamdouh Tawfik Hamdy** (Lecturer of Obstetrics and Gynecology, Faculty of Medicine- Minia University) for his scientific guidance and moral support. Let me admit that through his remarks, guidance and moralism I have been able to get valuable experience, information and avoid glaring errors.
- My gratitude is extended to all staff members at the department of Obstetrics and gynecology Faculty of Medicine – Minia University.
- My deep gratitude is to my parents who offered me love, support and encouragement throughout my life.
- Special thanks to every one who helped me in preparing this thesis.
- Last but not least I would like to thank the patients who participated in this study, for without their understanding and cooperation this work could not be done.

Mohammed Khairy

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LIST OF ABBREVIATIONS

AEDF	Absent End diastolic flow	
AFV:	Amniotic fluid volume	
AFI:	Amniotic fluid index	
AGA:	Appropriate for Gestational age	
BPD:	Biparietal Diameter	
BPPS:	Biophysical profile scoring	
CPR:	Cerebroplacental ration	
CST:	Contraction stress test	syn. OCT: Oxytocin challeget
CTC:	Cardiotocography	
EFW:	Estimated fetal weight	
FBM:	Fetal Breathing movements	
FHR:	Fetal Heat rate	
FL:	Femur length	
FM:	Fetal movements	
FT:	Fetal tone	
FWV:	Flow velocity waveform	
IUGR:	Intrauterine Growth retardation	
IVH:	Intraventricular haemorrhage	
LGA:	Large for Gestational age	
MCAPI:	Middle cerebral artery pulsatility index	
NICU:	Neonatal intensive care unit	
PI:	Pulsatility index	
PNMR:	Perinatal Mortality rate	
RDS:	Respiratory distress syndrome	
RI:	Resistance index	
S/D:	<u>Systolic</u> ratio Diastolic	
SGA:	Small for Gestational age	

Introduction

In the past, the method selected for antepartum fetal surveillance in high risk pregnancy conditions and the frequency of testing have been determined using an arbitrary criteria. Fitting such an arbitrary model to the spectrum of fetal diseases and their progression has never been satisfactory (*Manning, 1999*). Similarly, the application of one testing modality, to all fetal diseases (e.g antepartum fetal CTG) is not satisfactory. Because Assessment of other biophysical markers of impending fetal trouble may yield superior information (*phelan et al, 1985, Johnson et al, 1986*).

The object of any method of antepartum fetal surveillance is to identify that point in the natural progression of a perinatal disease process at which the risks attendant with continued fetal existence exceed those of delivery and neonatal life. At the same time the surveillance method should discriminate the fetus who is not at immediate risk even in the presence of risk factors in the mother permitting selective conservative management there by avoiding potential maternal and perinatal iatrogenic complications (*Manning, 1999*).

The fetal biophysical profile score (BPPS) is a method of fetal risk surveillance based on a composite assessment of both acute and chronic markers of fetal disease. The relationship between test scores and perinatal outcome is complex arguing for gathering as many bits of data as possible to arrive at an accurate estimate of fetal risk. Therefore it is speculated that the addition of newer modalities of fetal assessment such as Doppler areterial velocimetry and Antepartum fetal Blood gas determination to the existing method of fetal BPPS will help to define the critical point of intervention (*Manning, 1999*).

Doppler velocimetry studies were introduced in 1980s and it was expected that this technology could complement and eventually, replace existing methods of fetal surveillance. Many

studies are being done to evaluate the values of study of specific fetal circulations. For example the umbilical artery Doppler velocimetry is now regarded as a primary test of placental function which was histologically proved to reflect placental vascular insufficiency without due effects on the fetus (*Trudinger et al, 1991*).

Studies on fetal cerebral circulation has led to the development of new Doppler index that is the cerebroplacental ratio defined as the pulsatility index of middle cerebral artery divided by the pulsatility index of the umbilical artery. This ratio may be the most-sensitive Duplex index for prediction of outcome in fetuses with intrauterine growth retardation (*Arbeille et al 1987, Gramellini 1992, Arduini 1992*).

Aim of the Work

The aim of this study is to determine the screening efficiency and accuracy of the umbilical artery, middle cerebral artery pulsatility indices and cerebroplacental ratio in the prediction of fetal and neonatal morbidity and whether these tests are additive to fetal BPP in risk assessment and decision for timing of intervention in high risk pregnancy

Chapter 1

Basic Principles of Doppler Ultrasound

Introduction

Ultrasound is a sound with frequencies above the audible range. Diagnostic ultrasound uses frequencies of (2-10) MHz.

As a beam of ultrasound travels through human tissue it is reflected or scattered at tissue interfaces because of the heterogeneous nature of each tissue. Some of the back scattered echoes are detected by a receiving transducer and a computer then reconstructs these into a picture (*pearce,1990*).

The idea of Doppler ultrasound depends on basic physical phenomenon called Doppler frequency shift which was first described by *Johann Christian Doppler*, an Austrian mathematician and physicist in 1843. This phenomenon describes the perceived changes in the frequency of propagating energy waves consequent to any motion between the source of energy emission and an observer. When the source and the observer move apart the perceived frequency decreases. When the source and the observer move closer the frequency increases.

These changes will occur irrespective of whether the source and the observer moves.

Moreover, the magnitude of the changes in the frequency is proportional to the velocity of the movement of the source or the observer (*Doppler, 1842*), (*White et al 1982*).

In accordance with Doppler shift principle echoes returning from a moving structures are altered in frequency and the amount of shift is directly proportional to the velocity of the moving structures. The frequency of echoes returning from structures moving toward the transducer are higher than the frequency originally transmitted by the transducer. Conversely,