Accuracy of fetal transcerebellar diameter in prediction of gestational age in the third trimester

Thesis
Submitted for Partial Fulfillment of Master Degree in
Obstetrics and Gynecology

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2013

بسم الله الرحمن الرحيم

قالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

صدق الله العظيم

سورة البقرة آية (٣٢)

*Thanks are all to **Allah**, the Compassionate and the Merciful, for helping me finish this work, and for blessing me throughout my life by His Compassion and Generosity.*

*Words fail to express my great indebtedness to **Professor Dr. Sherif Abdelkhalek Akl**, Professor of Obstetrics and Gynecology, Ain Shams University, whose continuous supervision, advice and fruitful criticism have been of great help in performing this work.*

*I would like to express my sincere appreciation to **Professor Dr. Mohammed Elmandouh Mohammed**, Assisstant Professor of Obstetrics and Gynecology, Ain Shams University, for his valuable instructions, inspiring guidance and support throughout this work.*

*I find no words by which I can express my deepest thanks and gratitude to my honored **Dr. Ahmed M.Bahaa Eldin Ahmed** Lecturer of Obstetrics and Gynecology, Faculty of Medicine, Ain Shams University, for the continuous kind encouragement, support, guidance and advice throughout the entire work.*

Finally, I would like to express my deepest gratitude to my whole family who always support me throughout my life.

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Egypt, cairo,
2013

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LIST OF ABBREVIATIONS

2D	Two dimensional.
3D	Three dimensional.
AC	Abdominal circumference.
AH	Anterior horn.
BPD	Biparietal diameter.
CB	Cerebellum.
CC	Cephalic circumference.
CH	Cerebellar hemisphere.
ChP	Choroid plexus.
CM	Cisterna magna.
CP	Cerebral peduncles.
CRL	Crown rump length.
CSP	Cavum septum pellucidum.
CT	Cerebellar tonsils.
CV	Cerebellar vermis.
EDC	Estimated date of confinement.
Fig.	Figure.
GA	Gestational age.
GW	Gestational weeks.
HC	Head circumference.
IQR	Inter quartile range.
IUGR	Intrauterine growth retardation.
LMP	Last menstrual period.
MHz	Megahertz.
mm	Millimeter.
MRI	Magnetic resonance imaging.
NF	Nuchal skin fold.
OFD	Occipito-frontal diameter.
P	Para.
PH	Posterior horn.
SCV	Superior cerebellar vermis.

LIST OF ABBREVIATIONS (CONT.)

SD	Standard deviation.
SGA	Small for gestational age.
Tab.	Table.
TCD	Trans-cerebellar diameter.
TH	Thalami.

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Introduction

The estimation of pregnancy dates is important for the mother, who wants to know when to expect the birth of her baby, and for her health care provider, so they may choose the way in which to perform various screening tests and assessments. The three basic methods used to help estimate gestational age (GA) are menstrual history, clinical examination, and ultrasonography **(Mongelli et al., 2005).**

Accurate gestational dating is one of the most important assessments obstetrical providers make in pregnancy, given that all of the various management strategies are dependent on knowing where the patient is in gestation. In addition to traditional biometry, ancillary biometric and non biometric measurements can help narrow the biologic variability between fetuses. Moreover, one can employ these nontraditional measurements both in late gestation to assist in determining appropriate gestational age and fetal lung maturity, and in other specific clinical situations, such as oligohydramnios, in which compression of the fetal head and abdomen can lead to difficulty in obtaining an accurate biparietal diameter and abdominal circumference **(Amy and Henry, 2008).**

Since the beginning of ultrasound fetal measurements, the possibility of population differences has been considered (**Cummings, 1982**). Some researchers have suggested that population differences in fetal biometry are negligible and that separate standards are not essential (**Campbell et al., 1991**).

Mounting evidence shows that the fetal cerebellum exhibits a progressive growth throughout the gestation period (**Malik and Waqar, 2006, Araújo et al., 2007**), so it is an organ capable of providing information on the prediction of gestational age during the pregnancy. Although there are ultrasound studies regarding the correlation between transverse cerebellar diameter (TCD) in fetuses and gestational age, most of them address the third trimester of pregnancy or short gestational periods (**Vinkesteijn et al., 2000, Chang et al., 2000, Chavez and Ananth, 2003, Malik and Waqar, 2006**). Therefore, it is important to study the correlation between fetal TCD and pregnancy age addressing longer and earlier gestational periods.

The transverse cerebellar diameter (TCD) has been one of the most reliable ultrasound parameters for growth especially early gestation. The TCD was the only parameter that correlated with gestational age by the end of the second trimester (**Pinar et al., 2002**).

There is relative preservation of normal cerebellar growth in growth-restricted fetuses and a similar rate of growth in singleton and multifetal gestations. The transverse cerebellar diameter therefore represents an independent biometric parameter that can be used in both singleton and multifetal pregnancies to assess normal and deviant fetal growth (**Goldstein and Albert, 1995**).

Aim of The Work

To assess the accuracy of transcerebellar diameter (T.C.D.) measurement in estimation of the gestational age during the third trimester compared to the current fetal biometric measurements (F.L. and B.P.D.).

Chapter (1)

Ultrasound and Fetal Biometery

1.1 Introduction:

The development and practice of fetology has been dependent on advances in the field of prenatal imaging. Without the ability to accurately visualize the structure and well-being of the fetus within its own intrauterine environment, it would not be possible to diagnose or treat the range of abnormalities that can now be addressed by the multidisciplinary fetal health care team. Rapid advances in the technologic basis of two imaging methods ultrasonography and magnetic resonance imaging (MRI) have resulted in highly accurate visualization of the fetal anatomy. Ultrasonographic imaging is an integral part of obstetric practice today. In the United States, it is performed in the majority of all pregnancies **(Martin et al., 2003)**.

1.2 Safety of ultrasonography:

The temperature elevation and its possible effect of cavitations, or the formation of microbubbles in the tissues exposed to ultrasound waves, are known mechanical effects and the main concerns about ultrasound. Effects of ultrasound on tissues have been studied with animal experimentation. In