The Influence of Fetal Head Circumference and Fetal Weight Assessed by Intrapartum Ultrasound on Labor Outcome

Thesis
Submitted in partial fulfillment of M.SC degree of
Obstetrics and Gynecology

by

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List of Abbreviations

AC	:	Abdominal circumference
BMI	:	Body mass index
BPD	:	Biparital diameter
CPD	:	Cephalopelvic disproportion
CS	:	Cesarean section
FHC	:	Fetal head circumference
FL	:	Femur length
HC	:	Head circumference
HIV	:	Human Immunodeficiency Virus
ICU	:	Intensive care unit
NYHA	:	New York Heart Association
ROC	:	Receiver Operator Characteristics curves
SD	:	Standard deviation
TBH	:	Tygerberg Hospital
WHO	:	World Health Organization

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Abstract

The aim of the present study is to determine if fetal head circumference and fetal weight could predict the rate of cesarian section and operative vaginal deliveries in nulliparous women in labor.

This study evaluate intrapartum fetal head circumference and fetal weight as a sensitive majors for assessment of labor outcome.

The second stage is an important point at which the decision for mode of delivery and prediction of labor outcome should be setteled, it begins with complete cervical dilatation and end with delivery of fetus, prolonged second stage of labor should be 42 considered when the second stage of labor exceeds 3 hours if regional anesthesia is administered or 2 hours in the absence of regional anesthesia for nulliparas. **In** multiparous women, such a diagnosis can be made if the second stage of labor exceeds 2 hours with regional anesthesia or 1 hour without it.

Studies performed to examine perinatal outcomes associated with a prolonged second stage of labor revealed increased risks of operative deliveries and maternal morbidities but no differences in neonatal outcomes.

The numerical data have a significant relation between intra partum head circumference and fetal weight and the incidence of primary cesarian section, maternal and fetal complications. So measurement of intrapartum head circumference and fetal weight are good predictors Of labor outcome.

Keywords: AC :Abdominal circumference, BPD : Biparital diameter ; CPD :Cephalopelvic disproportion; FHC: Fetal head circumference; TBH :Tygerberg Hospital

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Introduction

Birth represents one of the most important of all the experiences of the human kind. Despite the complexity and sophistication of modern obstetrics it is important to remember the simple objective of every pregnancy, namely the delivery of a healthy baby to a healthy mother. The fullest possible understanding of the birth process, its perturbations and appropriate management policies is central to that objective **(Calder, 2007).**

One of these complexities is prolonged labour, operative delivery procedures arising from prolonged labor increase maternal morbidity, fetal morbidity, and the cost of care. Cephalopelvic disproportion (CPD), due to narrow maternal pelvic diameter relative to fetal head circumference (FHC) or large FHC relative to maternal pelvic diameter, is the main cause of prolonged labor **(Konje and Ladipo, 2000).**

High birth weight increases the risk of prolonged labor **(Högberg and Lekås Berg, 2000)**, and instrumental or operative delivery **(Mocanu, et al.,2000)**. A consistent increase in the mean birth weight and in the proportion of fetal macrosomia, defined as a birth weight greater than 4000 g, has been reported since the 1980s **(Blondel and Kermarrec, 2010)**. Primary concern about the birth of a macrosomic foetus is adverse neonatal outcomes including stillbirth and neonatal mortality secondary to birth asphyxia, shoulder dystocia, birth injury, metabolic disorders, and meconium aspiration syndrome **(Zhang, et al., 2008)**. Similarly, maternal

complications are increased in the setting of fetal macrosomia **(Stotland, et al., 2004)**.

Maternal risks include birth canal and pelvic floor injuries, increased rate of operative vaginal and caesarean deliveries, and postpartum haemorrhage **(Ekele and Otubu, 2006)**. Birth weight of an infant is the single most important determinant of newborn survival **(Ugwu, et al., 2014)**. Limiting the potential complications associated with the birth of excessively large fetuses requires that accurate estimation of fetal weight occurs before decision to deliver is made **(Kehinde, et al., 2013)** .

The two main methods for predicting birth weight in current obstetrics are clinical and ultrasonographic methods **(Westerway, 2012)**. Increasing attention is being paid to the accuracy of using various ultrasound measurements in estimating fetal head circumference and fetal weight. ultrasound could be useful for decreasing the number of C-sections performed defensively by obstetricians who wish to avoid the possibility of a complicated delivery **(Dückelmann, et al., 2011)**.

Aim of the work

The aim of the present study is to determine if fetal head circumference and fetal weight could predict the rate of cesarian section and operative vaginal deliveries in nulliparous women in labor .

Research hypothesis

In nulliparous women in labor, fetal head circumference and estimated fetal weight may predict the rate of cesarian section and operative vaginal deliveries.

Research question

In nulliparous women in labor, do fetal head circumference and fetal weight predict the rate of cesarian section and operative vaginal deliveries accurately?

Study design

Settings:

Study will be conducted at Ain Shams University Maternity labor ward.

Methods:

Pregnant parturients admitted to the labor room of Ain Shams University Maternity Hospital for delivery will be subjected to inclusion criteria of the study.

Inclusion criteria:

- Maternal age between 20 to 30 years old
- Maternal Body mass index less than 28kg/m2
- All parturients are primigravidas
- Normal singleton pregnancies
- cephalic presentation in labour with gestational age between 38 to 40 weeks.
- No congenital fetal abnormalities detected by U/S.

Exclusion criteria:

- Maternal age less than 20 and more than 30 years old.
- Body mass index above 28 kg/m2.
- Multigravidas and multiple pregnancies.
- Malpresented foetuses.
- Gestational age less than 38weeks.
- Women with uncertain gestational age, intrauterine fetal deaths and fetal anomalies will be excluded.

- Those who will have elective or emergency caesarean section for indications such as antepartum haemorrhage, preeclampsia/eclampsia, poorly controlled diabetes mellitus and other medical disorders of pregnancy prior to onset of labour were also excluded.

The following would be applied to all women included in our study:

- Evaluation of full obstetric history.
- General examination as regard general condition and vital data.
- Abdominal examination as regard fundal level, fetal position and fetal heart sound monitored by CTG.
- Vaginal examination as regard cervical dilatation, effacement and state of membranes.
- According to the hospital standards in the labor room, patients will be managed.

All women included in our study will be examined by trans-abdominal ultra-sound using Mindray dp6900 set in labor ward to measure the fetal head circumference and fetal weight.

Fetal weight will be estimated by measuring 4 biometric indices which are AC-BPD-FL and HC **(Hadlock et al., 1985)**

BPD will be measured from proximal echo of the fetal skull to the proximal edge of the deep border(outer-inner) at the level of the cavum septum pellucidum. The HC will be measured as an ellipse around the perimeter of the fetal skull **(Chitty et al.,1994).**

The AC will be measured in the transverse plane of the feal abdomen at the level of the umbilical vein in the anterior third and the stomach bubble in the same plane, measurements will be taken around the perimeter **(Chitty et al.,1994).**

The FL will be measured in a view where the full femoral diaphysis will be seen and will be taken from one end of the diaphysis to the other, not including the distal femoral epiphysis **(Chitty et al., 1994).**

Then post-natal fetal head circumference and fetal weight will be measured and recorded

Outcome will be classified into:

- Primary outcome: cesarian section rate
- Secondary outcomes: matermal and fetal complications result as a direct effect to the mode of delivery.

Maternal complications:

Birth canal and pelvic floor injuries, instrumental and operative vaginal deliveries, traumatic and atonic post partum haemorrhage.

Neonatal complications:

Birth asphyxia, shoulder dystocia, birth injuries, metabolic disorders, meconium aspiration syndrome, and still birth.

Finally assessing the critical range of fetal head circumference in cm and fetal weight in grams at which these women are subjected to complicated labour.