Prediction of Preterm Labour in the First and Second Trimesters by Ultrasonography

E S S A Y

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2D	Two dimensional ultrasound
3D	Three dimensional ultrasound
AF	Aquous fluid
AFI	Aquous fluid index
C.S.P	Cavum septum pellucidi
CNS	Central nervous system
CRL	Crown rump length
CS	Cesarean section
D & C	Dilation and curettage
EDD	Expected date of delivery
G. vaginalis	Gardenella vaginolis
HUAM	human uterine activity monitoring
I.V	Intravenous
I.V.F	In vetro fertilization
ICU	Intensive care unit
LDH	Lactic dehydrogenase
LMP	Last menstrual period
Mg Sou	Magnesium sulfate
PG	Prostaglandin
PRO. M	Premature rupture of membrane
T3, T4	Thyroxin hormone
U. vrelalicum	Ureoplasma urelaticum
U.T.I	Urinary tract infection
US	United state

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Nadia Younis Hassan

Abstract

Preterm labour is a common obstetric complication and prematurity is a major cause of perinal death and long term handicap.

This leads to searcher for a method for prediction of preterm labour.

One of these methods is ultrasonography which is safe economic and widely used all over the world and using it to obtain the normal ultrasonographic picture.

For the past 20 years diagnostic ultrasound has had a critical role in the practice of obstetrics, it has been used extensively as a tool for physical examination of the fetus becoming an indispensable part of obstetric decision-making.

Ultrasonographic assessment of cervical length is becoming an increasingly popular component of prenatal-care and it is useful in the prediction of preterm delivery.

Introduction

Preterm birth is any birth, regardless of birth weight, that occur before 37 weeks menstrual weeks gestation or less than 259 days form the first day of last menstrual period ***World Health Organization (1980) and American collage of Obstetricians and Gynecologists (1995).***

The applications of diagnostic ultrasound in obstetrics are numerous and provide reliable information whereby the health and well being of the mother and conceptus can be readily assessed ***(Chervenak et al., 1993).***

The parameters commonly used for estimations of gestational age in the first trimester and second trimester are included in this essay to show normal from abnormal one.

Assessment of uterine wall thickness should be obtained by ultrasounography.

In the last decade, transvaginal ultrasound for visualization of the cervix has become an important tool in obstetric antenatal care. The measurement of cervical length in the first and second trimester of pregnancy is one of the strategies that have been developed to identify high-risk patients for preterm labour ***(Motrison 1990; Iams 1994 and Tongsong, 1995).***

Surgical repair of the cervix using a vaginal or abdominal approach has been examined in detail.

Management of other factors of preterm labour in the first and second trimesters should be done.

The most important factor in directing management of preterm labour is correct identification including if there is membrane rupture or not.

Aim o the work

The aim of the essay is to review the role of ultrasound in prediction of preterm labour in the first and second trimesters management of cervical incompetence as a main factor in preterm labour in the first and second trimesters and management of other factors of preterm labour in the first and second trimesters.

Preterm Labor

Definition:

According to the ***World Health Organization (1980) and American College of Obstetricians and Gyncologists. (1995)***, preterm birth is any birth, regardless of birth weight, that occur before 37 menstrual weeks gestation or less than 259 days from the first day of last menstrual period. This is further subdivided into.

- Early preterm ... less than 34 weeks gestation.
- Very early preterm ... Less than 30 weeks.
- Extremely early preterm ... less than 26 weeks ***(Wen et al., 1990)***.

In terms of birth weight there are four standard definitions (***Lumley (1993)***):

- Low birth weight ... <2500gm.
- Very low birth weight ... <1500gm.
- Extremely low birth weight <1000gm.

However, it is more logical to use gestation al age as threshold (***Gardner et al., (1995))***:

1. Outcome is more closely related to gestational age especially before 30 weeks gestation.
2. Normal range of birth weight varies between population and it is dependent on a number of other factors such as hypertension and smoking.

The use of last menstrual period as a mean of calculating the estimated date of confinement is based on the assumption that women

menstrual cycle is always 28 days long, that she ovulates at mid cycle and that she is sure of her first day of her last menstrual period. However the LMP is uncertain or unknown in 20% of pregnant women and up to 1/3 of all women have menstrual cycle longer than 28 days ***(Mittendorf et al., 1993).*** Therefore fetal sonar biometry is an accurate way of assessing the predicted date of confinement ***(Kramer et al., 1998).***

Incidence

In many countries incidence of preterm birth increased in past 20 years. In Canada, birth at 37 weeks gestation or less increased from 6.3 percent in 1981 to 6.8 in 1992 ***(Joseph et al, 1998).***

This increases in preterm birth due to changes in frequency of multiple birth increases in obstetrical intervention, Improvement of early preterm birth and increases use of ultrasound estimating gestational age ***(Joseph et al, 1998).***

Thirty seven % of black women of low socioeconomic status. 50 % of white women of upper middle socioeconomic class, and possibly 75% of low risk selected South American women, are eligible for intervention therapy. On this basis it is estimated that nearly 5.5 million women in preterm labor, world wide, are potentially treatable ***(Viliar-Ezcurra 1994).***

Table (1): Estimated numbers of preterm birth by region ***(Viliar & Ezcurra, 1994)***

Region	Total no of births 1990 (x1.000)	Incidence of preterm birth	Total no. of expected preterm births/year (1.00)
Latin America	12.442	7.74	963
Africa	28.438	9.88	2.809
Asia	84.122	9.26	7.789
North America	4.513	10.60	478
Europe	6.385	5.88	375
Former USSR	5.065	9.20	465
Ocrania	202	5.80	29
Total worlds	141.167		12.908

Of these women who are potentially treatable, intervention is only likely to be successful if they present in early labor to a hospital capable of and skilled in the use of intervention agents. This immediately excludes at least 10 % of women who arrive in advanced labor and another 50% whose spontaneous preterm labor occur after 35 week gestation ***(Tucker et al 1991).***

Table (2): Estimated number of potentially treatable" women in preterm labor by world region ***(Villar & Ezcarra, 1994).***

Region	No of births 1990 (x 1.000)	Institutional deliveries (%)	Incidence of preterm birth (<37 weeks)	No. of "Potentially treatable" women in preterm labor (x 1.000)
Latin America	12.442	66	7.74	635.5
Africa	28.438	34	9.88	955.2
Asia	84.122	33	9.26	2.570.0
North America	4.513	95	10.60	454.4
Europe	6.385	95	5.88	356.6
Former USSR	5.065	95	9.20	442.6
Oceania	503	80	5.80	23.3
Total world	141.468			5.437.6

Cost of preterm birth

The principal short term cost is that of neonatal ICU, Which will be high with lower gestational age at delivery and lower birth weight. The largest component of this cost is nursing and medical staff, and clearly the longer the stay in the neonatal ICU, the greater the cost. Additional costs arises from treatment such as ventilation, artificial surfactant, recombinant Erythropioten, and surgical procedures ***(Hail et al 1997).***

Estimate costs of neonatal ICU for very low birth weight babies range from US $6000 per survivor for babies weighting 1000-1500 gm in the united kingdom to Us $ 159000 per survivor for babies weighing less than 750 gm in the U.S. ***(Hall et al., 1997).***

Other short term costs include additional time spent in the hospital by parents possible with loss of earning, and traveling costs to from the unit often for a long period of time ***(Griffin 1993).***

For long term costs it has been estimated that special education costs alone for all infants of birth weightless than 2500 gm would be approximately 150000 000 Sterling annually ***(Hall et al 1997).***

Risk Factor

The prediction of preterm labor depend on many variables and their association- with preterm labor.

A risk-scoring system devised by Papiernik and modified by ***Creasy et al. (1980)*** has been tested in several regions. In this system, scores of 1 through 10 are given to a number of pregnancy factors, including reproductive history, socioeconomic status, daily habits and factors in the current pregnancy. These risk factors are arranged in a scored manner, but they have not reached the level of discrimination adequate to be used to tell us precisely that this woman is going to have preterm labor.

Several investigators have emphasized the point that preterm birth can be the result of many different biologic events and these authors suggest the usefulness of recognizing these separate clinical entities in epidemic logical studies ***(Meis et al., 1995).***

Working on the assumption that preterm labor may have multiple causes, a comprehensive evaluation protocol for patients in preterm labor was instituted. ***Lettieri et al. (1993)*** indicate that, with a thorough evaluation, most preterm labor can be potentially explained, since 96% of patients had at least one identifiable possible cause. Surprisingly, in 58% of patient in preterm labor, two or more cause were found; this finding supports the hypothesis that preterm labor has multiple causes and that efforts to focus only on one area may miss many of the causative agents.

Before evaluation of this scoring system for predicting spontaneous preterm labor, the relation between each factor and preterm labor should be discussed.

I) Reproductive history:

The knowledge about the previous reproductive history is very helpful in the prediction of preterm labor that is why the systems for prediction of preterm labor are better applied for the multigravid women.

A) Effect of previous induced abortions:

The effect of induced abortions on the subsequent pregnancy outcome has been controversial. While many studies have indicated increased risks of fetal loss in the form of spontaneous abortions in the first and second trimesters, preterm delivery and perinatal mortality ***(Hogue et al, 1982).*** These findings have also been disputed by other studies which did not demonstrate such effects ***(Frank et al, 1991).***

Furthermore, although previous induced abortion increased the risk of subsequent pregnancy failure, this risk was found to be smaller than the risk associated with other socio-economic and behavioral indicators ***(Madoreetal, 1981).***

LaO and Ho (1998) support the opinion that induced abortion "purse" does not adversely affects the obstetric outcome of subsequent pregnancies. However, their findings are valid only for teenagers who have had suction evacuation. The method for induced abortion may be the important underlying factor because the risk of subsequent preterm labor was increased with dilatation and curettage but not with suction evacuation ***(World Health Organization, 1979)*** or medical induction with

vaginal prostaglandin analogue. Therefore, forcible dilatation of cervix during vaginal termination of pregnancy, leads to cervical incompetence particularly if the cervix was dilated to more than 12 mm. Reports showed an increase in preterm birth which reaches 13% after one previous D&C and up to 20% if three or more D&C were done ***(Jhnson et at., 1976).***

B) Effects of previous spontaneous preterm labor and previous adverse pregnancy outcome:

A history of prior preterm delivery, strongly correlates with subsequent preterm labor. The risk of recurrent preterm delivery for those whose first delivery was preterm increased three fold compared with women whose first infant reached term. Also, this study done by ***Carr-Hill and Hall (1985)*** showed that almost one third of women whose first 2 infants were preterm, delivered preterm infants during their third pregnancies. Almost identical results were obtained by ***(Kristensen et al 1995).***

Hagan et al. (1996) showed that there were significant differences in the mothers' previous obstetric history of those with singleton pregnancies compared with those with multiple pregnancies. Overall, almost three-quarters of the multigravid mothers with a singleton pregnancy had a history of a previous adverse pregnancy outcome. The study showed that the proportion with a history of previous abortion was very high (87.4% overall in multigravida). Also, those with history of loss of a previous infant or a previous preterm delivery was also high, being reported in 30.6% of multiparous women. Thus, spontaneous idiopathic preterm labor was the most common single reason for the early delivery