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Research Article

STUDYING RELATIONSHIP OF MYOMETRIAL THICKNESS CALCULATION WITH MEDICAL ULTRASOUND AND LATENT PERIOD OF PREGNANT WOMEN

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ABSTRACT
PROM means rupture of membranes before 37th week of pregnancy. Prolonged latency interval increase probability of amnionit in mothers with PPROM. A relation between uterine myometrium thickness and latency interval has been observed in many studies; therefore, by proving this relation, uterine myometrium thickness sonographic calculation is a simple and non-aggressive method for predicting probable complications on pregnant women. Main purpose of this research is to study the relationship of myometrial thickness calculation with medical ultrasound and latency interval of pregnant women. This sectioned analytical study is case-control type. Pregnant women are divided to two groups: PPROM and preterm pregnant women with normal pregnancy. Myometrium thickness is determined in 3 location fundal, lower segment and mid anterior with G50 medical ultrasound device and curvilinear 3-5 MHz probe. There's no significant relation between myometrial thickness in 3 uterine sites and LI thus it is concluded that in women with PPROM different mechanism is utilized for childbirth.

Keywords: *Pregnancy, Myometrium Thickness, Medical Ultrasound, Amnionit*

INTRODUCTION
Premature Rupture of Membranes
Premature rupture of fetal membranes (PROM) is one of the most common Obstetric problems which involve 5-10% of on time pregnancies and up to 30% of premature childbirth. Although premature rupture of membranes etiology is not clinically known, but there has been some agreement about its treatment course. Aspects like gestation age and patient's demographic condition must be considered in choosing a treatment schedule for the assumed patient. Clinical practitioners face complex decisions in this field, corticosteroids, tocolytic medicines, stronger antibiotics and innovative approaches based on different experiments (Amniocentesis, medical ultrasound, and biophysical experiment).
Notable point is significant improvement of lightweight infant's survivability.
Definitions
Commonly PROM is defined as rupture of membranes in any time before contraction because the term ''premature'' remind implicit definition of premature pregnancy. Thus, premature PROM (PPROM) is used on pregnancies less than 37 weeks. Latent period is an interval from rupture of membranes to start of contractions, this term is segregated from a similar term, '' latent phase'', which is first stage of childbirth or before beginning of its active state. Many different terms are defined for describing maternal and fetal infections related to PROM. Terms utilized to childbirth are '' fever in labor'', ''intra partum fever'', Chorioamnionitis and internal uterine infection. Temperature amount that defines ''fever'' differs. After childbirth, maternal infection refers to Endometritis and postpartum infection. These diagnoses are based on fever, uterine sensitivity to touch and rejecting other fever causes. In infants, common term used for fetal infection was fetus sepsis, but this term might only means positivity of blood culture and signs or symptoms of sepsis.
Incidence Rate
Incidence rate of PROM varies from 5 to 10% of all childbirths, and PPROM occurs in 1% of all on-time pregnancies, but in referral centers, over 50% premature pregnancies can be observed. PROM is the catalyst reason of clinical diagnosis and can be found in one-third of all premature birth. Despite PPROM

effects on relative catalyst of prolonged latency period and preventing the re-emergence (like utilizing progesterone or treatment with BV), PROM is still a troublesome issue in premature child birth.

Etiology

In the vast majority of cases, etiology is clinically unknown. Earlier studies identified some clinical conditions such as cervical insufficiency and Poly hydramnious as hazardous factors in some cases of PROM.

A survey study based on PROM indicates potential causes in each case. These causes are widespread loss of tensile strength of the membranes, Localized defects, reduction of amniotic fluid collusion and change in collusion structure, uterus Irritability, Apoptosis, collusion destruction and membranes elongation. In Maternal-fetal medicine universe (MFMU) it was discovered that PROM hazardous factors are PROM background, positivity of fetal Fibronectin in 23rd week, and short cervical span (lower than 25 mm) in the 23rd week.

Evidence suggests that subclinical infection can be one of – and not the only – causes of PROM. Factors that confirm infections include studies that indicate relation between detectable clinical Bacterial vaginosis (or anaerobic separation in vagina) and premature childbirth or PPROM. Some genital bacteria release enzymes- such as Proteases, Phospholipase, and collagenase- that might weaken membranes. Regarding PROM, if amniotic fluid is recovered via Amniocentesis and proper cultivation for genital aerobic, anaerobic and Mycoplasmas is utilized, almost in 30% of cases, cultivations will be positive.in a vast case-control study, a multifactor analysis showed that 3 factors are related to PPROM. These factors were premature childbirth experience (odds ratio [OR] =2.5 confidence interval [CI]=1.4-2.5), smoking (if stopped during OR=1.6 ; CI=0.8-3.3=95%, if continued during pregnancy OR=2.1 , CI:1.4-3.1=95%) and bleeding (first quarter OR=2.4;CI:1.5-3.9=95%, third quarter OR=6.5; CI=1.9-23=95%, in more than third quarter OR=7.4;CI=2.2-26=95%). In this study case group had same gestational age as control group (thus effects of sex in proximity of childbirth was ignored) and it was concluded that there's no relation between sex and PROM. However, studies didn't prove smoking or vaginal bleeding as hazardous factors. Recent sexual intercourse seemingly is not accounted as a cause of PROM.

Premature Childbirth

Premature childbirth is one of the most common causes of death and problems environs childbirth. In USA 10% of parturitions are premature but even this little percentage is cause of 50-70% of fetal death and issues. To reduce financial losses and medical complications, premature childbirth is one of obstetric care purposes to decrease their amount and increase gestation age in fetuses that their premature birth is inevitable.

Definition and Incidence

Parturitions between 20th and 30th week of pregnancies are called premature childbirth. Premature childbirth rate in USA has increased from 9.8% in 1981 to 11.8% in 2000. Between 1988-1999 fetal death rate of white infants has decreased from 49% per 1000 births to 7.1%. This amount in black infants has decreased from 45% to 13.8%.

Since prematurity is main cause of fetal deaths, thus premature childbirth prevention and is top priority of Health care.

Causes and Hazardous Factors

Causes of premature birth are studied in 3 groups (table 1-1)

1. Spontaneous and without specific etiologic factor
2. Premature rupture of fetal membranes
3. Birth induction due to critical medical conditions

Most common cause in normal women is idiopathic whilst the common cause in black women and those living in public places is premature rupture of membranes. It appears that idiopathic subgroup is not seemingly idiopathic and other factors such as Immunological, infectious, uterine, and cervical factors are involved. Recently it has been indicated that genetic Thrombophlebitis is an important etiological factors for pair uterine problems such as limited uterine internal growth and Eclampsia membrane. These two sates, limited uterine internal growth and Eclampsia are two important cause of birth induction, before the

appointed time and in both of these states to prevent fetal death we are forced to implement birth induction. Financial-social and mental-social conditions of medical conditions show role of these two factors on premature childbirth.

Table 1: Premature Childbirth Etiology

Patients	Idiopathic (Intact Membranes)	PROM	Critical Medical Conditions
Normal Women	-	-	-
Normal Women Residing in Public Places	54%	27%	19%
White	44%	36%	20%
Black	28%	51%	21%

Sonographic Discoveries of PPROM

Natural amniotic fluid is basically resulting of maternal serum. With increase of gestational age, fetus urine becomes the natural source of amniotic fluid. These fluid components are dynamic, as its volume changes every 3 hours.

Fetus devours amniotic fluid with speed of 450 cc in 24 Hrs. resulting transudate from fetus lungs forms part of this fluid. Water passes through fetus pair membranes based on Osmotic gradient. Amniotic fluid is necessary for fetus lungs growth and maturity.

Floating particles in amniotic fluid that are visible via medical ultrasound are in fact related to blood or Meconium natural vernix (Isolated skin from fetal). Amniotic fluid index is an estimating calculation of amniotic fluid volume that are based on Vertical diameter calculation of 4 numbers from deepest amniotic fluid packs in fourth quarter of uterus and their sum is calculated together. Calculated packs should not include naval cord or fetal members.

Normal amount is between 5 to 20 mm. oligohydraminus is referred to low volume of amniotic fluid. Fluid packs are either small or don't exist. Fetal members are very close to each other. Superficial characteristics such as face are hardly observed. AFI is lower than 5 cm. pack calculation in vertical direction below 1 cm determines intense oligohydraminus. Its causes are: rupture of fetal membrane, fetal death IUGR, renal anomalies (urine reduction), Eclampsia and prolonged pregnancies. Calculations below 8 cm before 32-34th week of pregnancy indicate reduction in amniotic fluid volume. AFI is a proper tool for serial diagnosis and in managing patients with many examiners with different experiences; also its percent error is below 7%.

In a study conducted by Atar Javadan and associates (2010) in Tehran, calculation of myometrial thickness in some uterine sites of pregnant women was performed in 3 groups. First group consists of women with PPROM, second group preterm no labor and third group term any labor. In the end it was determined that there's a positive relation between MT and Lithest results are similar in group with gestational age shorter than 30 week , however this was not observed in women with gestational age over 30 week.

The cross-sectional study of Iams *et al.,* (2000) conducted in Australia, evaluated 68 preterm pregnant women inflicted with PPROM. No significant relation was observed between MT and LI.

Hamdi *et al.,* (2010) conducted a study in Tabriz in which 30 pregnant women with PPROM and 30 women with normal pregnancy were studied. In this study, no significant relationship between MT and LI was found. 50% of women gave birth in 10 days after PPROM and only 43.3% of women gave birth 7 days after PPROM.

In the Bergeron and associates' (2009) study in Canada, myometrial thickness of women with PPROM was calculated and it was discovered that in gestational age before 29 weeks, it has significant relationship with LI.

MATERIALS AND METHODS

Methodology

In pregnant women with PPROM, positive Fern test and observation of amniotic fluid with sterilized speculum by Obstetrician and Gynecologist will take place. Evaluating myometrium thickness for pregnant women with PPROM will take place within 12 hours. All sonoghraphic scans will be performed on PPROM women ventrally with SIEMENS medical ultrasound equipment's G50 and a trans-abdominal 3-5 MHz curvilinear probe.

When AFI is lower than 5 cm it will be considered as oligohydraminus. Insonoghrapy evaluation, myometrium will be considered as a uniform layer between Serosa and decidua. MT will be estimated in 3 different points:

1. Uterus lower segment (LS), 2 cm above bladder reflection.
2. Uterus mid anterior (MA), 1 cm above navel (or probe)
3. Fundal, in Curvature at the top of the uterus

At least three measurements will be done and average and deviation standard will be calculated.

Treating pregnant women with PPROM based on Obstetrics and Gynecology protocol will be done by respective Obstetricians and Gynecologists.

Sampling Process

Study Society

1-Pregnant women with PPROM visited Imam Reza hospital from tir 90 to tir 91

2-Preterm pregnant women with natural pregnancy visited Imam Reza hospital from tir 90 to tir 91

2-5) Sampling method

The samples will be taken from visiting people.

The way of placing the patients in case or control group depends on presence or absence of PPROM.

Prior to medical ultrasound operation, Sonographer will not be informed about the group that the patient belongs to.

Patient visit will be by prior arrangement with respective Gynecologist.

Table 2: Variables

Variable	Scale	Role	Scientifically Definition	Unit
Myometrium Thickness	Slightly Continues	Independent	Interface between Uterine Layers Souza and Serous	Millimeter
Latency Interval (LI)	Slightly Discrete	Dependent	Time Interval from Membrane Rupture to Uterine Contractions	Hour
Gestational Age	Slightly Discrete	Background	Gestational Age is Considered 2 Weeks after Latest Period	Week
PPROM	Nominal	Dependent	Prom before 38th Week of Pregnancy	Have/don't have
Age	Slightly Continues	Background	Based on People ID	Year
Amniotic Fluid Index (AFI)	Slightly Continues	Dependent	Total of Amniotic Fluid Calculated via Sonoghraphy	Centimeter

Calculating Sample Volume

Based on following formula, sampling volume with 95% level of confidence and 90% potency by utilizing results of previous studies assuming average and deviation standard LUS are orderly 8.1±1.35 and 5.6±4.25, minimum required sample volume will be 34 persons in each group and total of 68 people.

$$n = \left[\frac{\left[\left[Z_1 - \frac{\alpha}{2} \right] + [Z_2 - \beta]^2 \right]^2 [s_1^2 + s_2^2]}{(\mu_1 - \mu_2)^2} = \frac{(1/96 + 1/28)^2 \left(\frac{1}{35}^2 + \frac{4}{25}^2 \right)}{(5/6 - 8/1)^2} \right] = 34$$

Data Gathering

1-Patients'data gathering form as a questionnaire and patient's information will be recorded confidentially for medical ethics observance.

2- Medical ultrasound calculation of myometrium thickness will be performed by resident advisor, under observation of executive with utilization of G50 device and 3-5 MHz curvilinear probe.

3- PPROM diagnosis will be performed by respective Obstetricians and Gynecologists with Fern test and observation of amniotic fluid using sterilized speculum.

Data Analysis

Average and deviation standard of thickness are reported by millimeters in 3 part fundal, lower segment and mid anterior (MT), average and deviation standard of LI are calculated in hours.

Data analysis is done using SPSS (v16).

Normality distribution will be performed by Kolmogorov-smirnov test. Comparison of averages will be done by Mann-whitney-U test or independent T-test.

Determination of correlation between MT and LI will be operated with Pierson correlation coefficient and if needed, Spearman. Differences with $p<0.05$ will be termed significant.

RESULTS AND DISCUSSION

In case group, relation between latency interval with MT in Fundal (p=0.9, r=0.021) and mid anterior (p=0.32, r=-0.17) and lower segment (p=0.9, r=0.021) with Pearson correlation was studied that results are indicated in table 3-12. According to results there's no significant relation between LI and MT in these 3 sites.

Table 3: Studying MT and LI Relationship in Fundal, Mid Anterior and Lower Segment Sites

Case Group	Fundal	Mid Anterior	Lower Segment
Latency Interval	r=-0.24	r=-0.17	r= -0.021
	p=0.15	p=-0.32	p=0.9

Similar results were obtained from Spearman correlation coefficient test. Relevant diagrams shown below clarify this subject.

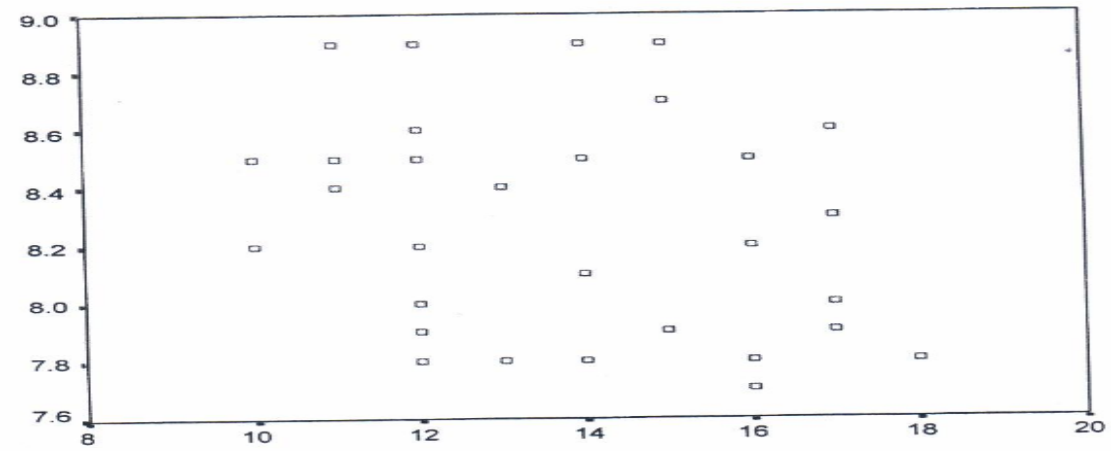

Diagram 1: Scatter Relation between MT and LI in Fundal Site in Case Group

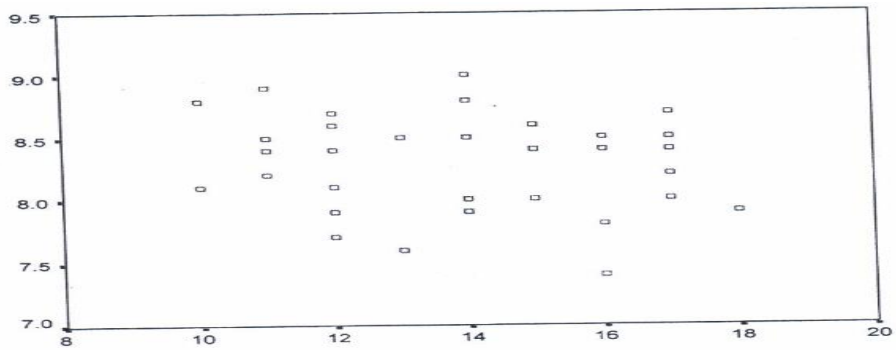

Diagram 2: Relation between MT and LI in Mid Anterior in Case Group

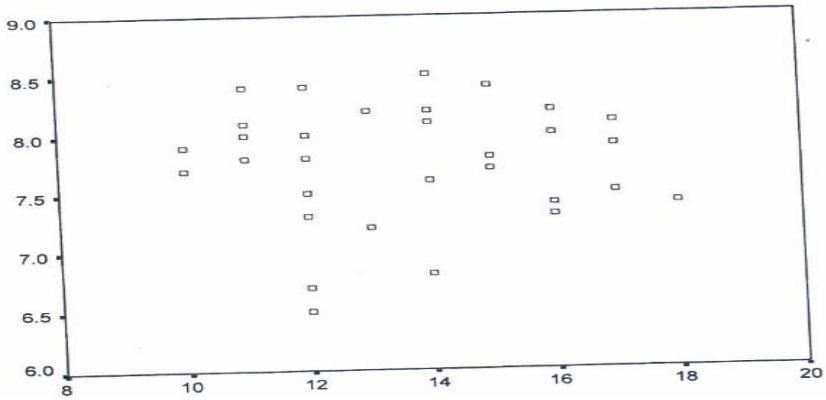

Diagram 3: Scatter Relation between MT and LI in Lower Segment Site in Case Group

In control group, relation between latency interval with MT in Fundal (p=0.41, r=-0.14) and mid anterior (p=0.47, r=-0.12) and lower segment (p=0.52, r=-0.11) with Pearson correlation was studied that results are indicated in table 3-13. According to results there's no significant relation between LI and MT in these 3 sites.

Table 4: Studying MT and LI Relationship in Fundal, Mid Anterior and Lower Segment Sites

Control Group	Fundal	Mid Anterior	Lower Segment
Latency Interval	r=-0.14	r=-0.12	r= -0.11
	p=0.41	p=-0.47	p=0.52

Similar results were obtained from Spearman correlation coefficient test. Relevant diagrams shown below clarify this subject.

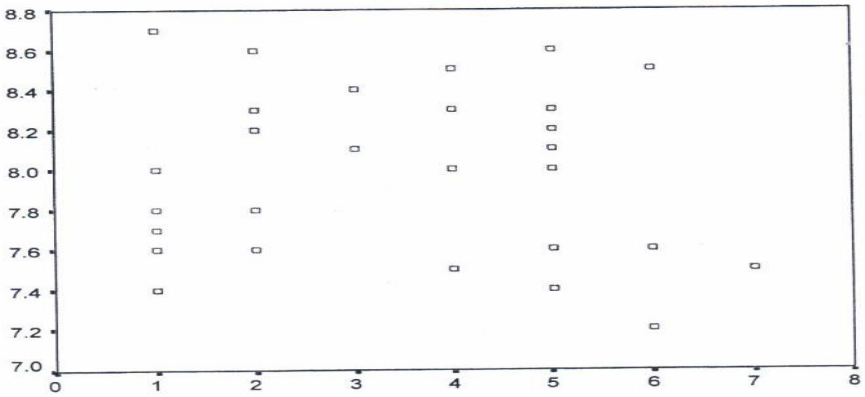

Diagram 4: Scatter Relation between MT and LI in Fundal Site in Control Group

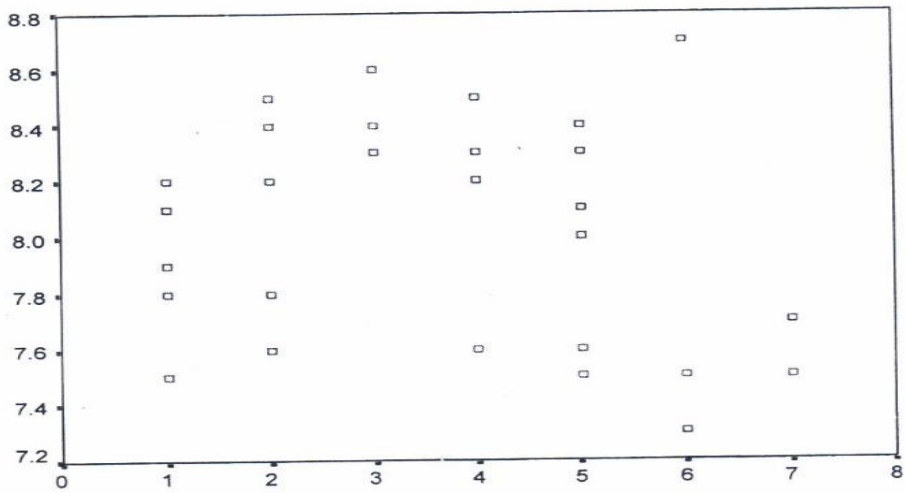

Diagram 5: Relation between MT and LI in Mid Anterior in Control Group

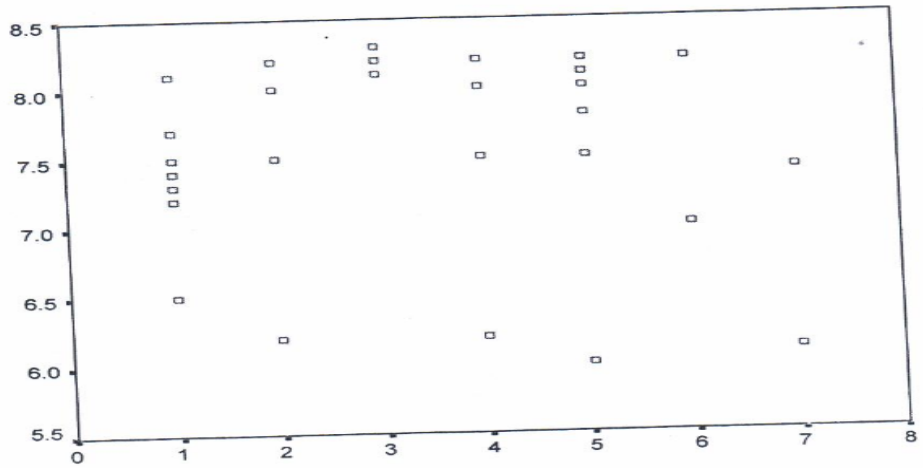

Diagram 6: Scatter Relation between MT and LI in Lower Segment Site in Control Group

Conclusion

In This case-control study some variables were compared. Case group were unified with control group in age and gestational age aspect. It appears that similar to Iams *et al.*, (2000) study, abortion and gravidity are similar in both case and control group.

According to results latency interval of case group was more than control group and significant difference was observable. Since case group consists of pregnant women with PPROM in these people longer latency interval was observed. This discovery was also observed in Buhimschi study.

Thus the hypothesis ‘’calculating myometrial thickness with sonographic techniques is efficient in women with PPROM’’ is denied by our study. To explain this discovery, it can be said that in term pregnant women, childbirth is in relation with thinning of uterine myometrium but in PPROM pregnant women different mechanism other than myometrial thickness affects childbirth thus this matter proved there’s no significant relation between MT and LI in 3 uterine sites: fundal, mid anterior and lower segment. Therefore, we have to look for other factors affecting this group’s parturition.

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