Maha Mohammed Al-Bayati, MBChB, CABOG Sura Saladdin Salman MBChB, FICOG, CABOG, Eman Jabbar Ghanem MBChB

Abstract:
Background: Prolonged pregnancy occurs in approximately 10% of all singleton pregnancies. It is a common cause of increased fetal, maternal and neonatal risks.
Objective: To evaluate transvaginal ultrasound measurement of cervical length at 37 weeks gestation as a predictor of prolonged pregnancy in nulliparous women.
Patients and methods: This study had been conducted in Al-Kadhimia teaching hospital which enrolled 100 nulliparous women with singleton gestation at 37 weeks. Cervical length was measured by transvaginal ultrasonography at 37 weeks gestation.
Results: Cervical length at 37 weeks gestation was longer in women who delivered at > 40 weeks than those delivered at ≤40 weeks and the best cut-off value of cervical length at 37 weeks for the prediction of prolonged pregnancy was 30 mm with a sensitivity of 67% and specificity of 100%.
Conclusion: Cervical length at 37 weeks gestation assessed by transvaginal ultrasonography can predict the likelihood of prolonged pregnancy in nulliparous women.
Key words: Prolonged pregnancy, nulliparity, transvaginal ultrasound

Introduction:
Prolonged pregnancy is a common obstetrical problem and it is one of the causes of anxiety for women and obstetricians. It is a common situation and is perceived as being a cause of increased fetal, maternal and neonatal risks (1). It is defined by the world health organization and the international federation of gynecology and obstetrics (FIGO) as pregnancy of 294 days duration or more from the last menstrual period (42 completed weeks or more) (1).

Prolonged pregnancy associated with an increase in perinatal mortality and morbidity in pregnancy which appears to be otherwise low risk (2). It is also associated with increased risk of fetal trauma due to fetal macrosomia, meconium aspiration and intrapartum fetal distress.

Many women find the physical burden of pregnancy at or near term to be intolerable and the concept of having to go past their estimated date of confinement unbearable. An early prediction of this condition is important; therefore there has been considerable interest in the development of tests for the prediction of prolonged pregnancy. These tests include fetal fibronectin, cytokine, or nitric oxide concentrations in cervicovaginal secretions and cervical length as determined by ultrasonography (3).

Transvaginal U/S is recommended in assessing the cervix as it is more reliable than the transabdominal route. With abdominal route bladder over distension can compress the walls of the lower uterine segment and cervix. Creating deceiving normal appearance in women with cervical effacement, shortening and dilatation, furthermore, an under distended bladder may preclude adequate visualization of the cervix due to acoustic shadowing from the symphysis pubis and refractive shadowing from the bladder uterine interface and amniotic fluid or inability to elevated the presenting part. The cervical length is accurately determined as the distance between the internal and external os. (1)

The internal os is normally at the level where the cervical canal meets the amniotic sac. The external os is more difficult to define because of acoustic shadowing from rectal gas; this problem can be reduced by scanning with the patient in lateral decubitus position or elevating the hips with a pillow. Cervical length is the distance between the internal os and external os and (TV-U/S) is the most amenable method and provide the highest degree of consistency for cervical measurement. Cervical length may vary in different populations depend on parity, gestational age, race, nutritional state, and obstetric complications. The external os is the point at which anterior and posterior lips of the cervix meet (3).

Transvaginal U/S is increasingly being used in the 2nd and 3rd trimester of pregnancy. It provides high resolution as the probe closer to the area being examined, avoidance of discomfort of full bladder, reduce problem with acoustic shadowing from the symphysis pubis and the fetal head, and fewer problem with the attenuation of sound waves in obese patients. (7)

Several studies have reported that sonographic measurement of cervical length at term is a useful predictor of the likelihood of successful induction of labour and the spontaneous onset of labour in a 7-day period, so it is possible that a longer cervix may predict a higher risk of prolonged pregnancy (8, 9, 10, 11, 12).

Aim of the study:

This study was designed to assess the transvaginal ultrasound measurement of cervical length at 37 weeks of gestation as a predictor of prolonged pregnancy in nulliparous women.

Patients and Methods:

This study was carried out at Al-Kadhimia Teaching Hospital in the department of obstetrics and
Prediction of prolonged pregnancy in nulliparous by transvaginal US of Cervical Length at 37 weeks Maha M Al-Bayati et al.

Gynaecology and Ultrasound department during the period from July 2008 through July 2009. The study was approved by the Iraqi council for medical specializations. The study included 100 pregnant women were recruited from the antenatal and outpatient clinics of obstetrics and gynaecology department. All were primigravida presented at 37 completed weeks of gestation. An estimation of gestational age was done by accurate dating of the last menstrual period plus early US. Calculation of gestational age depends on crown-rump length (CRL) in 1st trimester or biparietal diameter (BPD) prior to 20 weeks of gestation. Full medical, surgical, obstetrical, gynaecological history and examination were done for each woman. The inclusion criteria were primigravida, singleton, uncomplicated pregnancy (no hypertension, diabetes, cardiac problem), without gross congenital anomalies, gestational age 37 completed weeks, absence of labour, live fetus with vertex presentation, intact amniotic membrane and no history of uterine surgery. An informed verbal consent was obtained from all women included in the study for transvaginal ultrasound (TV-U/S) performance after explaining the procedure and the aim of doing it. Transvaginal ultrasonographic assessment of the cervical length was performed using the ultrasound device SIEMENS real time scanning system with a 6.3 MHz transducer. Women were asked to empty their bladder and were placed in the dorsal lithotomy position. The probe was gently inserted in the vagina to obtain a sagittal view of the complete cervix, including the internal os, external os and the endocervical canal. The probe was inserted half way between the cervix and the introitus to restore a clear cervical image. After obtaining a clear cervical image, electronic markers were placed at the furthest points between the internal os and external os, and then cervical length was measured once as a straight line. Follow up was done till delivery. Women participated in the study were divided into two groups: Group (1) those delivered before or at 40 weeks of gestation. Group (2) those delivered after 40 weeks of gestation. We assess the relationship between cervical length measured at 37 weeks of pregnancy and gestational age at delivery.

**Statistical analysis:** Data were collected and analyzed using computer facility programmed statistical package for social sciences (SPSS) version 10.0. The percentage means and standard deviations for variables were analyzed. Chi-square was used to detect the significance of relationship between various variables. Statistical significance was considered when P value was < 0.05.

**Results:** In this study (100) pregnant women met the inclusion criteria. Spontaneous onset of labour and delivery at or before 40 wks occurred in 85% of them. (Gestational age at delivery range from 37 & 40 weeks). 15% of the studied women remain undelivered beyond 40 wks, 10% of them had induction of labour and 5% of them had spontaneous onset of labour. (Gestational age at delivery range between (> 40 & 42 weeks). Cervical length was successfully measured in all cases and the mean (± standard deviation) cervical length at 37 wks was 28±4mm. Age range of patients was between 20-34 years old. Table (1) Shows the total no. of patients delivered beyond 40 wks of gestation were 15 (12 of them with cervical length ≥30 mm, and 3 of them with cervical length < 30 mm. Total no. of patient delivered before or at 40 wks of gestation were 85, 82 of them with cervical length <30 mm and 3 of them with cervical length ≥ 30 mm. A significant positive correlation between cervical length at 37 wks measured by (TV-U/S) and gestational age at delivery which was noted by using chi square where $\chi^2$ was 5.81 and accordingly P value was between 0.01-0.02 (P value <0.05) which was of significance?

**Table (1):** Patient distribution according to their cervical length at 37 weeks of gestation and gestational age at delivery.

<table>
<thead>
<tr>
<th>Cervical length at 37wks</th>
<th>&gt;40wk at delivery</th>
<th>37-40wk at delivery</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 30 mm</td>
<td>12</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>&lt; 30 mm</td>
<td>3</td>
<td>82</td>
<td>85</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>85</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 1 & 2 shows a significant positive correlation between sonographically measured cervical length at 37 weeks and gestational age at delivery in group 1 and group 2 respectively.
Figure (1): correlation between gestational age at delivery and cervical length in group 1 (37-40wk)

\[
y = 1.2857x - 21.929
\]

\[
29.5
30
30.5
31
31.5
32
32.5
40 40.5 41 41.5 42 42.5
\]

Gestational age (weeks)
cervical length (mm)

R=+0.894
P<0.05

Discussion:

Prolonged pregnancy is a common situation many women find the physical burden of pregnancy at or near term to be intolerable \(^{(13)}\).

The risk of stillbirth, serious neonatal morbidity and caesarian section are increased for post term pregnancy continue beyond the 42 weeks of gestation, but post term pregnancy is associated with an increase frequency of labour dystocia and increase in severe perineal injury related to macrosomia \(^{(14)}\).

Several studies have reported that measurement of cervical length in the 2nd trimester provides accurate prediction of risk for spontaneous preterm delivery.
and this risk inversely correlated with cervical length (15,16).

Some studies have begun cervical assessment at 37 weeks and demonstrated that cervical length at 37 weeks is associated with the incidence of prolonged pregnancy and the spontaneous onset of labour in a 7-day period (5,6,12).

A major finding in our study is that cervical length at 37 weeks of pregnancy measured by (TV – U/S) can predict the likelihood of prolonged pregnancy in nullipara women. Nulliparity was chosen as the enrollment criterion of our study because primparity and previous prolonged pregnancy are the most common identifiable risk factors for prolongation of pregnancy (5).

This finding is in keeping with the observation made by Ramanathan et al, who demonstrated that measurement of cervical length at 37 weeks of gestation can be used to determine the likelihood of prolonged pregnancy and the risk of C/S in those requiring induction for prolonged pregnancy (5). Conflicting finding however, has been reported by Vimercati et al, they demonstrated that the measurement of cervical length at 39 weeks and 40 weeks was significantly shorter in a group who had spontaneous onset of labour before 41 completed weeks of gestation than in those who did not, but the measurement of cervical length was similar in both groups at 37 weeks and 38 weeks (6). This disparity among these studies is probably attributable to a combination of factors including the definition of prolonged pregnancy, the study population to participate (i.e., nulliparity or primiparity), and sample size (5,7,18).

This study shows a significant positive correlation between cervical length at 37 weeks and gestational age at delivery. This finding is consistent with the observations of Ramanathan et al, who documented a high association between cervical length at 37 weeks and gestational age at spontaneous onset of labour (5).

In other study Vimercati et al reported that women who remain undelivered beyond 41 weeks has a high association between cervical length at 37 weeks and demonstrated that cervical length at 37 weeks can predict the risk of prolonged pregnancy in nullipara women who remain undelivered beyond 41 weeks has a high association between cervical length at 37 weeks and gestational age at delivery. This finding is consistent with the observation made by Ramanathan et al, who demonstrated that measurement of cervical length at 37 weeks of gestation can be used to determine the likelihood of prolonged pregnancy and the risk of C/S in those requiring induction for prolonged pregnancy (5).

More over in our study cervical length at 37 weeks at cut off value of 30mm had a sensitivity of 67% and specificity of 100% in the prediction of prolonged pregnancy. These data have several clinical implications for the management of patients at term. First, if routine measurement of cervical length at 37 weeks can identify patients at high risk of prolonged pregnancy, the incidence of prolonged pregnancy or the risks associated with prolonged pregnancy will be reduced because simple methods to promote spontaneous onset of labour (i.e., membranes stripping and outpatient prostaglandin therapy) can be already proposed (20,21). Second, these data may be utilized in individualizing the timing of elective caesarean section rather than performance of this operation at 38 weeks. Third, from the patient’s point of view these data may give patients information to arrange their social activities and to deal with their anxiety.

Conclusion and recommendation:

Cervical length at 37 weeks can predict the likelihood of prolonged pregnancy and is associated with the gestation at spontaneous onset of labour in low-risk nullipara women and the best cut-off value for prediction of prolonged pregnancy was 30 mm with a sensitivity of 67% and specificity of 100%.

We recommend performing transvaginal ultrasound for measurement of cervical length at 37 weeks of gestation to identify patients at high risks of prolonged pregnancy which may reduce the complication associated with it.

References


(6) Vimercati A, Greco P, Lopalco P, Loizzi V, Scioscia M, Mei L, Rossi AC, Selvaggi L. The value of ultrasonographic examination of the
Prediction of prolonged pregnancy in nulliparous by transvaginal US of Cervical Length at 37 weeks Maha M Al-Bayati et al.


* Professor & consultant in Obstetrics & Gynecology, College of Medicine / Al-Mustansiriya University.
**Specialist in Obstetrics & Gynecology, Al-Yarmouk Teaching Hospital.