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Sonographic Cervical Length to Differentiate True from False Labor in term patients

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ABSTRACT

Background: False labor pains are called Braxton Hicks contractions. False labor contractions can easily be mistaken for true labor as the delivery date approaches and you begin to look for signs of impending labor. However, unlike true labor contractions, Braxton-Hicks contractions will not gain in intensity, length, or frequency over several hours. In fact, they often stop all together with an increase in hydration or walking. These contractions are not working to soften or open the cervix and will not lead to additional labor signs. True Labor pain come at regular intervals and, as time goes on, gets closer together. Each lasts about 30–70 seconds, contractions continue despite movement, contraction increase in strength steadily and pain usually starts in the back and moves to the front. **Objective:** The present study was designed to differentiate true from false labor in term patients by sonographic cervical length assessment. **Patients and Methods:** This is a prospective study which was conducted on 410 pregnant women at term (38 to 42 weeks) presenting to Obstetrics emergency unit at AL-Azhar University hospital (New Damietta) and Damietta specialized hospital for labor check participated in this prospective study after oral and informed consent. **Results:** there was significant increase of gestational age associated with significant decrease of cervical length at women presented with true labor pain when compared with women with false labor pain. **Conclusion:** The trans-vaginal cervical length measurements were important to detect labor and show a statistical significant value in prediction of labor and to differentiate between true and false labor pain. The shortest cervical length (<1.5 cm) considered more specific for prediction of true labor pain.

Introduction

The obstetrical patient presenting to labor and delivery triage for labor evaluation at term is one of the most common clinical scenarios. Currently, the diagnosis of true labor at term relies on patient symptomatology and very frequently on progressive cervical dilation by digital vaginal examination. However, perception of contractions is a poor predictor of labor and digital examination, therefore Bishop score, have large intraobserver and interobserver variabilities, providing low accuracy to predict true labor (Miller and Grobman, 2016). Over the last few decades, cervical assessment has moved from digital examination to sonographic evaluation. Although transabdominal ultrasound was initially used for evaluation of the cervix in the second and third trimesters, appropriately performed transvaginal ultrasound produces better and clearer images of the internal and the external os (Tolaymat et al., 2007). In pregnancy, the uterine cervix serves 2 major functions. First, it maintains its firmness (i.e., physical integrity) during pregnancy as the uterus dramatically enlarges. This physical integrity is critical so that the developing fetus can remain in the uterus until the appropriate time for delivery. Second, in preparation for labour and delivery, the cervix softens and becomes more distensible, a process called cervical ripening. These chemical and physical changes are required for cervical dilatation, labour, and delivery of the fetus (Facchinetti et al., 2005).

Cervical length (CL) by transvaginal ultrasound (TVUS) to predict preterm labor is widely used in clinical practice (Kunzier et al., 2016). There are several studies examining the use of CL surveillance by TVUS to predict spontaneous preterm birth in symptomatic as well as asymptomatic patients. As a matter of fact, the usefulness of CL to predict preterm labor (PTL) has been documented very well so that it is now routinely used in clinical practice (Khalifeh and

Berghella, 2015). In term patients the use of CL has been limited to prediction of spontaneous labor in prolonged pregnancies and also in the prediction of successful labor induction (Comas et al., 2016).

There are no enough data on CL measurements to differentiate true from false labor in term patients presenting for a labor check (Osmundson et al., 2011). True labor occurred when the cervix opens (dilates), the uterus contracts at regular intervals, the abdomen becomes hard and between the contractions, the uterus relaxes and becomes soft which progress to the birth of the baby (ACOG, 2011). False labour pain mean infrequent and irregular cramping (Braxton Hicks contractions) not progressing to the birth of the baby (Hanghøj, 2013).

Patients and methods

This was prospective observational study that included 410 pregnant women at term (38 to 42 weeks) presenting either to Obstetrics emergency unit at Al- Azhar University hospital (New Damietta) or Damietta specialized hospital complaining for uterine contractions. Trans-vaginal ultrasound was performed to all women included in this study to measure cervical length. Women were kept under observation for 24 hour. If true labor was confirmed by (rupture membrane or increased labor pain within 24 hours), active management was done. If not, she was sent home with appropriate advices. The following criteria used to establish the onset of labor and to differentiate true labor from a false one: reduction of interval between uterine contractions and abdominal pain of increasing intensity. This study participated after oral and informed consent with the following criteria; age below 36 years, BMI below 32kg/m^2, parity between 0-3, singleton and live fetus, gestational age 38 to 42 weeks, cephalic presentation, presence of uterine contraction and intact membrane. All of the following criteria were excluded; parity more than four in number, previous cesarean section, previous preterm labor, previous post term labor, maternal or fetal indications for immediate delivery, pre labor rupture of membranes, clinical chorioamnionitis, placenta previa and cervix ≥ 4 cm dilated and ≥ 50% effaced.

After observation of women presented with pain for 24 hour, they divided into two groups:

Group (1): 231 women presented with true labor pain, 127 cases primi-gravida (nulli-para) and 104 cases were multi-gravida (multi-para).

Group (II): 169 women presented with false labor pain, 119 cases were primi-gravida and 50 cases were multi-gravida. There were 10 women escaped from this study.

Patient Preparation: Methods

All women included in the study were subjected to the following:

Full detailed history including labor pains (duration, frequency and other criteria which were regular intervals of uterine contractions, decreasing interval between uterine contractions, abdominal pain of increasing intensity, backache, pain relieved by walking, vomiting, changes in intestinal habits in the last 24 hours and changes of breathing pattern and body position during contractions). Gestational age determination based on the date of the last menstrual period and/or first and second trimester ultrasound.

Examination

Vital signs as (pulse, blood pressure or tempreture). Abdominal examination to check for uterine contraction, fetal presentation and heart activity confirmed by abdominal ultrsound.

Investigations

Complete blood count (CBC). ABO-Rh grouping. Urine analysis.

Technique for cervical length measurement

Ultrasonography: U ltrasound scan was performed using a Voluson 730 Pro machine (USA) ultrasound machine, equipped with a 7-10 MHz transvaginal probe. A proper technique is critical for accurate and reproducible cervical length measurements. The patient examined with an empty bladder to avoid dynamic cervical changes. The trans vaginal ultrasound (TVUS) probe was introduced into the anterior vaginal fornix under real-time visualization.

A mid-sagittal view of the cervix was obtained. The probe was then withdrawn just enough to allow the image to blur and then advanced just until the image comes back into focus. This sequence avoids excessive probe pressure on the cervix, which can result in falsely lengthened cervical measurements. The on-screen electronic calipers were placed at the notches representing the internal os and external cervical os, thereby identifying the bounds of the cervical length measurement. Three such measurements were taken by single operator and the shortest of the 3 is reported as the cervical length.

Then Women were admitted in obstetrics emergency unit at Al-Azhar University hospital for 24 hour under observation. If true labor was confirmed by rupture membrane or increased labor pain within 24 hours, active management was done. If not, she was sent home with appropriate advices. Statistical analysis: The collected data were organized, tabulated and statistically analyzed using statistical package for social sciences (SPSS) version 19 (SPSS Inc, Chicago, USA), running on IBM compatible computer. Quantitative data were expressed as the mean ± standard Error (SE). Qualitative data were presented as relative frequency and percent distribution. For comparison between two groups, the independent samples (t) test. For comparison between categorical groups, the student T test was used. For all tests, P values < 0.05 were considered significant. For all tests, P values > 0.05 were considered insignificant.

Results

This is a prospective observational study included 410 pregnant women; 231 of them presented with true labor pain, 169 presented with false labor pain and 10 women not came again. This table showed the demographic feature of the studied women. The mean age was 29.35 ± 0.88 years, BMI was 28.95 ± 0.87, Kg/m2, parity was 1.55 ± 0.19, gestational age was 38.8 ± 0.2 weeks and cervical length was 1.77 ± 0.23 cm. (table 1). In the present study, there were 231 of them presented with true labor pain and 169 presented with false labor pain when evaluated for 24 hour at Obstetrics emergency unit (Table 2). This table showed that age, BMI and parity were nearly comparable between both

women with true labor pain and with false labor pain (age: 29.0±1.37 Vs 29.7±1.17 years; BMI: 28.8±1.46 Vs 29.1±1.03 Kg/m2 and parity: 1.3±0.2 Vs 1.8±0.3 respectively) with no statistical significant differences (Table 3).

This table showed that significant increase of gestational age associated with significant decrease of cervical length at women presented with true labor pain when compared with women with false labor pain (Table 4). This table showed that the sensitivity, specificity, positive predictive value, negative predictive value, positive likelihood ratio and negative likelihood ratio were 67.4% Vs 55.2%, 75.0% Vs 71.4%, 96.7% Vs 80.0%, 17.6% Vs 43.5%, 2.7 Vs 1.93 and 0.43 Vs 0.63 with primiparous when compared with multiparous women when the cervical length was <1.5cm respectively (Table 5).

The present work showed that, the sensitivity, specificity, positive predictive value, negative predictive value, positive likelihood ratio and negative likelihood ratio were 79.5% Vs 76.0%, 64.3% Vs 54.5%, 86.1%Vs 82.6%, 52.9% Vs 50.0%, 2.23 Vs 1.67 and 0.32 Vs 0.44 with primiparous when compared with multiparous women when the cervical length was 1.5-2 cm respectively (Table 6). The present work showed that, the sensitivity, specificity, positive predictive value, negative predictive value, positive likelihood ratio and negative likelihood ratio were 92.3% Vs 68.4%, 44.4% Vs 41.7%, 60.0% Vs 65.0%, 90.9% Vs 45.5%, 1.66 Vs 1.17 and 0.17 Vs 0.76 with primiparous when compared with multiparous women when the cervical length between 2.1-2.5 cm respectively (Table 7). The present work showed that, the sensitivity, specificity, positive predictive value, negative predictive value, positive likelihood ratio and negative likelihood ratio were 94.7% Vs 83.8%, 30.8% Vs 15.4%, 47.4% Vs 70.3%, 97.8% Vs 28.6%, 1.37 Vs 0.99 and 0.17 Vs 1.05 with primiparous when compared with multiparous women when the cervical length between 2.6-3.5 cm respectively (Table 8).

Discussion

Uterine contractions at term or preterm are one of the most common reasons for visits to obstetrical triage. Determining which patient with contractions is in true labor and needs to be admitted is, however, difficult. Evidence shows that misjudgments are often made; up to 50% of women admitted with the diagnosis of term labor are subsequently found not to be in true labor (McPheeters et al., 2005). Women at term admitted in the latent phase or not yet in labor are more likely to receive medical intervention (electronic monitoring, epidural analgesia, oxytocin and cesarean section) than those admitted in active labor (Jackson et al., 2003).These interventions in labor have been associated with increased levels of morbidity and mortality for mothers and babies (Villar et al., 2007). In this study, we differentiate true from false labor in term patients by sonographic cervical length assessment. In the present study, age, BMI and parity were nearly comparable between both women with true labor pain and with false labor pain (age: 29.0±1.37 Vs 29.7±1.17 years; BMI: 28.8±1.46 Vs 29.1±1.03 Kg/m2 and parity: 1.3±0.2 Vs 1.8±0.3 respectively) with no statistical significant differences.

These results agree with Kunzier et al. (2016) who noticed that groups with true and false labor pain were similar to each others in regards to maternal age, BMI, gravidity and parity. In the present study, there was a significant increase of gestational age from 38.3±0.15 at women with false labor to 39.3±0.3 at women with true labor pains associated with significant decrease of cervical length from 2.2±0.28 at women presented with false labor pain to 1.3±0.31 at women with true labor pain. These results agree with (How et al., 2009) who indicate that cervical dilatation of 3-6 cm increases by two times the risk of delivery in the first 48 hour compared to a lower dilatation.

Amon et al. (2000) reported a high percentage of women with cervical dilatation of 3 cm or more for whom delivery was delayed by 24 hour (75%) or 48 hour (60%). Melamed et al. (2013) report a significant correlation between the length of the cervix and the time interval to delivery. Lee et al. (2013) and Mehra et al. (2015) showed that short cervical length is associated with an increased risk of preterm delivery. Moroz and Simhan (2012) reported on 2695 asymptomatic women with consecutive cervical length measurements after a median time interval of four weeks 16. In the 250 women with a cervical length of less than 25 mm, for every one millimeter shortening, the risk for preterm delivery increased by 3%. Hosli et al. (2014) noticed that the median interval between admission and delivery was significantly higher (3 days) for women with dilatation of the cervix between 0 cm and 2 cm compared to women with a dilatation of 3-6 cm (less than 24 h).

Transvaginal ultrasound assessment of the cervix and measurement of its length are helpful in predicting the risk of delivery in patients presenting with preterm contractions. However, much less is known about whether the predictive accuracy could be improved by obtaining serial measurements of the cervix after admission (Wagner et al., 2016). Iams (2014) noticed that the cervix is more likely to progressively shorten in patients with true labor as compared to patients with false labor. Vimercati et al. (2001) measured CL in 120 nulliparous women starting at 37 weeks and then weekly. They found that CL at 39 and at 40 weeks is shorter in women who delivered prior to 41 weeks. They also found that before 39 weeks' gestation, CL did not predict time to delivery. One explanation for the difference between their findings and ours may reflect the reproductive history and ethnic differences in the study populations; their population consisted of only nulliparous Italian women while our population included nulliparous and multiparous women. Ramanathan et al. (2003) published their findings of CL at 37 weeks' gestation as a predictor of delivery after 40 weeks and 10 days. They found that CL of <20 mm at 37 weeks is associated with 0% incidence of delivery after 40 weeks and 10 days. They did not assess CL at any other gestational age. Bayramoglu et al. (2005) reported on a cohort of 93 women at 37–40 weeks and assessed the relationship between CL and delivery within 7 days. Using the ROC curve, they identified optimal cutoff measurements (29.5, 27.5, 25.5 and 24.5 mm) at 37, 38, 39 and 40 weeks respectively.

Table (1): Demographic data of the studied women

Variable	Studied women (400)
Age (years)	
Mean ± SE	29.35 ± 0.88
Range	22-35
BMI (Kg/m^2)	
Mean ± SE	28.95 ± 0.87
Range	22-32
Parity	
Mean ± SE	1.55 ± 0.19
Range	0-3
Gestational age (weeks)	
Mean ± SE	38.8 ± 0.2
Range	38-41
Cervical length (cm)	
Mean ± SE	1.77 ± 0.23
Range	0.4-3.8

Table (2): Classification of studied women according to pain character.

Variable	Studied women (400)
true labor	231 (57.7%)
False labor	169 (42.3%)

Table (3): Demographic data of studied groups.

Variable	True labor (n= 231)	False labour (n= 169)	*t test*	P value
Age (years)				
Mean ± SE	29.0 ± 1.37	29.7 ± 1.17	0.38	0.7
Range	24-35	22-35		
BMI (Kg/m^2)				
Mean ± SE	28.8 ± 1.46	29.1 ± 1.03	0.16	0.86
Range	22-36	24-34		
Parity				
Mean ± SE	1.3 ± 0.2	1.8 ± 0.3	1.2	0.21
Range	0-2	0-3		

Table (4): Comparison between studied groups regarding gestational age and cervical length.

Variable	True labor (n= 231)	False labour (n= 169)	*T test*	P value
Gestational age (weeks)			2.97	0.008*
Mean ± SE	39.3 ± 0.3	38.3 ± 0.15		
Range	38-41	38-39		
Cervical length (cm)				
Mean ± SE	1.3 ± 0.31	2.2 ± 0.28	2.26	0.036*
Range	0.4-3.7	0.9-3.8		

**: significant*

Table (5): Diagnostic accuracy when the cervical length (CL) <1.5cm to predict true labor at term

	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Positive likelihood ratio	Negative likelihood ratio
Primiparous 246 (%)	67.4%	75.0%	96.7%	17.6%	2.7	0.43
Multiparous 154 (%)	55.2%	71.4%	80.0%	43.5%	1.93	0.63

Table (6): Diagnostic accuracy when ($1.5 \geq CL \leq 2$ cm) to predict true labor at term

	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Positive likelihood ratio	Negative likelihood ratio
Primiparous 246 (%)	79.5%	64.3%	86.1%	52.9%	2.23	0.32
Multiparous 154 (%)	76.0%	54.5%	82.6%	50.0%	1.67	0.44

Table (7): Diagnostic accuracy when (2> CL ≤ 2.5 cm) to predict true labor at term

	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Positive likelihood ratio	Negative likelihood ratio
Primiparous 246 (%)	92.3%	44.4%	60.0%	90.9%	1.6	0.17
Multiparous 154 (%)	68.4%	41.7%	65.0%	45.5%	1.17	0.76

Table (8): Diagnostic accuracy when the (2.5> CL ≤ 3.5 cm) to predict true labor at term

	Sensitivity	Specificity	Positive predictive value	Negative predictive value	Positive likelihood ratio	Negative likelihood ratio
Primiparous 246 (%)	94.7%	30.8%	47.4%	97.8	1.37	0.17
Multiparous 154 (%)	83.8%	15.4%	70.3%	28.6%	0.99	1.05

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