



Predictive role of transvaginal ultrasonographic measurement of cervical length at 22-26 weeks of gestation for preterm deliveries in twin pregnancies

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Abstract

Aim of this study is to investigate the predictive role of transvaginal ultrasonographic measurement of cervical length (CL) at 22-26 weeks of gestation in determining preterm deliveries in twin pregnancies. CL was measured by transvaginal ultrasonography at 22-26 weeks in 75 twin pregnancies. Signs of preterm labor, ruptured membranes, vaginal bleeding, patients with systemic disease, cervical incompetence were excluded. The primary outcome was spontaneous preterm birth at before 37 weeks of gestation. 63 pregnancies delivered with cesarean section and 10 (% 13.3) babies had NICU requirement. The mean CLM was 37 ± 7.26 mm in patients. Twenty patient (%27) were hospitalized with a diagnosis of preterm labor. 46 patients were delivered at small than 37 gestational weeks and the mean CLM was 37.63 ± 6.53 mm. 29 patients occurred term delivery with 38.64 ± 6.23 mm CLM. According to the ROC curve analysis CLM was found to be a discriminative parameter in patients. The area under curve (AUC), cut off values, sensitivity and specificity were 0.794, 34.95 and %70-80; respectively ($p=0.029$). In twin pregnancies, measurement of CL with transvaginal ultrasonography at 22-26 weeks of gestation can be of beneficial in predicting the risk of preterm deliveries.

Keywords: Twin pregnancies, cervical length, preterm delivery

Introduction

Preterm birth occurs in more than 50% of twin gestations. As a result of using the assisted reproductive technologies in the last decades, an increase in the incidence of twin gestations has been observed [1]. Early preterm deliveries associated with increased morbidities and mortality related to premature infants. Hence, methods to foresee preterm birth in these pregnancies are an important issue in obstetrical investigations. Because of cervix uteri has a labile construction, structure and shape change occur throughout the pregnancy period. That is, cervix softens, shortens, dilates and becomes thinner as pregnancy progresses and term move toward [2]. However, provided that these changes develop in early of gestation, risk of preterm delivery increases [3]. Consequently, to determine the changes of cervical status is important in predicting spontaneous onset of labor [4]. The serial digital examination of cervix uteri was used as an effective method to determine the cervical status, but as this method is subjective and giving only information about the vaginal portion of cervix, it has been flawed [5].

Nowadays as a result of widespread use of ultrasonography, examiners owned more information about the structural changes of cervix uteri by sonographic scanning. For this, It has been recognized as an important tool in the evaluation of the cervix by transvaginal sonography [6].

Previously studies and reviews demonstrate that transvaginal cervical length (TVCL) ultrasound in the second trimester is a powerful predictor of preterm birth among asymptomatic women [7]. Further, CLM has the highest positive and negative predictive values to predict the risk of spontaneous preterm delivery in twin pregnancies [8]. CLM may be identifying a group of twin pregnancies that are better aspirants for interventions intended to prevent prematurity.

Material and Methods

This cross sectional study was conducted at Zekai Tahir Burak Woman's Health Education and Research Hospital (Ankara/Turkey). The local ethics institutional review board approved the study; all participants received a detailed explanation about the research and all have signed an informed consent form.

A total of 75 healthy twin pregnancies whose gestational age between 22-26 weeks were enrolled the study. The risk

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factors evaluated were; age, gravidity, parity, GW (gestational weeks), gestational week at birth, birth weight, using cigarette, formation of pregnancy, delivery type, neonatal intensive care unit (NICU) requirement and cervical length measurement (CLM). Patients with Pre-existing maternal disease (diabetes, chronic hypertension, renal disease), fetal structural or chromosomal anomalies, monochorionic monoamniotic twin pregnancies, history of short cervix, use of progesterone during current pregnancy or any previous cervical surgeries such as cervical conization, cervical incompetence, vaginal bleeding, cervical dilatation identified by digital cervical examination, ruptured membranes and uterine contractions detected by external monitorization were excluded from the study.

Gestational age (weeks) were assessed by ultrasound examination (Aloka prosound F37 ultrasound machine; Hitachi, Japan) or according to last menstrual period, or both and each of the patients were followed-up till the birth via routine antenatal care program and delivered at hospital via vaginal route or cesarean section.

At 22-26 week antenatal visit, after emptying the bladder, all suitable patients underwent a routine transabdominal ultrasound examination to evaluate the fetal presentation, placental site and measurement of fetal head and abdominal circumference, fetal femur length and amniotic fluid index. To determine the CLM, patients were placed in dorsal lithotomy position and probe (Logic P5 with a 6-MHz transvaginal transducer, GE Healthcare, Wauwatosa, WI) was gently placed at the anterior fornix of the vagina and withdrawn slowly until a sagittal view of the full cervix, including the internal os, external os and endocervical canal, was obtained without distortion of the shape by pressure of the ultrasound probe. This cervical image was magnified to at least 75% of the screen and CL was measured as a straight line between the two electronic

markers located at the furthest points of internal os and external os and recorded. All ultrasound examinations were performed by one of the authors (T.D.). Only one CLM were obtained for the each patient. The patients were compared in terms of their CLM and gestational age at birth.

Statistical analysis was performed using the using SPSS software version 15.0 (SPSS Inc., Chicago, IL). Kolmogorow-Smirnow test was performed to determine whether the data were sampled from a normal distribution. Continuous variables with normal distribution are presented as mean $\pm$ standard deviation and calculated student t-test. Categorical variables were analyzed with Pearson Chi-square test. Receiver-operating characteristic (ROC) curves were constructed to calculate the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy for different measures of CL in predicting gestational age at birth.

Results

During study period, 75 twin pregnancies at 22-26 weeks of gestation underwent transvaginal ultrasonographic CLM. The clinical and demographic features of the patients showed in table 1. 63 pregnancies delivered with cesarean section and 10 (% 13.3) babies had NICU requirement. The mean CLM was 37 ± 7.26 mm in patients. Twenty patients (27%) were hospitalized with a diagnosis of preterm labor. Table 2 demonstrates the association between cervical length and gestational week at birth. 46 patients were delivered at small than 37 gestational weeks and the mean CLM was 37.63 ± 6.53 mm. 29 patients occurred term delivery with 38.64 ± 6.23 mm CLM. According to the ROC curve analysis (Figure 1) CLM was found to be a discriminative parameter in patients. The area under curve (AUC), cut off values, sensitivity and specificity were 0.794, 34.95 and %70-80; respectively ($p=0.029$).

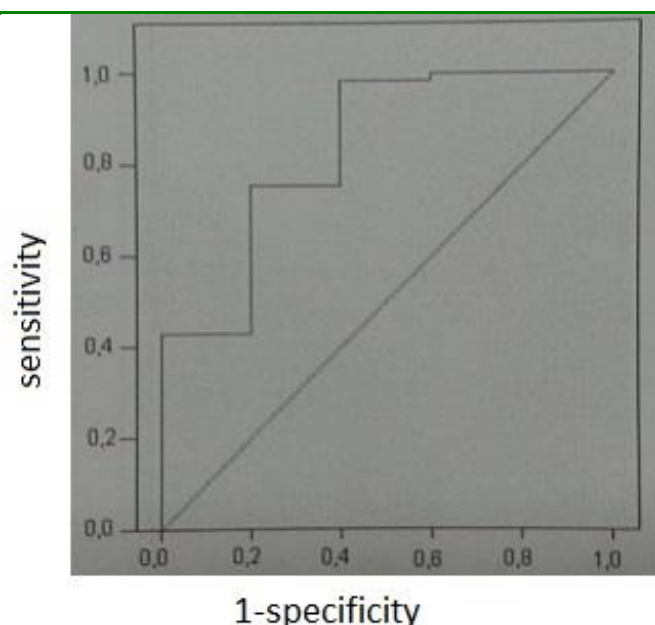
Table 1. The clinical and demographic features of the patients with twin pregnancies

Variables n = 75		n	%
Smoking (n%)	+	4	5.3
	-	71	94.7
Formation of twin pregnancy	ART	24	32
	spontaneously	51	68
Family history of twin pregnancy	+	43	57.3
	-	32	42.7
	vaginal	12	16
Delivery type	cesarean	63	84
NICU requirement	One baby	4	5.3
	Both	6	8
	1000-1500 g.	6	8
Birth weight (first baby)	1500-2500 g.	36	48
	2500 $\uparrow$	33	44
Birth weight (second baby)	1000-1500 g.	9	12
	1500-2500 g.	41	54.7
	2500 $\uparrow$	25	33.3

NICU: neonatal intensive care unit; ART: assisted reproductive techniques

Table 2. The association between cervical length and gestational week at birth.

GW at birth	n	CL (Mean $\pm$ sd)
≤ 28 week	2	17.00 $\pm$ 1.41
28 – 32 week	10	39.21 $\pm$ 6.70
32 – 35 week	18	38.52 $\pm$ 6.36
35 – 36.9 week	16	38.24 $\pm$ 7.31
≥ 37 week	29	38.64 $\pm$ 6.23

**Figure 1.** The area under curve (AUC), cut of values and sensitivity and specificity for CL in patients delivered before 32 gestational weeks

Discussion

Preterm delivery is a very important complication among twin pregnancies and caused to increase morbidity, NICU requirement in newborns. Various changes should be effect if pretem delivery occur; such as infections, genetic factors, diurnality, fetal and maternal status, etc [9, 10]. We demonstrated that transvaginal ultrasonographic CLM at 22-26 weeks of gestation is associated with gestational week at delivery and should be predict the women at high risk of preterm delivery [11].

In our study, 75 twin pregnancies at 22-26 weeks of gestation underwent transvaginal ultrasonographic CLM. 63 pregnancies delivered with cesarean section and 10 (% 13.3) babies had NICU requirement. The mean CLM was 37 ± 7.26 mm in patients. Twenty patients (%27) were hospitalized with a diagnosis of preterm labor. 46 patients were delivered at small than 37 gestational weeks and the mean CLM was 37.63 ± 6.53 mm. 29 patients occurred term delivery with 38.64 ± 6.23 mm CLM. According to the ROC curve analysis (Figure 1) CLM was found to be a discriminative parameter in patients. The area under curve (AUC), cut off values, sensitivity and specificity were 0.794, 34.95 and %70-80; respectively ($p=0.029$).

It has been showed that CL changes during pregnancy is constant [12]. There is a continuous decrease in CL which has a steady drop and then tends to shortenning rate of cervix towards the term [13]. According to gestational age-related reference values of CL measured by transvaginal ultrasonography, measures of CL at 22-26 weeks of gestation values between 28 and 51 mm (10th–90th percentile) [14]. In our study, CL at 22-26 weeks of gestation was 37.63 ± 6.53 mm among patients who delivered at term. For all, compared to term deliveries, CL was significantly shorter in preterm deliveries. It has been established that the risk of pre-term delivery is inversely related to CL measured at the second trimester and therefore screening of CL during second trimester should be performed as an useful and cost-effective method to identify the risk of preterm delivery [15, 16]. In a study, Fuchs et al. studied 87 twin pregnancies whose gestational ages between 24 and 36 weeks and find that CLM can predict preterm labor at shorter than 25mm. Imseis et al. find in their study that in twin pregnancies, CLM at 24-26 gestational week can predict preterm labor at 34.95mm measurement. In our study we demonstrated if shorter cervix can predict the preterm labor in twin pregnancies and our results showed that shorter than 34.95mm cervix may be predict preterm labor among twin pregnancies [17, 18].

In conclusion, in twin pregnancies, CL at 22-26 gestational weeks is indicative of the gestational week at delivery. Consequently, transvaginal sonographic assessment of CL can be useful in predicting the risk of preterm deliveries in twin pregnancies. This evaluation should be prevented in opinion when taking decisions that may prevent preterm and post term morbidity and mortality. However, because of insufficient high quality evidence in favor of this recommendation, further controlled clinical interventional trials are needed to study the benefits of this evaluation. Additionally, further studies are also needed to establish accurate cut-off values for CL that will require intervention and test the cost effectiveness of this measurement in the third trimester.

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