DOI: 10.4274/tjod.galenos.2022.64176
Turk J Obstet Gynecol 2022;19:187-94

The predictive role of second trimester uterocervical angle measurement in obstetric outcomes

İkinci trimester uteroservikal açı ölçümünün obstetrik sonuçları öngörmedeki rolü

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Abstract

Objective: Uterocervical angle has been suggested as a marker to predict preterm birth. However, the literature has limited data about its predictive role in preterm delivery. Moreover, no evidence is present to clarify the role of second-trimester uterocervical angle in induction success and postpartum hemorrhage. Here, it was aimed to compare the role of uterocervical angle with cervical length in predicting preterm labor and assess the utility of the second-trimester uterocervical angle in induction success and postpartum hemorrhage.

Materials and Methods: A total of 125 pregnant women, hospitalized with a diagnosis of preterm labor were included in the study. Sonographic measurements of cervical length and uterocervical angle were performed between 16 and 24 weeks of gestation. The demographic, obstetric, laboratory, and sonographic features of the participants were recorded. Patients were divided into subgroups as preterm and term; with and without induction success; with and without postpartum hemorrhage. Additionally, preterm cases were divided into subgroups as early and late preterm. Variables were evaluated between the groups.

Results: Cervical length was shorter in the preterm group (30.74±6.37 and 39.19±5.36, p<0.001). The uterocervical angle was 100.85 (85.2-147) in preterm and 88 (70-131) degrees in terms that were statistically significant (p<0.001). Furthermore, the uterocervical angle was wider [126 (100.7-147) and 98 (85.2-114), p<0.001] in the early preterm group. When the groups with and without postpartum bleeding were compared, no significant difference was detected in terms of uterocervical angle [96.5 (71-131) and 88 (70-147), p=0.164]. Additionally, the uterocervical angle was wider in the successful induction group (p<0.001). An a uterocervical angle >85 degrees predicted preterm delivery with 100% sensitivity and 45.54% specificity [area under the curve (AUC)=0.743, p<0.001]. When the cervical length and uterocervical angle were evaluated together to predict preterm delivery, no significant difference was found (p=0.086). An a uterocervical angle >88 degrees predicted induction success with 84.78% sensitivity and 79.75% specificity (AUC=0.887, p<0.001).

Conclusion: Our study revealed that the uterocervical angle can be a useful marker in predicting preterm labor and induction success, although it does not predict postpartum hemorrhage.

Keywords: Induction success, postpartum hemorrhage, preterm labor, cervical length, uterocervical angle

Öz

Amaç: Bu çalışmada uteroservikal açının preterm eylem ve obstetrik sonuçları öngörmedeki rolünü değerlendirmeyi amaçladık.

Gereç ve Yöntemler: On altı-24 hafta arası rutin takip için polikliniğe başvuran, uteroservikal açısı ölçülerek doğumu tarafımızca yaptırılan toplam 125 gebeyi çalışmaya dahil ettik. Hastaların yaş, boy, kilo, gravida, parite, doğum şekli, gebelik haftası ve fetal ağırlık, doğum öncesi ve doğum sonrası tam kan sayımı, servikal uzunluk ve uteroservikal açı değerleri kaydedildi. Hastalar preterm ve term; indüksiyon başarısı olan ve olmayan; doğum sonu kanama olan ve olmayan olarak ayrıldı. Değişkenler gruplar arasında değerlendirildi.

PRECIS: Second trimester uterocervical angle can be a useful marker in predicting preterm labor and induction success, while it does not predict postpartum hemorrhage.

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Received/Geliş Tarihi: 24.05.2022 **Accepted/Kabul Tarihi:** 02.08.2022

Bulgular: Servikal uzunluk preterm grupta anlamlı olarak daha kısaydı (30,74±6,37 ve 39,19±5,36, p<0,001). Uteroservikal açı pretermlerde 100,85 (85,2-147) ve termlerde 88 (70-131) derece idi ve istatistiksel olarak anlamlıydı (p<0,001). Ayrıca erken preterm grubunda uteroservikal açı anlamlı olarak daha genişti [126 (100,7-147) ve 98 (85,2-114), p<0,001]. Doğum sonu kanaması olan ve olmayan gruplar karşılaştırıldığında uteroservikal açı [96,5 (71-131) ve 88 (70-147) açısından anlamlı fark bulunmadı, p=0,164]. Hastalar indüksiyon başarısına göre sınıflandırıldığında, indüksiyon başarısı pozitif grupta uteroservikal açı daha genişti (p<0,001). Uteroservikal açı >85 derece olması, preterm doğumu %100 duyarlılık ve %45,54 özgüllük ile öngördü (eğrinin altındaki alan=0,743, p<0,001).

Sonuç: Çalışmamız literatürle uyumlu olarak uteroservikal açının preterm eylem ve indüksiyon başarısını öngörmede yararlı bir belirteç olabileceğini gösterdi. İlaveten bu açı, erken ve geç preterm olgularda da yararlı bir belirteç olabilir.

Anahtar Kelimeler: İndüksiyon başarısı, postpartum kanama, preterm eylem, servikal uzunluk, uteroservikal açı

Introduction

Preterm labor, which is defined as births before 37 weeks of gestation, is one of the most common obstetric complications worldwide. Although the pathogenesis of preterm labor is not clearly understood, intraamniotic infection or bleeding, uteroplacental ischemia, overdistension of the uterus, and immunological processes are proposed in the etiology. The prediction of preterm labor plays a crucial role in avoiding premature births and related complications. However, there is still no precise predictive tool[1]. Many obstetricians have proposed different ultrasonographic measurements and biochemical markers to predict true preterm labor. Sonographic assessment of cervical structure by measuring cervical length (CL) has been used as a popular predictive tool to predict preterm labor. The uterocervical angle (UCA) is defined as the angle between the lower anterior uterine segment and the endocervical canal. Recently, UCA has been suggested as an alternative to CL to predict preterm birth. Additionally, the UCA is supposed to play a predictive role in induction success, primary dysmenorrhea, cerclage failure, unexplained infertility, and second-trimester pregnancy terminations[2-4]. Unfortunately, the data about the relationship between wider UCA and induction success is not clear[5,6]. To the best of our knowledge, there is no study investigating the role of the second-trimester UCA in induction success and postpartum hemorrhage.

This study compared the predictive role of UCA with CL in predicting preterm labor and assess the utility of the second trimester UCA in induction success and postpartum hemorrhage.

Materials and Methods

A single-center, prospective study was conducted in a university-affiliated research and training hospital between December 1, 2020, and June 30, 2021.

A total of 125 pregnant women, hospitalized with a diagnosis of preterm labor were included in the study. This study was approved by the local ethics committee with an approval number 2011-KAEK-25 and complied with the Helsinki Declaration. Written informed consent was obtained from all participants.

Preterm labor was defined as births that occurred before 37 weeks of gestation. Then, it was classified as early preterm (before 34 weeks) or late preterm (between 34 and 36 weeks). Inclusion criteria for the study were as follows: i) singleton pregnant women between 18 and 40 years old, ii) being in the second trimester of the pregnancy and having a fetus in a vertex presentation, iii) having a sonographic measurement of CL and UCA, iv) giving birth in the hospital. Pregnant women younger than 18 years old, having chronic diseases, uterine anomalies, previous uterine surgery, multiple pregnancies, and cigarette smokers, alcohol consumers were excluded. Additionally, pregnant women having a history of preterm delivery or postpartum hemorrhage were excluded from the study. Patients with a moderate or high risk of postpartum hemorrhage were also excluded from the study.

CL and UCA measurements were conducted between 16 and 24 gestational weeks by the same physician (MS). After the bladder of the patients had been emptied, transvaginal sonography was performed in the lithotomy position. The vaginal probe of the Voluson P6 Model Ultrasonography device was placed into the vagina without pressing on the cervix. UCA was defined as the angle between the anterior uterine segment and the internal cervical os. Then, the distance between the internal os and the external cervical os was recorded as CL. While defining CL, a cross-section image was taken in the sagittal plane, from where the internal cervical os, external cervical os, cervical canal, and endocervical mucosa can be viewed simultaneously and occupied 3/4 of the screen. If the two os were located on a single line, the distance between the two was measured directly. If it is not on the same line, the linear parts were measured separately and summed up to obtain the CL. Each measurement for CL and UCA was performed three times and then mean values were calculated in the analysis.

The vaginal ovule of dinoprostone was applied to all participants with a bishop score of ≤6. The maximum application duration of the dinoprostone ovule was 24 h[7]. The time of application was recorded and patients with no cervical dilatation despite dinoprostone for 24 h, were performed a cesarean section and excluded from the study. While the Bishop score was more than 6, the dinoprostone oval was removed and oxytocin was infused. It was prepared as 5 units in 500 mL saline and was started with an initial dose of 4 mU/min which was increased 2 mU/min every 20 min. The maximum dose was defined as 20 mU/min. Continuous fetal heart monitoring was performed for all patients having uterine contractions.

Postpartum hemorrhage was defined as an estimated blood loss above 1000 mL. Estimated blood loss was calculated as estimated blood volume x (preoperative hematocrit - postoperative hematocrit)/preoperative hematocrit [where estimated blood volume (mL) = weight (Kg) x 85][8].

The demographic and obstetric characteristics of the patients, such as age, body mass index [weight (kg)/height x height (m^2)], gravida, parity, delivery week, delivery mode, and birth weight were recorded. Additionally, laboratory and sonographic characteristics such as prepartum and postpartum hemoglobin, hematocrit, white blood cell (WBC) and sonography week, CL, and UCA values were also recorded.

Statistical Analysis

Statistical analysis was carried out using SPSS Version 23.0. (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp.) and Medcalc version 19.5.6 software. Shapiro-Wilk test was performed to evaluate the normality of the distribution of the variables. The Student t-test was used to compare normally distributed continuous variables, while the Mann-Whitney U test was used to compare non-normally distributed continuous variables between two groups. For categorical variables, chi-square and Fisher's exact tests were used for comparisons. The descriptive statistics were expressed as mean ± standard deviation for normally distributed variables, median (minimum-maximum) for non-normally distributed variables, and frequency or percentages for categorical variables. Receiver operating curve (ROC) analysis was carried out to examine the efficiency and cut-off values of UCA in predicting preterm delivery and induction success. An alfa value <0.05 was considered statistically significant.

Results

A total of 125 pregnant women were included in the study and participants were divided into two groups: Preterm (n=24) and term (n=101). The demographic, obstetric, laboratory, and sonographic characteristics of the two groups are shown in Table 1. No statistically significant difference was determined between the two groups in terms of age, gravida, parity, body mass index, delivery mode, postpartum hemorrhage, sonography week, prepartum and postpartum hemoglobin, hematocrit, and WBC values. As expected, delivery week and birth weight was significantly lower in the preterm group. The mean of the CL in the preterm and term groups was 30.74±6.37 mm and 39.19±5.36 mm, respectively. A statistically significant difference was obtained between the two groups (p<0.001). The UCA was 100.85 (85.2-147) degrees in the preterm group and

Table 1. Demographic, obstetric, laboratory and sonographic characteristics of term and preterm groups

	Preterm (n=24)	Term (n=101)	p
Age (years)	27.5 (19-35)	26 (18-37)	0.121
Gravida (n)	2 (1-8)	2 (1-8)	0.370
Parity (n)	1 (0-4)	1 (0-4)	0.487
BMI (kg/m²)	27.78 (16.53-40.86)	25.46 (19.13-38.67)	0.311
Delivery week (week)	36 (25-36)	38 (37-41)	**<0.001**
Delivery mode			
- Vaginal	22 (91.7%)	57 (56.4 %)	0.003
- Cesarean section	2 (8.3%)	44 (43.6 %)	
Birth weight (gram)	2.885 (650-3600)	3.200 (2435-4210)	**<0.001**
Postpartum hemorrhage (n, %)	3 (12.5%)	21 (20.8%)	0.564
Prepartum hemoglobin (g/dL)	11.42±1.13	11.7±1.14	0.275
Postpartum hemoglobin (g/dL)	10.7±1.41	10.77±1.22	0.795
Prepartum hematocrit	35 (25.1-40)	34.9 (21.2-42.8)	0.670
Postpartum hematocrit	32.25 (19-38.9)	32.2 (24.1-42.1)	0.948
Prepartum WBC (mcL)	10.900 (6.700-22.400)	10.600 (6.700-16.000)	0.564
Postpartum WBC (mcL)	15.050 (7.200-25.000)	14.800 (8.500-28.000)	0.656
Sonography time (week)	20 (16-23)	20 (16-24)	0.820
Cervical length (mm)	30.74±6.37	39.19±5.36	**<0.001**
Uterocervical angle (degree)	100.85 (85.2-147)	88 (70-131)	**<0.001**

Values were presented as mean ± SD or n (%) or median (min-max). P-value <0.05 was statistically significant. SD: Standard deviation, BMI: Body mass index, WBC: White blood cell, Min: Minimum, Max: Maximum

88 (70-131) degrees in the term group. A statistically significant difference was noticed between the two groups in terms of UCA (p<0.001). The role of CL and UCA in predicting preterm delivery was evaluated thanks to ROC analysis. CL value of ≤33 millimeters had sensitivity of 70.83% and specificity of 86.14% [area under the curve (AUC)=0.847, p<0.001] (Figure 1a), and a UCA value of more than 85 degrees had a sensitivity of 100% and a specificity of 45.54% (Figure 1b). Moreover, when the cut-off value was taken to 95, as it is in the literature, UCA had a sensitivity of 70.83% and specificity of 63.37%. When the role of CL and UCA in predicting preterm delivery was evaluated together, no statistically significant difference was detected between the two AUC values (p=0.086) (Figure 1c).

Preterm cases were classified as early (n=7) or late (n=17). The demographic, obstetric, laboratory, and sonographic characteristics of the two groups are shown in Table 2. No statistically significant difference was detected between these groups according to age, gravida, parity, body mass index, sonography week, prepartum and postpartum hemoglobin, hematocrit, and WBC. Delivery week and birth weight was significantly lower in the early preterm group (p<0.001 and p=0.011, respectively). The CL was significantly shorter [25 (15.5-30) mm vs 32 (23-42.5) mm, p<0.001], and UCA was significantly narrower [126 (100.7-147) degrees vs 98 (85.2-114) degrees, p<0.001] in the early preterm group.

When postpartum hemorrhage cases based on hemoglobin decrease were diagnosed evaluated, 24 cases were diagnosed with postpartum hemorrhage. The demographic, obstetric, laboratory, and sonographic characteristics of the postpartum hemorrhage and control groups are presented in Table 3. No significant difference was detected between the two groups with regard to age, gravida, parity, body mass index, delivery week and mode, birth weight, sonography week, prepartum hematocrit, prepartum and postpartum WBC. Furthermore, CL (37.98±5.06 vs 37.48±6.78, p=0.734) and UCA [96.5 (71-131) vs 88 (70-147), p=0.164] were not significantly different between the two groups.

Patients were also divided into two successful subgroups (n=79) and unsuccessful (n=46) induction groups. Demographic, obstetric, laboratory, and sonographic characteristics of the groups are shown in Table 4. No significant difference was found in terms of age, gravida, parity, body mass index, delivery week, birth weight, prepartum and postpartum hemoglobin, hematocrit, WBC, sonography week, and CL. UCA was significantly wider in the successful induction group compared to the unsuccessful induction group [(73.4-147) vs. 78.5 (70-110), p<0.001]. In ROC analysis (Figure 2), UCA was calculated to predict induction success with a cut-off value of 88 degrees, sensitivity of 84.78%, and a specificity of 79.75% (AUC=0.887, p<0.001).

Discussion

The main findings of this study revealed that the second-trimester UCA value played a predictive role for preterm birth and no difference was present between UCA and CL in this prediction. Additionally, anterior UCA measured in the second trimester was found to predict the success of labor induction. However, UCA played no predictive role in postpartum hemorrhage.

UCA, which presents the angle between the anterior uterine wall and cervical canal, is a newly used ultrasonographic parameter for predicting many obstetric outcomes. In the literature, there are studies investigating the role of UCA in preterm birth, labor induction, pregnancy termination, the success of cerclage, dysmenorrhea, polyhydramnios, and unexplained infertility[2,3,6,9,10]. Narrow UCA is related to unexplained

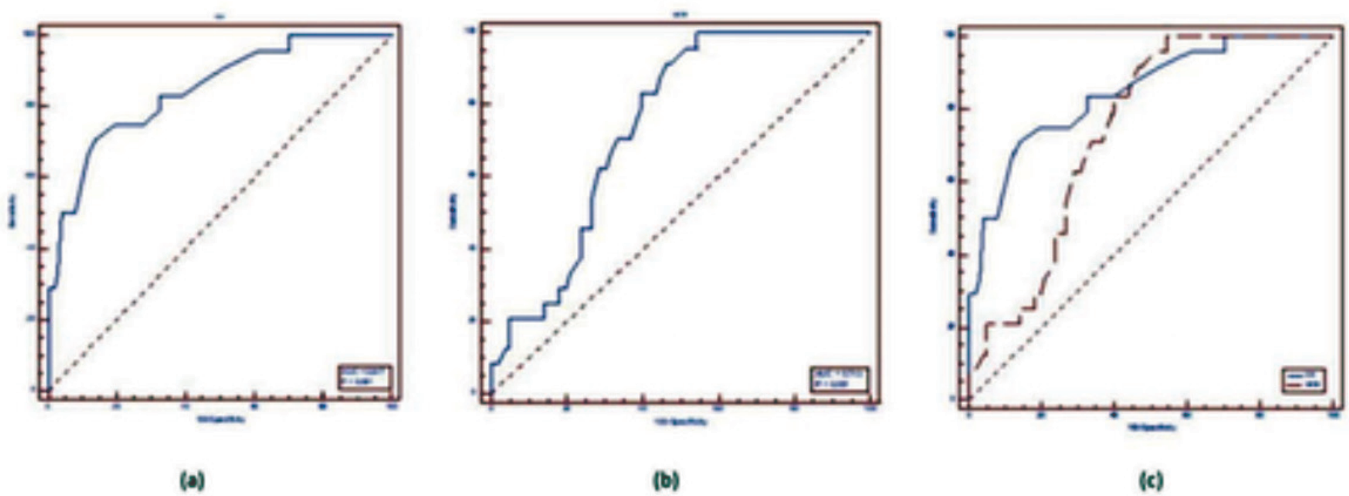

Figure 1. The ROC analysis to determine the predictive role of (a) cervical length, (b) uterocervical angle, (c) cervical length and uterocervical angle

ROC: Receiver operating curve

infertility[10] and primary dysmenorrhea[11], whereas broader UCA values are associated with successful second-trimester termination and preterm labor[12,13].

Recent studies have shown that broader UCA measured in the second trimester is linked to spontaneous preterm birth in singleton pregnancies[9,14]. In 2016, Dziadosz et al.[15] measured CL and UCA in 972 pregnant women between 16 and 24 weeks of gestation. In this study, the UCA of >95 degrees was found to predict preterm birth <37 weeks with a sensitivity of 80%, and the UCA of >105 degrees predict preterm birth <34 weeks with sensitivity of 81%. Moreover, it was claimed that CL ≤25 mm predicts preterm birth at both <34 weeks and <37 weeks nearly with a sensitivity of 62%. In the study of Sawaddisan et al.[16], it was shown that UCA was significantly wider in patients with spontaneous birth compared with term births. Furthermore, a UCA of ≥110 degrees predicted preterm birth with a sensitivity of 83.3% and specificity of 61.2%. In another study[17], Luechathananon evaluated the role of UCA and CL in predicting preterm birth in threatened preterm delivery and reported that the UCA of ≥110.97 degrees predict preterm birth with 65.1% sensitivity and 43.6% specificity, the CL of <34 mm predict preterm birth with 48.8% sensitivity and 68.4% specificity. In contrast, Farràs Llobet et al.[18] claimed that the UCA measured between 19 and 23 gestational weeks in singleton pregnancies had been a poor predictor of spontaneous preterm birth. Likewise, Wagner et al.[19] evaluated this role in women with pain, who have regular uterine contractions and a CL of ≤25 mm and reported that the UCA had not been a useful predictor of preterm birth after one week since the initiation of preterm contractions.

In this study, it was concluded that the second trimester UCA was wider in the preterm birth group, and the UCA of >85 degrees had a sensitivity of 100% and specificity of 45.54% for predicting preterm birth. Moreover, when the cut-off value

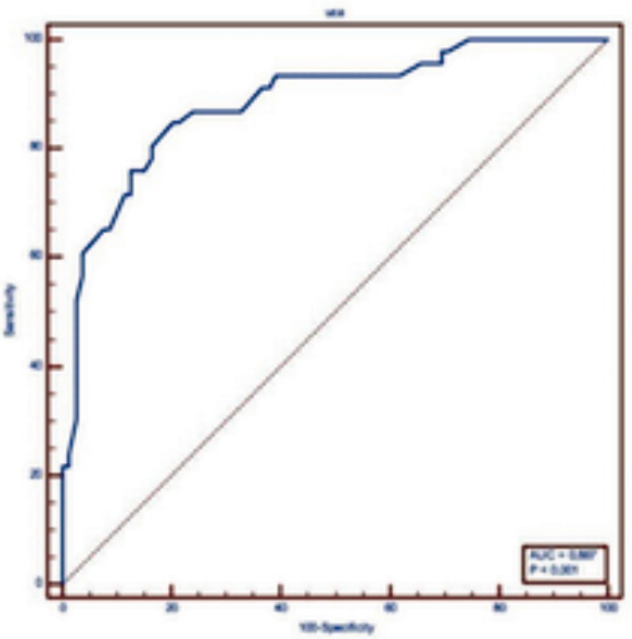

Figure 2. The ROC analysis to determine the predictive role of uterocervical angle in induction success

ROC: Receiver operating curve

Table 2. Demographic, obstetric, laboratory and sonographic characteristics of early and late preterm groups

	Early preterm (n=7)	Late preterm (n=17)	p
Age (years)	32 (23-35)	27 (19-35)	0.065
Gravida (n)	2 (1-3)	2 (1-8)	0.804
Parity (n)	1 (0-2)	1 (0-4)	0.951
BMI (kg/m²)	30.3 (17-36.44)	27.55 (16.53-40.86)	0.288
Delivery week (week)	30 (25-34)	36 (35-36)	**<0.001**
Birth weight (gram)	1.200 (650-3034)	2.980 (1640-3600)	**0.011**
Sonography time (week)	20 (16-23)	21 (16-23)	0.757
Prepartum hemoglobin (g/dL)	11.2 (8.6-13.5)	11.7 (10-12.9)	0.951
Postpartum hemoglobin (g/dL)	11 (8.7-13.7)	10.4 (7.9-12.6)	0.418
Prepartum hematocrit	34.7 (25.1-38.6)	35 (30-40)	0.534
Postpartum hematocrit	35.6 (26-37.3)	32 (19-38.9)	0.383
Prepartum WBC (mcL)	10.600 (8.300-20.000)	11.200 (6.000-22.400)	0.710
Postpartum WBC (mcL)	15.800 (7.200-22.800)	14.900 (10.300-25.000)	0.576
Cervical length (mm)	25 (15.5-30)	32 (23-42.5)	**<0.001**
Uterocervical angle (degree)	126 (100.7-147)	98 (85.2-114)	**<0.001**

Values were presented as median (min-max). P-value <0.05 was statistically significant. BMI: Body mass index; WBC: White blood cell, Min: Minimum, Max: Maximum

Table 3. Demographic, obstetric, laboratory and sonographic characteristics of postpartum hemorrhage and control groups

	Postpartum hemorrhage (n=24)	Control (n=101)	p
Age (years)	27.5 (18-35)	26 (18-37)	0.585
Gravida (n)	2.5 (1-5)	2 (1-8)	0.612
Parity (n)	1 (0-3)	1 (0-4)	0.460
BMI (kg/m²)	28.85 (22.06-34.45)	25.7 (16.53-40.86)	0.705
Delivery week (week)	38 (25-40)	38 (26-41)	0.796
Delivery mode			
- Vaginal	18 (75%)	61 (60.4%)	0.272
- Cesarean section	6 (25%)	40 (39.6%)	
Birth weight (gram)	3.145 (750-3820)	3.105 (650-4210)	0.590
Hemoglobin change (%)	-18.18 (-30:-15)	-5.5 (-18:17)	**<0.001**
Prepartum hematocrit	34.89±4.88	34.47±3.24	0.604
Hematokrit change (%)	-12 (-47:74)	-5 (-28:17)	**<0.001**
Prepartum WBC (mcL)	11.250 (8.000-22.400)	11.500 (6.700-20.000)	0.225
Postpartum WBC (mcL)	15.250 (10.500-25.000)	14.600 (7.200-28.000)	0.263
Sonography time (week)	20 (16-24)	20 (16-24)	0.980
Cervical length (mm)	37.98±5.06	37.48±6.78	0.734
Uterocervical angle (degree)	96.5 (71-131)	88 (70-147)	0.164

Values were presented as mean ± SD or n (%) or median (min-max). P-value <0.05 was statistically significant. SD: Standard deviation, BMI: Body mass index, WBC: White blood cell, Min: Minimum, Max: Maximum

Table 4. Demographic, obstetric, laboratory and sonographic characteristics of successful and unsuccessful induction groups

	Successful induction (n=79)	Unsuccessful induction (n=46)	p
Age (years)	27.43±4.44	26±5.29	0.109
Gravida (n)	2 (1-8)	2 (1-8)	0.622
Parity (n)	1 (0-4)	1(0-4)	0.550
BMI (kg/m²)	27.7±5.08	25.19±3.48	0.016
Delivery week (week)	38 (225-41)	38 (36-41)	0.017
Birth weight (gram)	3.100 (6504040)	3.200 (2460-4210)	0.274
Prepartum hemoglobin (g/dL)	11.56±1.11	11.78±1.19	0.292
Postpartum hemoglobin (g/dL)	10.58±1.14	11.07±1.38	0.053
Prepartum hematocrit	35 (21.2-42.8)	34.95 (24-40.9)	0.441
Postpartum hematocrit	32 (19-40.2)	33 (24.1-42.1)	0.354
Prepartum WBC (mcL)	10.800 (6.700-22.400)	10.600 (6.700-16.000)	0.693
Postpartum WBC (mcL)	14.700 (7.200-25.000)	150.020 (9.000-28.000)	0.229
Sonography time (week)	20 (16-24)	20 (16-24)	0.572
Cervical length (mm)	36.97±6.47	38.61±6.41	0.173
Uterocervical angle (degree)	100 (73.4-147)	78.5 (70-110)	**<0.001**

Values were presented as mean ± SD or median (min-max). P-value <0.05 was statistically significant. SD: Standard deviation, BMI: Body mass index, WBC: White blood cell was taken to 95 degrees, as in the literature, the UCA had a sensitivity of 70.83% and specificity of 63.37%. Additionally, the CL of ≤33 millimeters had a sensitivity of 70.83% and specificity of 86.14% in the prediction of preterm birth. When the predictive roles of CL and UCA were compared, no differences were found. The study was performed in a low-risk population for preterm birth and the findings were consistent with the literature. Another interesting finding of the study was the significant difference in UCA values between early and late preterm cases. Unfortunately, ROC analysis could not be performed because to the limited number of cases.

In 2018, Eser and Ozkaya[6] searched the role of UCA in labor induction and suggested that the CL and UCA could be predictors of successful labor induction. Optimal cut-off values were reported as 97 degrees with 64% sensitivity and 91% specificity for UCA and 27 mm with 64% sensitivity and 64% specificity for CL. In another study by Dagdeviren et al.[5], the predictive effect of UCA on labor induction was explored and concluded that the pre-induction UCA could not predict labor induction, whereas the broader UCA led to shortened active phase duration.

In this study, it has been the first time to investigate the role of second-trimester UCA instead of pre-induction in the prediction of induction success. It was concluded that the second-trimester UCA was wider in the successful induction group and it predicted induction success with a cut-off value of 88 degrees, with a sensitivity of 84.78% and specificity of 79.75%. In addition to the literature, the role of the second trimester UCA was evaluated in postpartum hemorrhage and no significant difference was found between postpartum hemorrhage and control groups.

Study Limitations

However, this study had some limitations. First, the number of patients who participated in the study was limited. It was thought that more study participants would yield more robust results. Second, the UCA was measured between 16 and 24 weeks of gestation and the measurement week was not considered. Only Sawaddisan et al.[20] evaluated the UCA prediction success according to the weeks and reported a significant difference between the groups when the UCA measurement was taken only over 19.5 weeks.

Conclusion

Consequently, the second-trimester UCA was found to be a useful predictive marker for preterm birth in low-risk, singleton pregnancies and had a significant difference between early and late preterm cases. Furthermore, the second-trimester UCA can predict induction success, while it has no use in postpartum hemorrhage. New studies are needed to increase the diagnostic accuracy of the UCA in preterm labor with more specific patient groups and cut-off values that can be standardized. Additionally, further studies with much more participants should be conducted to confirm these findings.

Ethics

Ethics Committee Approval: This study was approved by the local ethics committee with an approval number 2011-KAEK-25 and complied with the Helsinki Declaration.

Informed Consent: Written informed consent was obtained from all participants.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: M.Ş., E.Ü., B.D.Ç., S.K., N.N.Y., Concept: M.Ş., E.Ü., B.D.Ç., S.K., N.N.Y., Design: E.Ü., B.D.Ç., S.K., Data Collection or Processing: M.Ş., S.K., Analysis or Interpretation: B.D.Ç., N.N.Y., Literature Search: B.D.Ç., S.K., N.N.Y., Writing: M.Ş., E.Ü., B.D.Ç., S.K., N.N.Y.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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