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Original Research Article

Uterocervical angle (UCA) to predict preterm labor: What's the correct angle?

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ABSTRACT

Background: Commonly cervical length is measured as a predictor of preterm labour. Recently UCA has been suggested as a predictor of preterm labour. The purpose of this study to find out the role of UCA as a predictor of preterm labour.

Materials and Methods: This was a prospective observational study. All women who entered the study had the UCA done in second trimester. They were followed up and incidence of preterm labour noted. A ROC curve was constructed to predict the ability of UCA to predict preterm labour. Sensitivity and specificity of UCA to predict preterm labour was calculated.

Results: A total 699 cases were recruited for the study. However we could analyse only 668 women as rest were lost to follow up. There were a total of 144 preterm deliveries. ROC curve was constructed and at value of 140 degrees the sensitivity to predict preterm labour was 27.8% and specificity was 79.6%.

Conclusion: UCA has a high specificity but low sensitivity in predicting preterm labour.

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1. Introduction

Preterm labour, defined as labour less than 37 weeks of gestation, is a critical cause of neonatal morbidity and mortality.¹ Preterm labour is a cause of neonatal death in 70% of cases. Many inflammatory markers have been suggested as a method to predict preterm labour, but none of them are clinically useful as a marker.² Cervical length less than 25 mm and fetal fibronectin are currently used as preterm delivery screening methods. There is good evidence that cervical length less than 25 mm is a good predictor of preterm labour.^{3,4}

Most cases of preterm labour occur with any identifiable risk factors; hence, a screening method to predict preterm labour is of utmost importance. There are various methods to prevent preterm labour, like the use of progesterone and tocolytics, and it's important to identify a group of women

who are likely to develop preterm labour. Cervical length is a time-tested method of predicting preterm labour, and recently, UCA has been suggested as a method to predict preterm labour. Our study aimed to analyse the role of UCA as a method of predicting preterm labour. Though cervical length and fibronectin are methods that would predict preterm labour, there is a need to search for other methods that would predict preterm labour.

A wider UCA angle is associated with preterm labour. An angle of more than 105 degrees has been proposed to predict preterm labour when done in the second trimester. Our study aimed to determine whether UCA measured in the second trimester can predict preterm labour.^{5,6}

2. Materials and Methods

The study was done at Kasturba Medical College a unit Manipal Academy of Higher Education Manipal. All patients who entered the study had their gestational

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confirmed by a first-trimester scan. Only patients with singleton pregnancy and no comorbidities like Diabetes and Hypertension entered the study—patients with Multiple pregnancies. Congenital fetal anomalies, Polyhydramnios, Placenta previa/placenta accreta, History of cervical trauma and medically indicated preterm delivery were excluded from this study. Transabdominal sonography was used to measure UCA. All patients underwent measurement of UCA at 28 weeks of gestation. UCL was calculated as the angle between a line joining external and internal os and a line drawn at 3 cm in the lower uterine segment. Same sonographer measured the UCA in all cases. The sample size was calculated as 699. Patients were followed up till delivery, and incidences of preterm delivery were noted. The study was approved by the university ethics committee IEC2:426/2022. The study was registered under CTRI Number CTRI/2023/03/050732. The collected data was analysed with the R - 4.0.3 software version and SPSS software 19.0 version. To describe about the data descriptive statistics frequency analysis, percentage analysis was used for categorical variables and continuous variables the mean, and S.D was be used. The Receiver Operator Characteristic (ROC) curve analysis was used to find the Sensitivity, specificity, PPV and NPV on accessing the accuracy of the variables. The Logistic regression analysis was used to predict the model. The Chi-Square test was used to find the association of significance in categorical data. In all the above statistical tools, the probability is 05 will be considered as significant level.

3. Results

699 women were recruited for the study. We could analyses only 668 women as rest were lost on follow up. Demographic variables are mentioned in Table 2. A ROC curve was constructed and a value of 140 degrees UCA had a sensitivity of 27.8% and a specificity of 79.6% in predicting preterm labour (Table 4).

Table 1: ROC curve for Uterocervical angle in predicting preterm labour

Parameter	Value (95% CI)
Cutoff (p value)	≥ 140 (0.257)
AUROC	0.531 (0.476 - 0.586)
Sensitivity	27.8% (21-36)
Specificity	79.6% (76-83)
Positive Predictive Value	27.2% (20-35)
Negative Predictive Value	80.0% (76-83)
Diagnostic Accuracy	68.4% (65-72)
Positive Likelihood Ratio	1.36 (0.99-1.86)
Negative Likelihood Ratio	0.91 (0.81-1.01)
Diagnostic Odds Ratio	1.5 (0.98-2.29)

Table 2: Demographic variables

Age (Years)	29.98±4.13
Age	
18-35 years	609(91.2%)
>36 years	59(8.8%)
Parity	
Primigravida	351(52.5%)
Multigravida	317(47.5%)
BMI(kg/m2)	26.98±3.64
History of preterm labour	29(0.3%)
History of vaginitis	22(3.3%)
History of spontaneous abortion	81(12.1%)
History of spotting in early pregnancy	17(2.5%)
Urinary tract infection	16(2.4%)
Term delivery	525(78.5%)
Preterm delivery	144(21.5%)

4. Discussion

We did a study to determine the UCA at 28 weeks of gestation to predict preterm labour. We constructed the ROC curve and found that at a value of 140 degrees had sensitivity of 27.8% and a specificity of 79.6% in preterm labour.

Cervical length and fibronectin are commonly used to predict preterm labour. Fibronectin has low sensitivity, is expensive, and is unavailable in most clinics.⁷ Cervical length is widely used to predict preterm labour with reasonable Sensitivity and specificity. It is readily available and not expensive.⁸

Recently, UCA has been suggested as a predictor of preterm labour. A wide UCL means direct pressure over the cervix, and that predisposes it to preterm labour. If the UCL is narrow, the pressure over the cervix will be lower and protect against preterm labour. UCA can be measured transabdominally, avoiding the discomfort of a transvaginal scan.^{9,10} Some studies have shown that it is more reliable than cervical length in predicting preterm labour.¹¹

Singh et al., in a study, found that UCA is an accurate predictor of preterm labour predictor with an angle > 105 degrees.¹² In another study, a UCA > 110.9 degrees had a sensitivity of 65.1% and specificity of 43.9% in predicting preterm labour. They found higher Sensitivity in predicting preterm labour when both cervical length and UCA were added together.¹³

Elmaraghy AM et al. in a study found that a UCA of more than 89.8 degrees could predict preterm labour with a sensitivity of 81.8% and a specificity of 70.8%. Patients with a previous history of preterm labour were selected for the study, and they underwent serial measurements during pregnancy. UCA angle between 24 and 32 weeks of gestation had a good correlation to predict preterm labour in their research. However, the study was done on women with previous history of preterm labour and women without risk factors.¹⁴

Table 3: Association between UCA and maturity at birth

UC Angle (°)	Fetal Maturity at Birth		Wilcoxon-Mann-Whitney U Test	
	Term	Preterm	W	p value
Mean (SD)	124.65 (18.15)	126.43 (18.77)		
Median (IQR)	126 (118-136)	128 (118-140)	35409.500	0.257
Min - Max	65 - 158	82 - 158		

Table 4: Diagnostic performance of UCA (°) in predicting preterm labour

Parameter	Value (95% CI)
Cutoff (p value)	≥ 140 (0.257)
AUROC	0.531 (0.476 - 0.586)
Sensitivity	27.8% (21-36)
Specificity	79.6% (76-83)
Positive Predictive Value	27.2% (20-35)
Negative Predictive Value	80.0% (76-83)
Diagnostic Accuracy	68.4% (65-72)
Positive Likelihood Ratio	1.36 (0.99-1.86)
Negative Likelihood Ratio	0.91 (0.81-1.01)
Diagnostic Odds Ratio	1.5 (0.98-2.29)

Goldstein et al. recently did an extensive meta-analysis of UCA in predicting preterm labour. A total of 192 articles were retrieved and studied. They did not find UCA or UCA and cervical length together were not better than cervical length alone in predicting preterm labour. Though various studies have shown that a wider UCA was associated with preterm labour in the meta analysis, they did not find UCA superior to cervical length in predicting preterm labour. Though wider UCA was not superior to cervical length in predicting preterm labour it is still associated with increased chances of preterm labour and should not be ignored. Just like cervical length a wider UCA is a predictor preterm labour.¹⁵

Singh et al. in a study found that a wider UCA of more than 95 degrees was a good predictor of preterm labour. In their study 159 pregnant women in second trimester under UCA estimation. The women were with uncomplicated pregnancies. They found that UCA wider than 95 degrees could predict preterm labour with a sensitivity of 86.7% and a specificity of 93.0%. In their study, when compared with UCA, cervical length had lower sensitivity in predicting preterm labour.¹²

Khamees et al. found that UCA is a good predictor of preterm labour. The study was performed on 167 women with high-risk factors for preterm labour. In their study A uterocervical angle of 105° or more predicted preterm birth with sensitivity and specificity of 86.1% and 60.4%. However, the study was performed on women with high-risk factors for preterm delivery. In their study cervical length had very poor sensitivity of 27.8%.¹⁶

Cervical length was more sensitive and specific in predicting preterm labour in most studies. Palacio et al. found that a cervical length of less than 25 mm could predict preterm labour with a sensitivity of 53% and specificity of

81%.¹⁷ Iams et al. observed that in patients with threatened preterm labour, a cervical length of 30 mm could predict preterm labour with 100% sensitivity and 44% specificity.¹⁸ Heath et al found that cervical length done in routine scan in the mid-trimester could predict preterm labour with 58% sensitivity and 99% specificity.¹⁹ Thus, many studies suggest that cervical length is a better predictor of preterm labour compared to UCL. Cervical length is readily available and can be performed easily by sonographers, do not need much training.

Zhang M et al. compared the efficacy of cervical length and UCA at 15 weeks of gestation and followed up till term to test the ability of both parameters to predict preterm labour less than 34 weeks. They found a value of 2.54 cm for cervical length and UCA of 106 degrees would predict preterm labour less than 34 weeks with reasonable accuracy. They also found that both UCA and cervical length together is a great predictor of preterm labour. Hence UCA may be used along with cervical length to predict preterm labour. When we screen for cervical length in pregnancy UCA may be added along with that to predict preterm labour as combination of both cervical length and UCA has a good accuracy in predictor of preterm labour.²⁰

J C Knight in a study tried to find out the role of UCA in prediction of preterm labour in women with multiple gestation. They found that UCA is wider in women with multiple gestation who had preterm delivery. A value of 110 degrees was suggested by them to predict preterm labour. They found a value of 110 degrees had a sensitivity of 80% sensitivity and 82% specificity in predicting preterm labour. Hence UCA can be adjuvant tool along with cervical length in prediction of preterm labour in women with multiple gestation.²¹

İlgi Esen et al studied the UCA in women with short cervix of 20-30mm. They found that the UCA was significantly wider women who had preterm labor. According to their study UCA more than 95.3 degrees in patients with shortened cervix could predict preterm labour with 72% sensitivity and 63% specificity. Hence combination of UCA and cervical length would predict preterm labour better than UCA alone.²²

Pruksanusak N et al. studied the interobserver variability of UCA and cervical length between different observers and they found that UCA had greater interobserver variabilities compared to cervical length. A disparity to 30 degrees were observed between operators. Hence it is important that greater caution and procedures must be followed when UCA measurements are taken.¹¹

Dziadosz M et al. in study found that combination of both UCA and cervical length together can be better predictor of preterm labour than either of these parameters alone. All patients underwent scan between 16-23 weeks of gestation. UCA of more than 95 degrees could predict preterm labour less than 37 with a sensitivity of 80%. UCA angle of more than 105 degrees could predict labour less than 34 weeks of gestation with 81% sensitivity. Cervical length of less than 25 mm predicted preterm labour with only 62% sensitivity. According to their data UCA predicted better than cervical length in predicting preterm labour. Thus the data regarding UCA and cervical length are conflicting while many studies showed cervical length better than UCA in predicting preterm labour some studies show that UCA is better. Much more research is needed further to categorize the risks of preterm labour associated with cervical length and UCA.²³

Luechathananon S et al. followed up women admitted with threatened preterm labour with both cervical length and UCA. They found that UCA wider than 110 degrees could predict preterm labour with 65% sensitivity and 45% specificity whereas cervical length less than 34 mm had a sensitivity of 48% and specificity of 68% in predicting preterm labour. A combination of both had higher sensitivity and specificity. Many studies also have suggested that a combination of both UCA and cervical length had higher sensitivity and specificity in predicting preterm labour. Hence, we suggest that a combination of cervical length and UCA may be used in the prediction of preterm labour.¹³

One advantage of UCA is that it can be performed transabdominally and avoids the use of transvaginal sonography. UCA, like cervical length, can be performed with minimal training.

No consensus on the value of UCA would predict preterm labour. In our study, we found a value of 140 degrees had a sensitivity of 27.8% and a specificity of 79.6% in predicting preterm labour. In our study we found that UCA has moderate sensitivity in predicting preterm labour but poor sensitivity compared to cervical length. Hence, it's a useful adjuvant in the prediction of preterm labour.

5. Conclusion

UCA done in the second trimester can predict preterm labour with reasonable specificity but low sensitivity.

6. Source of Funding

None.

7. Conflict of Interest

None.

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