Zagazig University Medical Journal
www.zumj.journals.ekb.eg
https://doi.org/10.21608/zumj.2024.234154.2873 Volume 30, Issue 8, Nov. 2024
Manuscript ID ZUMJ-2408-3503 (R1) DOI . 10.21608/zumj.2024.309133.3503
ORIGINAL ARTICLE

Evaluation of Effectiveness of adding Uterocervical Angle Measurement by Transvaginal Ultrasound to Bishop Scoring in Prediction of Successful Induction of Labor

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Submit Date 02-08-2024
Revise Date 31-08-2024
Accept Date 05-09-2024

ABSTRACT

Background: The evaluation of the cervix using the Bishop score before induction is very subjective, and various studies have demonstrated its limited predictive utility, especially for women with low Bishop scores. On the other hand, transvaginal ultrasonographic cervical measurement is a method that provides precise numerical data and may be easily evaluated. Integrating uterocervical angle (UCA) assessment using transvaginal ultrasonography with Bishop scoring could enhance the accuracy of predicting the success of labor induction. So we aimed to evaluate the role of addinguterocervical angle measurements by transvaginal ultrasound to Bishop scoring in prediction of successful induction of labor (IOL).

Methods: This prospective cohort study was conducted on 134 cases in obstetrics and gynecology emergency hospital, Zagazig university hospitals, Sharkia, Egypt, and OB-GYN fetal medicine unit. Singleton pregnancy, living fetus, cephalic presentation, 37-41 weeks of gestation with no contraindication to vaginal delivery were included. All patients were subjected to complete history taking, examination, baseline investigation and vaginal examinationto assess the Bishop score of the cervix. All women had transvaginal ultrasound for assessment of uterocervical angle.

Results: Uterocervical angle showed a significant increasing in mean value within vaginal delivery mode so each of the bishop score and uterocervical angle were good predictors to vaginal delivery.

Conclusions: UCA was not superior to the Bishop score in predicting successful IOL. However, UCA combined with Bishop score showed higher accuracy and can help predict successful IOL.

Keywords: UterocervicalAngle ; Transvaginal Ultrasound; Bishop Scoring; Induction of Labor

INTRODUCTION

The induction of labor is considered necessary when the benefits of vaginal birth surpass the potential dangers associated with a Cesarean section (CS) [1].Currently, the Bishop score is widely Regarded as the most dependable approach for forecasting the duration and outcome of induced labor.

However, the assessment of the cervix's "favorability" through the Bishop score before to induction is very subjective, and multiple studies have shown its poor ability to accurately predict outcomes, especially for women with low Bishop scores [2-4].

For women who are having labor induced, using ultrasound to measure Prior to induction, assessing cervical length and utero-cervical angle is more effective than relying on the Bishop score to predict labor outcomes [5]. owever, transvaginal ultrasonographic cervical measuring is a highly accurate and straightforward procedure evaluated method that provides quantitative data [6].

Preliminary phase before induction. Cervical length, utero-cervical angle, and maternal characteristics are important variables that can accurately predict the likelihood of vaginal delivery within 24 hours and the need for Cesarean section in women undergoing labor induction [7;8].The commonly referenced reasons for initiating labor induction include Preterm rupture of membranes occurring before the onset of labor, medical problems such diabetes mellitus or hypertension during pregnancy, and intrauterine growth restriction, and pregnancies that have exceeded 41 weeks, which is the most frequent indication [9].

So we aimed to evaluate the role of addinguterocervical angle measurements by transvaginal ultrasound to Bishop scoring in prediction of successful induction of labor (IOL).

METHODS

This study was conducted in the Obstetrics and Gynecology Emergency Hospital, part of Zagazig University Hospitals, Sharkia, Egypt, and OB-GYN fetal medicine unit during the period from August 2023 to August 2024. All recruited patients provided verbal consent. The study was granted approval by the ZU-IRB with the assigned number 10979

The inclusion criteria comprised of the following: a pregnancy with only one fetus, a fetus that is alive, a presentation of the head first, a gestational age between 37 and 41 weeks, and no medical reasons that would prevent a vaginal delivery.

The exclusion criteria encompassed multifetal pregnancy, congenital anomalies,malpresentations, placenta previa or vasa previa, active genital herpes/warts, extremely low birth Weight is defined as being below 1500g. Prior cervical operations, such as cautery, cerclage, cervical amputation, or conization, were considered. Patients who were already in active labor upon admission were excluded. Any medical condition that makes vaginal delivery unsafe was also considered. Previous uterine surgery and women experiencing vaginal bleeding (antepartum hge) were also excluded.

All patients underwent a comprehensive history assessment, which included personal information such as name, age, occupation, residence, and any relevant medical habits. Obstetric history was also recorded, including details about the last menstrual period, Embryonic development stage and consistent prenatal medical attention. In addition, the medical records included information about the patient's previous medical issues such as diabetes mellitus or hypertension, as well as any surgical

procedures they had been undergone. Ultimately, the medical professionals gathered information on the past events related to the ongoing pregnancy, such as the length of time since the last menstrual period, any difficulties that arose, and any medications taken throughout pregnancy. Every subject got a thorough checkup, which included evaluating their degree of consciousness, vital signs, and overall look. In addition, the abdomen area was assessed to determine the fetal position, identify uterine contractions, and evaluate the fetal heart rate using ultrasonography. Additionally, a vaginal examination was conducted to assess the Bishop score of the cervix, condition of the membranes, pelvic adequacy, and fetal appearance.

Uterocervical Angle Measurement(Figure 1S)

The measurements were conducted using an ultrasound machine (Mindray DC-70 EXp 7) with a transvaginal probe, administered by the same operator to eliminate differences between observers. The gestational age varied between 37 and 42 weeks. An ultrasonography was conducted with the patient in a supine position, slightly inclined towards the left side, to avoid the occurrence of supine hypotension. The purpose of the ultrasound was to confirm the gestational age, fetal viability, weight, and overall well-being, as well as to ensure compliance with the inclusion criteria. The patient was instructed to empty their bladder, followed by an assessment using transvaginal ultrasound (TV U/S). Ultrasound measurements were conducted in the sagittal plane. The UCA was measured by gently advancing the transducer Inserted into the front part of the vaginal cavity until the fluid around the fetus and the opening of the uterus were able to be seen. The distance between the internal os and external oswas measured after identifying the endocervical mucosa and anterior uterine wall. The initial ray was positioned from the cervix's inner opening to its outer opening. The calipers were placed at the junction of the anterior and posterior walls of the cervix, where the internal and external apertures of the endocervical canal meet. If the cervix exhibited curvature, the initial ray was likewise depicted as a straight line extending from the internal os to the external os. Subsequently, a second ray was sketched to demarcate the lower uterine segment. The ray was traced along the anterior uterine region until it reached the maximum distance indicated by the preloaded image. For an accurate measurement, it is optimal to extend the second ray by 3 cm into the lower uterine area. The measurement of the angle formed by the two beams was determined using a protractor. [10-12].

The induction of labor was performed using one of the following techniques: The drug misoprostol, specifically in the form of 25 micrograms administered intravaginally (known as vagiprost), was given. A digital inspection was performed 6 hours after the initial treatment. If needed, three further doses were given at 6-hour intervals [13]. 2. The initial dose for intravenous oxytocin delivery is 1milli-international unit (mIU) per minute, with an increase of 1 mIU every 30 minutes. Prior to the injection of

oxytocin, certain individuals underwent amniotomy [14].

Regularly, external cardiotocographywas conducted to monitor the fetal condition. In order to provide pain relief, the option of administering pethidine intramuscularly was presented.The dosage is 50 milligrams [15]. The active phase of labor is distinguished by the occurrence of 3-4 consistent and rhythmic contractions happening every 10 minutes, with each contraction lasting from 45 to 60 seconds. The cervix is expanded to a minimum of 3 centimeters and the cervix is effaced by 80% or more. Successful induction of labor is defined as the initiation of active labor within 24 hours following the administration of the induction technique.

Failed induction refers to the inability to reach the active phase of labor, which is characterized by cervical dilation of 3 cm or more within 24 hours after the final administration of PG E2.[16].

Orit is diagnosed if adequate uterine contractions are not achieved after 6–8 h of oxytocin administration and use of the maximum dose for at least 1 hr. [17].

A cesarean delivery is performed in cases where there is a Failure to advance refers to the lack of cervical dilatation for the past 2 hours during the active phase of labor, or the absence of descent of the fetal head for at least 1 hour during the second stage of labor, despite adequate uterine contractions and abnormal fetal heart rate trace.

Statistical analysis:

The data was collected, organized, and subjected to statistical analysis using SPSS version 26.0 for Windows (SPSS Inc., Chicago, IL, USA). The subsequent examinations were employed: Discrete sets of data that are neither related or dependent on each other. Statistical tests commonly used in research include the Student's t-test, Mann Whitney U test, and ROC curve analysis.

RESULTS

The average age of the group under study was 24.55±5.7 years, ranging from 18 to 43 years, with a mean BMI 27.08±4.49 (kg/m2).Regarding obstetric history, the (mean ±2 SD) graviditiy was2.09±1.5 with median of 1(1-3) and the mean parity was 0.89±1.28 with median 0 (0-2), the mean Gestational age was 39.12±1.26 years, the mean amniotic fluid index was 6.83±3.65 with median 7(3.5-9) and the mean Course of estimated fetal body weight was 3611.13±285.75. About (12%) were diabetic, hypertensive cases were (23.1%) and (8.7%) of cases had either hypothyroid, epilepsy or HCV. 11.9% of cases had a history of Appendectomy, and (7.5%) for each of Tonsillectomy and Cholecystectomy. PROM was the most common cause of termination of pregnancy among cases was 29%, followed by postdate was 19.4%, HTN was 13.4%, Oligohydramnios was 11.6% and each of PET and gestational HTN 6%, 3.7% respectively (Table 1).

Table (1): Basic characteristics of the studied group

Variable		cases group (n=134)	
Age (years) Mean ± SD Range		24.55±5.7 (18-43)	
BMI Mean±SD Range		27.08±4.49 (19-38)	
Gravidity Mean±SD Median (IQR)		2.09±1.5 1(1-3)	
Parity Mean±SD Median (IQR)		0.89±1.28 0(0-2)	
Gestational age Mean±SD Range		39.12±1.26 (37-41)	
AFI Mean±SD Median (IQR)		6.83±3.65 7 (3.5-9)	
EFBW Mean±SD Range		3611.13±285.75 (2900-4400)	
Medical history	DM	16	11.9%
	HTN	31	23.1%
	Hypothyroid	9	6.7%
	Epilepsy	1	0.7%
	HCV	1	0.7%
	free	76	56.7%
Surgical history	Appendectomy	16	11.9%
	Cholecystectomy	10	7.5%
	Tonsillectomy	10	7.5%
	Upper endoscope for foreign body removal	1	0.7%
	Free	97	72.3%
Cause of termination	GDM	6	4%
	Pregestational Diabetes	16	12.4%
	HTN	18	13.4%
	Gestational HTN	5	3.7%
	Oligohydramnios	16	11.9%
	Postdate	26	19.4%
	PET	8	6%
	PROM	39	29.0%

Estimated fetal body weight (EFBW), the amniotic fluid index (AFI), premature rupture of membranes (PROM). pre-eclampsia (PET)

Table (2): The cervical parameters (bishop score and Uterocervical angle) of the studied group

Variable	cases group (n=134)
Bishop score Mean±SD Range	 5.79±2.08 (1-9)
UCA Mean±SD Range	 115.46±10.78 (85-138)

Uterocervical angle (UCA)

Table (3): Mode of induction and Mode of delivery among the studied group

cases group (n=134)			
Variable		**No**	**(%)**
Mode of induction	Amniotomy+ Syntocinon	6	4.47
	Misotac	85	63.43
	Syntocinon	43	32
Mode of delivery	Cesarean section	41	30.6
	Vaginal delivery	93	69.4

Table (4): Relation between Mode of delivery and basic and obstetric characteristics

Characteristic	Mode of delivery		Test (t)	P value
	Vaginal delivery (n=93)	Caesarean (n=41)		
Age Mean±SD	 24.9±5.7	 23.76±5.69	1.074	0.285
BMI Mean±SD	 26.88±4.63	 27.54±4.18	-0.777	0.439
Gravidity Mean±SD Median (IQR)	 2.33±1.51 2 (1-3)	 1.54±1.32 1	-3.630	**<0.001***
Parity Mean±SD Median (IQR)	 1.08±1.28 1(0-2)	 0.46±1.21 0	-3.444	**0.001***
Gestational age Mean±SD	39.05±1.25	39.27±1.27	-0.910	0.365
AFI Mean±SD	 6.97±3.71	 6.52±3.53	0.653	0.515
EFBW Mean±SD	 3604.37±262.6	 3626.46±335.49	-0.411	0.682

Course of estimated fetal body weight (EFBW), the amniotic fluid index (AFI)

(t)= Independent Samples Test, Mann-Whitney Test

Table (5): Relation between Mode of delivery and the cervical parameters (bishop score and Uterocervical angle)

Characteristic	Mode of delivery		Test (t/z)	P value
	Vaginal delivery (n=93)	Caesarean (n=41)		
Bishop score Mean±SD Median(IQR)	 6.67±1.62 6 (6-8)	 3.8±1.58 4 (2.5-5)	-7.265	**<0.001***
UCA Mean±SD	 119.53±8.77	 106.24±9.16	7.972	**<0.001***

Uterocervical angle (UCA)
(t)= Independent Samples Test, (Mann-Whitney Test

Table (6): Validity of Bishop Score at cutoff (>5) and validity of Uterocervical Angle Measurement at cutoff value (>112) in Prediction of Successful Induction of Labor

Variables	AUC	95%CI	Cutoff	Sensitivity	Specificity	PVP	PVN	Accuracy
Bishop score	0.890	0.829-0.951	>5	77.4%	85.4%	92.3%	62.5%	80%
UCA	0.855	0.785-0.925	>112	79.6%	75.6%	88.1%	62%	78.3%

AUC=Area under curve, PVP=Predictive value for positive, PVN= Predictive value for Negative, CI= Confidence Interval

Table (7): Validity ofcombined positive Bishop Score and UCA in Prediction of Successful Induction of Labor

Variables	Sensitivity	Specificity	PVP	PVN	Accuracy
Combined Bishop score and UCA	96.7%	79.4%	89.2%	93.1%	90.4%

AUC=Area under curve, PVP=Predictive value for positive, PVN= Predictive value for Negative, CI= Confidence Interval

DISCUSSION

Predicting IOL. The women in the successful IOL group had substantially greater uterocervical angle (UCA) measurements (p = 0.012) and higher Bishop scores (p = 0.001) compared to those in the non-successful IOL group. The University of Central Arkansas (UCA) by itself did not outperform the Bishop score in predicting the success of induction of labor (IOL). Nevertheless, the combination of UCA and the Bishop score demonstrated superior accuracy in predicting IOL. Specifically, when UCA was greater than 108.4° and the Bishop score was favorable, the sensitivity was 44.6%, specificity was 96.0%, positive predictive value (PPV) was 96.2%, and negative predictive value (NPV) was 43.6%. Ultimately, the utilization of UCA in conjunction with The Bishop score has the potential to be a dependable sonographic approach for predicting the probability of a successful induction of labor.

Abdelhafeez et al. [19]Their findings corroborated our results, indicating that the optimal threshold for the uterocervical angle was determined to be 110.2 degrees, with a The sensitivity is 87% and the specificity is 93%. The uterocervical angle had a significant correlation with the efficacy of labor induction. The uterocervical angle is a reliable indicator of the likelihood of a successful labor induction.

Likewise, In bBash et al. [20**]**the study's findings demonstrated the correlation between the efficacy of labor induction, as determined by the bishop score and ultrasonography. The mean bishop score was 7.20, with a standard deviation of 1.80. The mean posterior cervical angle was 116.3, with a standard variation 14.23. A positive and statistically significant connection was discovered between effective induction and both the pre-induction Bishop score and the posterior cervical angle.

Also, Alfaham[21] found that PCA had a statistically significant effect in promoting successful induction of labor (p value=0.012), but the Bishop score did not show a meaningful effect (P= 0.270). The PCA with a cutoff point of 104.0º had the highest diagnostic characteristics in predicting successful induction, The sensitivity is 90.6% and the specificity is 88.9%, and diagnostic accuracy of 90.0%. In comparison, the Bishop score with a cutoff point of 5.0 had the sensitivity 65.6%, the specificity is 83.3%, and the diagnostic accuracy is 72.0%. The PCA values were substantially higher in cases with effective induction compared to those without (122.3±14.6 vs. 92.8±13.2). Similarly, The BISHOP score was markedly higher in situations where induction was effective compared to cases where it was not (4.7±0.5 vs. 3.8±0.7). The disparity in both PCA and BISHOP scores between the two groups exhibited statistical significance (P= <0.001). Conclusion: When predicting the effectiveness of inducing labor, PCA (Pelvic Conformity Assessment) was found to be more significant than the Bishop score. The highest diagnostic characteristics were observed at a cutoff point of ≥104.0º, and the PCA score was significantly higher in cases where induction was successful.

Similarity, in Kana Gül [22**],**the average uterine contraction amplitude (UCA) was 102.17 ± 4.26 degrees in the group of women who had a successful labor induction. While it was 94.25 ± 7.141 degrees in the cohort of women who experienced a failed labor induction. There was a substantial difference between the groups in terms of UCA, as supported by statistical analysis. This study provided evidence that UCA (ultrasound contrast agent) (umbilical cord artery) measures were highly predictive of successful induction of labor and normal birth in nulliparous pregnant women who were in the late term or post-term stage of pregnancy.

Nevertheless, Dagdeviren et al. have recently asserted that UCA did not prove to be a reliable indication of IOL in a well designed study conducted at a single center [23]**.**

Furthermore, the study employed distinct induction approachesDagdeviren et al. [23]the current study contrasted those who exclusively utilized prostaglandin with those who employed PGE2 and oxytocin.

Also, on the contrary, Khandelwal et al.[24] concluded that Bishop's score was more effective than the sonographic

parameters.Uzun et al. [25]It was also determined that the area under the curve (AUC) The Bishop's score had a greater value than the AUC for the sonographic parameters. Nevertheless, this disparity did not demonstrate statistical significance.

Likewise, Wafa et al. [26] the correlation between the posterior cervical angle and cervical length measurements and the successful beginning of labor was identified as well as the Bishop Score, using transvaginal ultrasonography. However, the Bishop Score demonstrated higher specificity and accuracy compared to ultrasonographic data in predicting successful vaginal delivery.The precise factors contributing to the disparities between our findings and the aforementioned study include not obvious, however they can be linked to various circumstances. Firstly, the patients included in the research listed above were diverse in terms of their characteristics. Furthermore, the sample size exhibited significant variation among the aforementioned research. Furthermore, there is a diversity in parity and the techniques employed for induction. These causes may have contributed to the observed heterogeneity.The qualities of the women included in the study were evidently diverse, which can be regarded as an additional element.

CONCLUSIONS

Ultimately, UCA did not demonstrate superiority over The Bishop score accurately predicts the effectiveness of labor induction (IOL). However, the combination of UCA and Bishop score has demonstrated greater accuracy and can aid in predicting the efficacy of induction of labor (IOL).

Conflict of interest: None

Financial disclosure: None

REFERENCES

1. **Ara I, Sultana R, Solaiman SM and Hassain MS**. Outcome of surgical induction of labor in a combined military hospital. Bangladesh Med. Res. Counc. Bull., 2018; 44(1): 52-9..
2. **Kuba K, Kirby MA, Hughes F, Yellon SM.** Reassessing the Bishop score in clinical practice for induction of labor leading to vaginal delivery and for evaluation of cervix ripening. Placenta Reprod Med. 2023, 31;2.
3. **Abdullah ZHA, Chew KT, Velayudham VRV, Yahaya Z, Jamil AAM, Abu MA, Ghani NAA, Ismail NAM.** Pre-induction cervical assessment using transvaginal ultrasound versus Bishops cervical scoring as predictors of successful induction of labour in term pregnancies: A hospital-based comparative clinical trial. PLoS One. 2022;17(1):e0262387.
4. **Dîră L, Drăguşin RC, Şorop-Florea M, Tudorache Ş, Cara ML, Iliescu DG**. Can We Use the Bishop Score as a Prediction Tool for the Mode of Delivery in Primiparous Women Term Before the Onset of Labor? Curr Health Sci J. 2021 Jan-Mar;47(1):68-74.
5. **Eid M, Abdallah A and ElHalwagy A**. Value of transvaginal ultrasonography versus Bishop Score in predicting successful induction of labor. Int J Evid Based Health, 2017; 7(4): 125-30.
6. **Anikwe CC, Okorochukwu BC, Uchendu E and Ikeoha CC.** The Effect of Ultrasound-Measured Preinduction Cervical Length on Delivery Outcome in a Low-Resource Setting. Sci. World, 2020; 8273154.
7. **Khazardoost S, GhotbizadehVahdani F, Latifi S.** Pre-induction translabialultrasound measurements in predicting mode of delivery compared to bishop score: a cross-sectional study.BMC PREGNANCY CHILDB, 2016; 16, 330.
8. **Dagdeviren E, Çetin BA, Mathyk BA, Koroglu N, Topcu EG, Yuksel MA**. Can uterocervical angles successfully predict induction of labor in

nulliparous women? Eur. J. Obstet. Gynecol. Reprod. Biol. 2018; 228:87–91

9. **Hernández-Martínez A, Pascual-Pedreño AI, Baño-Garnés AB, Melero-Jiménez MR, Tenías-Burillo JM, Molina-Alarcón M.** Predictive model for risk of cesarean section in pregnant women after induction of labor. Arch. Gynecol. Obstet. 2016; 293(3):529-38.
10. **Kerr RS, Kumar N, Williams MJ**. Low-dose oral misoprostol for induction of labour. Cochrane Database Syst Rev. 2021; 6: CD014484.
11. **Makled AK, Abuelghar WM, Abd Al Razik MS and Kamel OI**. Relationship between Uterocervical Angle and Prediction of Spontaneous Preterm Birth. Ain Shams Med. J., 2021; 11(3): 256-63.
12. **KitipoonwongwanidK, and Soongsatitanon A. (2021):** Transvaginal ultrasound measurement of the uterocervical angle for prediction of spontaneous preterm birth. TJOC; 29 (2): 112-9.
13. **Wormer KC, Williford AE, Bauer A.** Bishop score. StatPearls, 2023; [Internet].
14. **Bentley JP, Roberts CL, Bowen JR, Martin AJ, Morris JM, Nassar N**. Planned birth before 39 weeks and child development: a population-based study. Ped., 2016; 138(6).
15. **Kadirogullari P, YalcinBahat P, Sahin B, Gonen I, Seckin KD**. The Effect of Pethidine Analgesia on Labor Duration and Maternal-Fetal Outcomes. Acta Biomed, 2021; 92(2), e2021065.
16. **Baños, N., Migliorelli, F., Posadas, E., Ferreri, J., & Palacio, M. (2015).** Definition of failed induction of labor and its predictive factors: two unsolved issues of an everyday clinical situation. Fetal DiagnTher, 38(3), 161-9.
17. **Gebreyohannes RD, Mesfin E**. Determinants of outcome of Induction of Labor in Four Teaching Hospitals in Addis Ababa, Ethiopia. Ethiopian Med J, 2020; 58: 3.
18. **Yang SW, Kim SY, Hwang HS, Kim HS, Sohn IS, Kwon HS**. The uterocervical angle combined with Bishop Score as a predictor for successful induction of labor in term vaginal delivery. J. Clin. Med., 2021.
19. **Abdelhafeez MA, Elguindy AE, Hamed MAM, Nawara M.** Transvaginal Sonographic Assess- ment of the Cervix for Prediction of Suc- cessful Induction of Labor in Nulliparous Women. Open J ObstetGynecol, 2020; 10, 892-901.
20. **Al-Sayed Ibrahim Basha, A., Hamdy Mohamed, A., & Mohamed Zakaria, A. E. M.** Bishop score versus ultrasonographic techniques for prediction of successful induction of labor. AIMJ, 2020, 49(4), 1703-12.
21. **Alfaham M**. Transvaginal ultrasound measurement of posterior uterocervical angle and cervical length in the prediction of successful induction of labor. 2020.
22. **KanzaGül D**. uterocervical angle and cervical length determine the success of induction of labor in late-term and post-term nulliparous pregnant women?Cukurova Med J. 2020; 45(4):1634-43.
23. **Dagdeviren E, Çetin BA, Mathyk BA, Koroglu N, Topcu EG, Yuksel MA**. Can uterocervical angles successfully predict induction of labor in nulliparous women? Eur. J. Obstet. Gynecol. Reprod. Biol. 2018; 228:87–91.
24. **Khandelwal R, Patel P, Pitre D, Sheth T, Maitra N.** Comparison of cervical length measured by transvaginal ultrasonography and Bishop score in predicting response to labor induction. J. Obstet. Gynecol. India., 2018; 68, 51-7.
25. **Uzun I, Sık A, Şevket O, Aygün M, Karahasanoglu A, Yazıcıoglu HF**. Bishop score versus ultrasound of the cervix before induction of labor for prolonged pregnancy: which one is better for prediction of cesarean delivery. J Matern Fetal Neonatal Med, 2013; 26(14), 1450-4.
26. **Wafa YA, Mohamed NF, Abouzeid MS.** Comparative Study between 2D and 3D Ultrasound Cervicometry and Digital Assessment of the Cervix before Induction of Labour. EJHM, 2018; 71-5

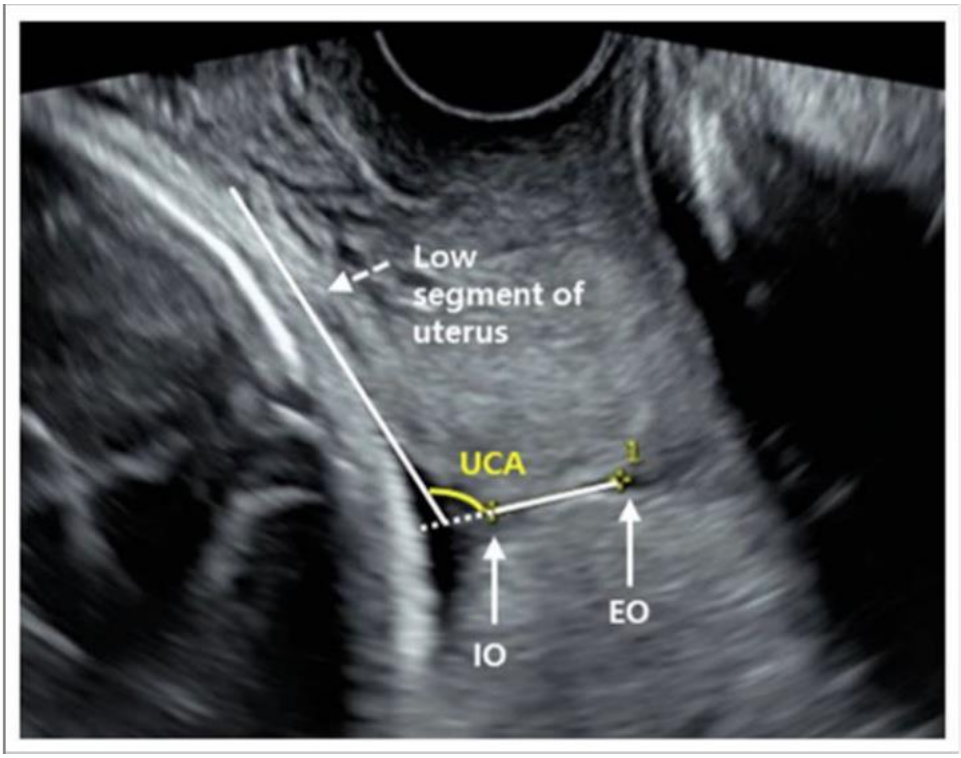

Figure (IS) : Measuring of uterocervical angle

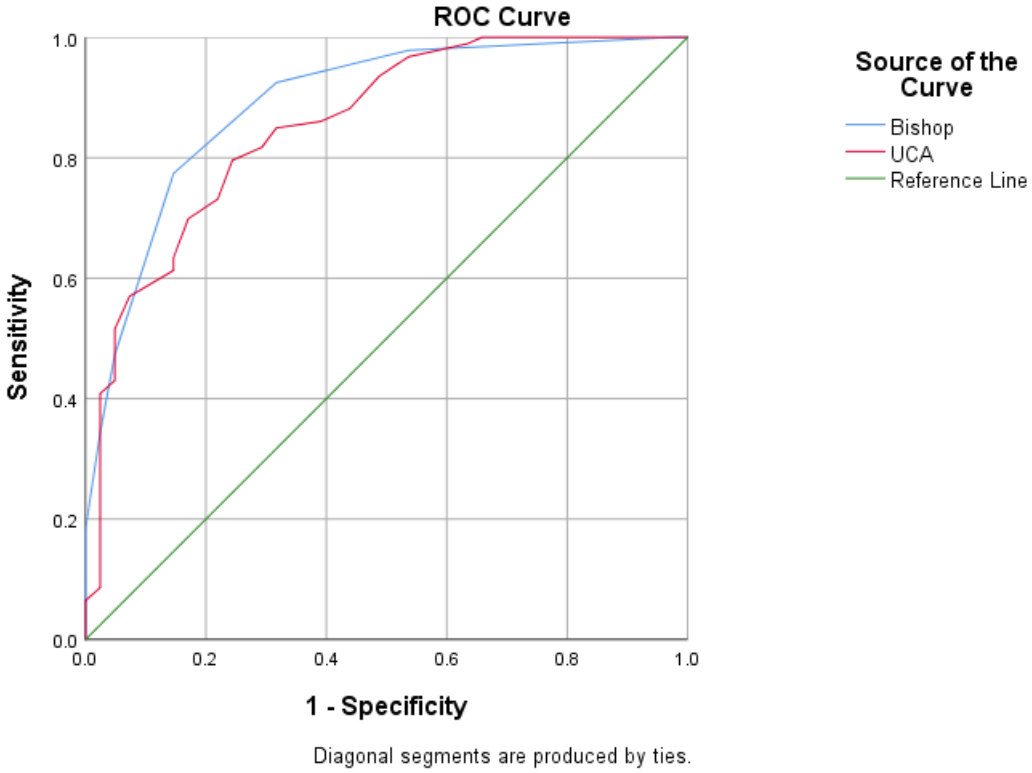

Figure (2S): Roc curve illustrating validity of bishop and UC angle in predicting successful induction of labor

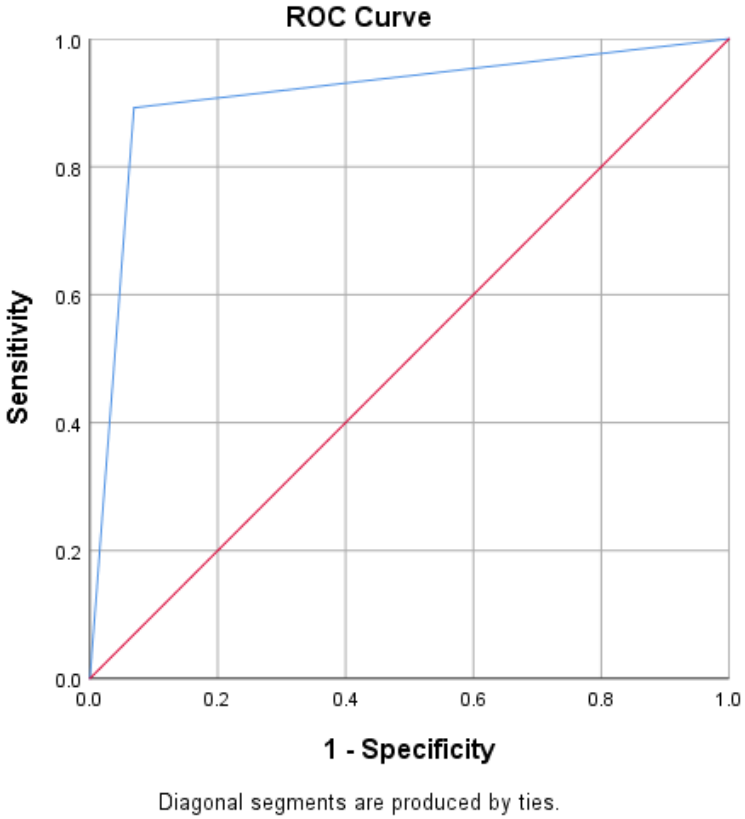

Figure (3S): Roc curve illustrating validity of combined bishop and UC angle in predicting successful induction of labor.

Citation:

Hamed, B., Alanwar, A., Desoky, S., Ezzat, R. Evaluation of Effectiveness of adding Uterocervical Angle Measurement by Transvaginal Ultrasound to Bishop Scoring in Prediction of Successful Induction of Labor.. *Zagazig University Medical Journal*, 2024; (): -. doi: 10.21608/zumj.2024.309133.3503