Role of Preinduction Transvaginal Ultrasound Measurment of Cervical Length in Prediction of Labour Induction Success

DOAA ALAA, M.D.; NERMIN ABO SALEM, M.D.; AHMED ABD EL HAK, M.D. and MAI FATHY, M.Sc.

The Department of Obstetrics and Gynaecology, Faculty of Medicine, Cairo University

Abstract

Background: A common intervention in contemporary labor is induction of labor. Since its introduction in 1964, the Bishop score has been the gold standard for determining favorability for induction of labor. However, the Bishop score's assessment of the cervix's "favorability" prior to induction is very subjective, and several studies have shown that it has a poor prognostic value, particularly for women with low Bishop scores.

Aim of Study: Was to assess the accuracy of transvaginal and other ultrasound parameters in predicting the outcome of labor induction.

Patient and Method: Transvaginal ultrasonography was used to evaluate cervical length. In our research, 100 pregnant women between 37 and 42 weeks had labor induction. A digital cervical examination and Bishop score were recorded before to induction.

Results: A statistically substantial negative link between Bishop Score and failure of induction and chance of C.S. and a statistically substantial positive connection between cervical length as evaluated by ultrasonography and those two outcomes.

Conclusion: In this study we found that Bishop score and ultrasonographic cervical length both have a strong correlation with effective induction. The Bishop score does not appear to be as accurate as cervical length measured by ultrasonography in predicting successful vaginal delivery within 24 hours. The cutoff value for cervical length is 2.8cm, and cervical length has higher sensitivity, specificity, and diagnostic accuracy than bishop score.

Key Words: *Induction of labour – Bishop score – Ultrasonographic evaluation of the cervix.*

Introduction

WHEN advantages to the mother or the fetus exceed those of extending the pregnancy, such as in cases of post-dated pregnancy, preclampsia, or fetal development limitation, induction of labor is suggested. Achieving a successful induction is said

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Correspondence to: Dr. Doaa Alaa,
E-Mail: drdodo841@gmail.com

to be correlated with cervical features, or "ripeness," in roughly 20% of all pregnancies [1].

Bishop score continues to be the accepted measure for predicting the length and outcome of induced labor today. However, the Bishop score's assessment of the cervix's "favorability" prior to induction is very subjective, and several studies have shown that it has a poor prognostic value, particularly for women with a low Bishop score [2].

Recent years have seen a shift in cervical assessment from digital inspection to ultrasound evaluation, and significant study has been devoted to cervix ultrasound [3].

Bishop score is one approach that might be replaced by transvaginal ultrasonography cervical length to predict caesarean delivery and the effectiveness of labor induction in particular discovered that TVU CL, as opposed to Bishop score, was a stronger predictor of effective induction of labor in nulliparous women [4].

To determine the risk of premature delivery and to forecast the success of labor induction, transvaginal ultrasound (TVU) cervical length (CL) has been measured in a variety of groups, including asymptomatic and symptomatic preterm laboring women [5].

Transvaginal cervical length measurements have mostly been used to identify cervical alterations in women who are at risk for premature labor. The effectiveness of labor induction may be predicted using the same cervical alterations, however. Theoretically, transvaginal ultrasound assessment of the cervix could reflect a more accurate and objective analysis of the cervix than digital examination because the supra-vaginal portion of the cervix, which typically makes up about 50% of

the cervical length, is extremely difficult to assess digitally in a closed cervix. Additionally, with a closed cervix, it will be difficult to forecast the evaluation of the effacement, which begins at the internal os. Additionally, sonographic cervical length assessment is a quantitative, repeatable approach of evaluating the cervix that may be performed with little pain to the patient [6].

Patients and Methods

This study is a prospective research had 100 pregnant patients 18-38 years old, admitted to Kasr El-Ainy Maternity Hospital from March 2018 to August 2018.

Inclusion criteria:
• Singleton pregnancy.
• Primigravida.
• 37-42 weeks gestation.
• Living fetus.
• Cephalic presentation.
• Occipitoanterior.
• Average amount of clear liquor.
• Indication for induction (Hypertension with pregnancy, Preeclampsia, passed date, Decrease fetal movement).
• Preinduction reassuring non stress test (NST).

Exclusion criteria:
• Malpresentation.
• Multigravida.
• Occipitoposterior
• Twin pregnancy.
• Any contraindication for vaginal delivery as contracted pelvis, placenta previa).
• Active Labour.
• History of uterine scar (myomectomy or previous C.S.).
• Pre-induction non reassuring non stress test (NST).
• Fetal macrosomia.
• Fetal distress.

Methods:

All cases were subject to:
    • Initial evaluation (Pre-induction):

A- *History taking to fulfill selection criteria:*
1- *Personal History:*
    Name, age, place of residence, job, and any particularly significant medical habits.

2- *Present History:*
  - Duration of pregnancy.
  - Final period's first day of menstruation.
  - Reduced fetal movements, watery vaginal discharge, vaginal hemorrhage, headache, visual symptoms, oedema of the face and fingers, severe vomiting, heartburn, epigastric discomfort, pain in the loin, and oedema of the lower limbs are all warning signs.
  - Ultrasound examinations and results.
  - Blood grouping and Rh typing.
  - Complete blood count, urine analysis, fasting or glucose tolerance test.
  - Any medication.

3- *Obstetric History:*
    I- Pregnancy.
    II- Abortion.
    III- Delivery.
    IV- Puerperium.
    V- Fetuses, newly born infants and children.
    VI- Contraception.

B- *General examination:*
 1- Vital data measurements; blood pressure, pulse, temperature and respiration rate.
 2- Chest and heart examination for any abnormalities.
 3- Lower limb examination for bilateral extensive edema.
 4- Detection for presence of proteinuria in fresh mid-stream urine sample.

C- *Abdominal examination:*
 1- Evaluation of the fundal level, alcohol use, presentation, and anticipated fetal weight.
 2- Presence of scars of previous abdominal or pelvic surgeries.

D- *Vaginal examination:*
 1- Cervical position, dilatation, consistency and length (Bishop's score).

Table (1): The inducibility evaluation method utilized by Bishop [7].

Score	Dilatation (cm)	Effacement (%)	Station (–3 to +3)	Cervical consistency	Cervical position
0	Closed	0-30	–3	Firm	Posterior
1	1-2	40-50	–2	Medium	Midposition
2	3-4	60-70	–1	Soft	Anterior
3	>5	>80	+1.+2	–	–

2- Condition of membranes.

3- Pelvic adequacy.

4- Ensure presentation, position and detection of head station.

E- *Ultrasound:*

• *Transabdominal:*

The thorough real-time transabdominal ultrasound examination includes the confirmation of weeks of gestation, fetus's number, viability, presentation, approximate fetus's weight, position and grade of placenta, amount of alcohol consumed, detailed anomaly scan, biophysical profile, and Doppler indices of umbilical artery.

• *Transvaginal:*

After that, a transvaginal ultrasound was used to determine the cervical length. To prevent the cervix from lengthening during the examination, the patient had to be empty of the bladder. The lithotomy posture was used for the patient. Moreover, a transvaginal probe is inserted into the vagina far from the cervix. Once the cervical canal has been located, the probe is gently retracted to prevent the tip from pressing on the cervix.The external cervical os, the cervical canal, and the internal cervical os are all visible in a sagittal plane through the cervix. From the outside to the inner cervical os, the cervix's length is calculated as a straight line. It is crucial to only include the endocervical mucosa-bordered portion of the cervical canal.
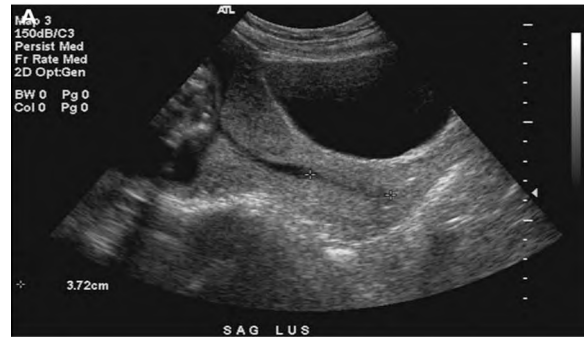

Fig. (1): Cervical length measurement.

• *Further evaluation:*

Selected patients were subjected for:

• *Antepartum fetal heart monitoring (non stress test NST):*

There are several definitions of responsiveness. The most often used definition is that the NST is reactive (normal or negative) if there are two or more FHR accelerations that peak at least 15 beats/min above baseline and last 15s from baseline to baseline, during a 20-min time frame, with or without fetus movement noticed by the mother. Without adequate FHR accelerations during a 40-min period, a trace is considered non-reactive [8].

Table (2): Definition of normal, suspicious and pathological: FHR traces [9].

Category	Definition
Normal	All four characteristics are categorized as consoling.
Suspicious	One characteristic was deemed as non-reassuring, whereas the other qualities were deemed comforting.
Pathological	Two or more aspects that are not comforting, or perhaps just one that is aberrant

Table (3): Classification of FHR trace features.

Feature	Baseline (bpm)	Variability (bpm)	Decelerations	Accelerations
Reassuring	110-160	≥5	None	Present
Non-reassuring	100-109 161-180	<5 for 40-90min	Typical variable decelerations with over 50% of contractions, for over 90 min. Single prolonged deceleration for up to 3 min	The absence of accelerations with otherwise normal trace is of uncertain significance
Abnormal	<100 >180 Sinusoidal pattern ≥10min	<5 for 90min	Either atypical variable decelerations with over 50% of l contractions or late decelerations, both for over 30 min. Single prolonged deceleration for more than 3 min	

Using intravaginal misoprostol (25 microgram) (vagiprost), labor was induced. A digital examination was performed 6 hours after the initial intravaginal dosage, and if more doses were required, they were administered at intervals of 6 hours. The health of the fetus was periodically assessed using external cardiotocography.

In every instance, continuous cardiotocography was employed. When the cervix is 2cm or more

dilated, intravenous oxytocin delivery is initiated. It begins at 1mIU/min and is increased by 1mIU every 30 minutes as needed. Intramuscular pethidine was made available for analgesia.

In the current research, a successful outcome was one in which labor was induced and delivered vaginally within 24 hours. According to the preceding two tables' abnormal fetal heart rate traces, a lasting stop of dilation for at least 3 hours, or the lack of fetal head descent for at least an hour despite sufficient uterine contractions, it was determined that a caesarean birth was necessary.

Data collected include:
• No of cases delivered vaginally.
• No of cases delivered by C.S.

Bishop score and sonographic cervical length for each case.

Results

This study was conducted at Kasr El-Aini Maternity Hospital from March 2018 to August 2018. The purpose of this research was to evaluate the two measures in the prediction of a successful vaginal birth within 24 hours and to determine the link between preinduction sonographically assessed cervical length and Bishop score.

At 37 to 42 weeks' gestation, 100 women scheduled for labor induction had transvaginal ultrasound and a digital examination to calculate the Bishop score.

Table (4): Descriptive statistics of the whole study group.

	Min	Max	Mean ± SD
Age	17	35	23±3.87
G. Age	37	42	39±1.4
BMI	19	35	26.7±2.78
EFW (KG)	2.40	3.80	3.08±0.36

• The age ranged between 17 and 35 with mean age was 23±3.87.
• The gestational age ranged between 37 and 42 with mean gestational age 39±1.4.
• The BMI ranged between 19 and 35 with mean BMI 26.7±2.78.
• The EFW ranged between 2.40 KG and 3.80 KG with mean EFW 3.08±0.36.

Table (5): Indications for induction of labour.

Indication	No. of patients	No. of success in induction of labour
HTN & Preeclampsia	60	42
Post term	23	12
Dec.DFMC	17	13
Total	100	67

This table shows that the most common cause of induction was HTN & Preeclampsia (60 females) 42 of them have delivered vaginally followed by postterm (23 females) 12 of them has delivered vaginally, followed by decrease DFMC (17 females) 13 of them delivered vaginally.

Table (6): Mode of delivery and percentage.

Mode of delivery	Number	Percentage %
CS	33	33
NVD	67	67

• 33 caesarian sections and 67 vaginal deliveries.
• Indications of C.S. were failed induction (patient received 4 doses of misoprostol 25 microgram with 6 hours interval and no labour pains nor cervical dilatation or effacement were noted).

Table (7): Descriptive statistics according to mode of delivery.

	V.D	C.S	p-value
Age	23.23±3.64	23.69±4.43	0.589
BMI	26.17±2.59	28.03±2.83	0.002
Gestational age	39.08±1.38	39.38±1.50	0.347

• The median age of patients delivered vaginally was 23.23±3.64 and the median age of patients delivered by C.S. was 23.69±4.43.
• The median BMI of patients delivered vaginally was 26.17±2.59 and the median BMI of patients delivered by C.S. was 28.03±2.83.
• The average gestational age of patients delivered vaginally was 39.08±1.38 and the average gestational age of patients delivered by C.S. was 39.38±1.50.
• There was no statistically substantial connection between age, gestational age and success of labour induction, however there was a statistic all substantial connection between increased BMI and failure of induction.

Table (8): Bishop score and cervical length.

	V.D	C.S	p-value
Bishop score	8.30±1.79	6.55±1.27	<0.064
Cervical length (mm)	2.63±0.14	3.06±0.11	<0.001

- When patients were delivered vaginally, the average cervical length was 2.63 ±0.14cm, however when patients were delivered via C.S., the average cervical length was 3.06 ±0.11 cm.
- The median Bishop score in patients delivered vaginally was 8.30±1.79 while The median Bishop score in patients delivered by C.S. was 3.06± 0.11.

From the previous table we found a statistically substantial negative connection between the Bishop Score and the likelihood of C.S. and a statistically substantial positive link between the cervical length

as determined by ultrasonography and the likelihood of C.S.

This table shows that the cut off value of cervical length is 2.85 & shows that sensitivity of ultrasound measures of cervical length in prediction of successful induction is 94% & specificity is 100%.

This table shows that the cut off value of bishop score is 6.5 & shows that sensitivity of bishop score in prediction of successful induction is 86% & specificity is 62%.

Table (9): Accuracy of ultrasonographic cervical length in prediction of successful induction.

Area Under the Curve	p-value	95% Confidence Interval		Cut off	Sensitivity %	Specificity %	PPV	NPV	Accuracy
		Lower Bound	Upper Bound						
0.973	<0.001	0.940	1.000	2.85	94.4	100	100.00	87.88	96.04

Table (10): Accuracy of the Bishop Score in predicting induction success.

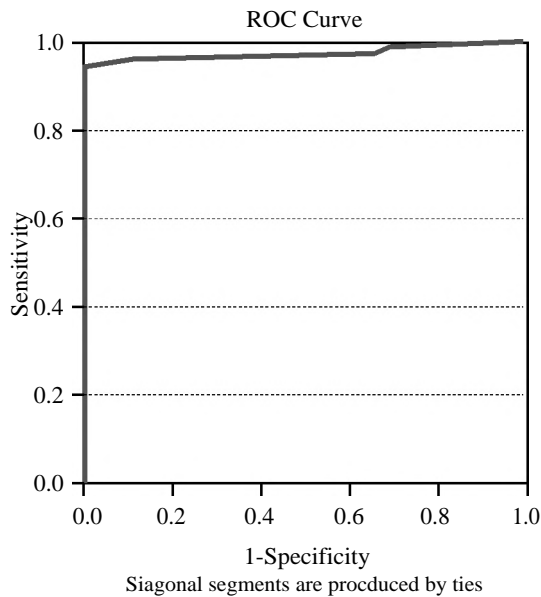| Area Under the Curve	p-value	95% Confidence Interval		Cut off	Sensitivity %	Specificity %	PPV	NPV	Accuracy
		Lower Bound	Upper Bound						
0.808	<0.0064	0.720	0.897	6.5	85.9	62.1	100.00	87.88	96.04

Fig. (2): Receiver-operating characteristics (ROC) curve for sonographically measured cervical length and its relation to successful induction.
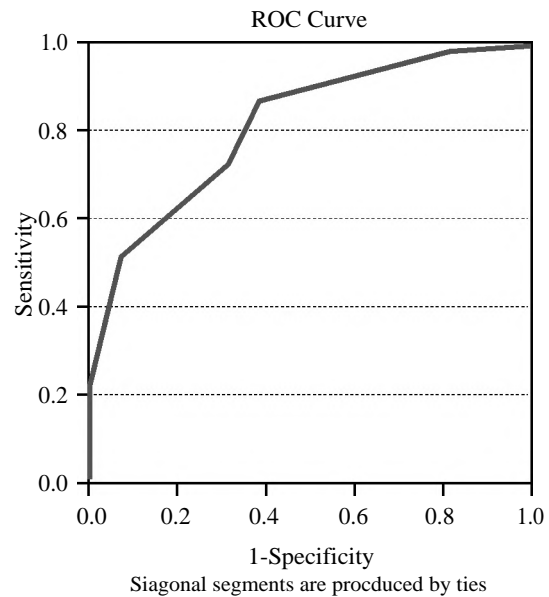

Fig. (3): Receiver-operating characteristics (ROC) curve for Bishop Score and its relation to successful induction.

Discussion

In around 20% of pregnancies, labor is induced, and effective induction has been linked to cervical features, or 'ripeness' [10].

Bishop score continues to be the go-to measure for predicting the length and outcome of induced labor. However, the Bishop score's assessment of the cervix's "favorability" prior to induction is very subjective, and several investigations have shown

that it has a poor prognostic value, particularly for women with a low Bishop score [11].

As About 50% of the cervical length is made up of the supra-vaginal region of the cervix, which varies from woman to woman. Digital estimation of this part of the cervix is challenging, and thus makes evaluation very subjective [12].

Cervical length measurement with transvaginal ultrasonography may be a more accurate way to evaluate cervical health [13].

The purpose of this research was to compare Bishop score and preinduction sonographically assessed cervical length to establish their link to successful vaginal delivery prediction. In this trial, 100 pregnant women between the ages of 37 and 42 weeks had vaginal administration of 25 g g of misopristol to induce labor as a result of ROM, postdate, and reduce DFMC. The dosage was administered again every 6 hours for a total of 24 hours.

The results of the current investigation showed a strong connection between the Bishop score and the ultrasonographic cervical length ($p<0.001$ and $p<0.064$, respectively).

This study agreed with Yang et al., [14] who examined 105 women's labor inductions. A postterm pregnancy of at least 41 completed weeks followed by a large-for-gestational-age fetus was the most frequent cause of induction. Additionally, they discovered a strong correlation between parity and cervical length and effective induction. Maternal age and gestational age were not significant predictive factors.

Also Peregrine et al., [15] the same outcomes when they examined induction of labor in 267 women who were 36 weeks or more pregnant just before induction of labor. To identify the parameters that most accurately predicted the probability of cesarean birth, logistic regression analysis was utilized. Body mass index, height, and ultrasonic transvaginal cervical length were shown to be the most reliable variables for predicting the likelihood of a cesarean birth after labor induction ($p<0.001$, $p=.005$, and $p<0.001$, respectively). Additionally, we discovered that ultrasonic transvaginal cervical length is one of the most accurate metrics in our research ($p<0.001$).

Of the 100 participants, (67%) vaginal births and (33%) C.S. deliveries were made by women. Bishop score and ultrasonographically determined cervical length both had independent roles in pre-

dicting the chance of a vaginal delivery within 48 hours. In the ROC curves, the best cut-off point for the prediction of successful induction was 28.5mm for cervical length (Area under curve = 0.973 and $p<0.001$) and >6.5 for the Bishop score (Area under curve = 0.808 and $p<0.064$). However, cervical length appears to be a better predictor than the Bishop score, with Sensitivity 94.4%, Specificity 100%, PPV 100%, NPV 87% and diagnostic accuracy 96% compared to 85.9%, 62.1%, 84%, NPV 64% and 79% respectively.

Bastani et al., [16] 200 singleton pregnant women who had labor induction at 37-42 weeks were investigated. Prior to induction, transvaginal ultrasound was performed on each subject. ROC curves were drawn, and the equality of the area under the curve (AUC) was checked in order to compare the approaches' predictive power. Bishop score's AUC was 0.39 (95% confidence interval [CI]: 0.3-0.48). The ultrasonography-derived AUC for cervical length was 0.69 (95% CI 0.6-0.77). The cervical length ROC was substantially different from the Bishop score when the ROC curves for these two approaches were compared ($p<0.001$). They discovered that, if a facility like this is accessible, when necessary, cervical length determined by transvaginal ultrasonography has the potential to replace the conventional Bishop score.

Laencina et al., [17] 177 women with a single pregnancy, 36-42 weeks of pregnancy, and a live baby with cephalic presentation were evaluated for Bishop Score by digital examination and measured for cervical length by transvaginal ultrasound prior to induction of labor with both prostaglandin and oxytocin. Similar to our findings, they discovered that the Bishop Score, cervical length, and parity each contributed independently to the prediction of the propensity for a vaginal delivery within 60 hours. The cervical length cutoff of 24mm (28mm in our research) and the Bishop score cutoff of 4mm (>6.5 in our result) were the best cut-off points for predicting successful induction utilizing ROC curves. Similar to our finding, cervical length was a greater predictor than the Bishop score (94% and 100%, respectively, vs 85% and 62%).

Tan et al., [18] 249 women who were hospitalized for labor induction participated in their prospective research, which was conducted. They discovered that analysis of the ROC curves for cervical length and Bishop Score revealed that both were predictors of Caesarean section (area under the curve, 0.611 versus 0.607; $p=0.012$ versus $p=0.015$, respectively), with the best cutoffs for predicting Caesarean section being >20mm for

cervical length and <5 for Bishop score. Cervical length exhibited greater positive (30% vs. 27%), negative (89% vs. 83%), and sensitivity (80% vs. 64%) predictive values. Additionally, they discovered that transvaginal sonography was much less uncomfortable than digital examination for determining Bishop Score.We discovered that cervical length had superior sensitivity than Bishop Score for predicting cesarean delivery (94.4% vs. 85.9%), better specificity (100% vs. 62%), better PPV (100% vs. 84%), and better NPV (87% vs. 64%) according to our cutoffs (28.5mm for cervical length and >6.5 for Bishop Score).

This study disagreed with Groeneveld et al., [19] Prior to labor induction, the transvaginal ultrasonographic assessment of cervical length was compared to the Bishop score in terms of predicting the mode of birth within four days. by looking at 110 women who had labor inductions between 37 and 42 weeks of pregnancy. Dinoprostone gel was used for induction on the first two days and, if required, misoprostol pills were administered intravaginally on the 3rd or 4th day. Dinoprostone was administered in two dosages totaling 3 mg over the course of 24 hours.A maximum of 75 gg of misoprostol in 24 hours might be administered intravaginally in three separate doses on the third and fourth day. Within 96 hours, a successful vaginal birth was the primary outcome criteria. The 110 women were 66 nulliparous and 44 multiparous individuals. For 48 (73%) nulliparous and 40 (91%) multiparous women (i.e., 80% of the population), vaginal birth within 96 hours was successful.17% of deliveries were through the caesarean section overall. The only variable that significantly correlated with predicting a successful labor induction was the Bishop score in nulliparous women (area under the ROC curve: 0.679; standard error: 0.73; p 0.05; 95% CI: 0.536-0.823). The Bishop score's best cutoff point was 3, which had a sensitivity of 56.3% and a specificity of 72.2%. Cervical length measured by transvaginal ultrasonography was not a reliable independent predictor of vaginal delivery within 96 hours. This was contrary to our findings since they opted for a longer window of time (96h) between the commencement of induction and vaginal birth in an effort to minimize the need for a caesarean section. Compared to our research, where the caesarean birth rate was 33%, their rate was 17.3%. But compared to our 48-hour interval, that lengthy duration can be seen as having an additional burden on the participants since lengthier labor trials result in maternal tiredness and longer hospital stays, which in turn increase morbidity and cost money.

Bueno et al., [20] a study of the clinical and sonographic factors that influence labor induction success. In order to predict a successful vaginal birth within 24 hours after induction, 196 pregnant women's Bishop scores, cervical lengths, and parities were examined. When parity was initially implemented, the optimal statistic sequence that forecasts the labor induction was discovered. Cervical length and Bishop predicted the success of labor induction equally & this disagreed with our study that ultrasonic transvaginal cervical length is more accurate parameter in prediction of successful induction.

Chandra et al., [21] transvaginal ultrasound and digital vaginal exams were done just before labor induction on 122 women who had post-dated pregnancies. The Bishop Score components and ultrasound measurements of cervical length, dilatation, and funneling were compared. They discovered that no ultrasonography feature indicated a successful vaginal delivery. Maternal age, the Bishop score, and the cervical position each independently predicted vaginal delivery. Multiple signs of induction of labor in our research sample might account for the disparities between these two investigations.

Reis et al., [22] 134 women who were having labor induction at term due to various obstetric problems were prospectively included. Each participant consented to a digital examination, as well as transvaginal ultrasounds to evaluate cervical length and look for funneling. Only obstetric history and digital examination were independently related to labor length and reliably predicted vaginal birth within 24 hours. The results of an induced labor could not be correctly predicted using ultrasound measures of cervical length.

Paterson-Brown et al., [23] the manner of delivery was compared to ultrasound data, and it was shown that cervical length was not a reliable indicator of the style of birth. Bishop score's overall accuracy in predicting vaginal birth was low, despite the fact that it strongly predicted successful vaginal deliveries. This contrasted with our research, which found that cervical length is more accurate than bishop score (96% VS 79%).

In yet another research, Roman et al., [24] showed that According to our research, cervical length has higher sensitivity and specificity than bishop score (94% vs. 85%) and (100% vs. 62%), respectively. However, when compared to Bishop score, cervical length by ultrasound is not a superior predictor for the result of labor induction.

Rozenberg et al., [25] the Bishop score was reported to be superior to cervical length for pre-

dicting the success of induced labor in a trial of 166 women who used prostaglandins. This contradicted our research, which revealed that the Bishop score was inferior to cervical length with a diagnostic accuracy of 79% vs 96%.

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دور قياس عنق الرحم بواسطة السونار المهبلى
كوسيلة لتوقع نجاح تحفيز الولادة

الأسباب : انفجار جيب الماء، تأخر ميعاد الولادة وقلة حركة الجنين.

الطرق للتنبؤ بنجاح التحريض : وتستند الطريقة التقليدية للتنبؤ بنجاح عملية التحريض على استخدام الفحص المهبلى التقليدى والتعبير عن خصائص عنق الرحم بالنقاط (بيشوب) واستخدام الموجات الفوق صوتية عبر المهبل لقياس طول عنق الرحم. وقد أجريت هذه الدراسة بمستشفى النساء والتوليد – كلية طب القصر العينى فى الفترة من مارس وحتى أغسطس واشتملت على ١٠٠ سيدة حامل ما بين ٤٢-٣٧ أسبوع وتتضمن فحص عنق الرحم بالفحص المهبلى التقليدى ويتم حساب نقاط بيشوب كما يتم قياس طول عنق الرحم بواسطة الموجات فوق الصوتية عبر المهبل. وتم استخدام عقار ميزوبروستول عن طريق المهبل بجرعة ٢٥ ميكروجرام من أجل تحريض الولادة ويتم تكرار الجرعة كل ٦ ساعات بحد أقصى ٤ جرعات.

النتائج : وتراوحت أسباب تحريض الولادة ما بين إنفجار جيب الماء ٦٠ سيدة وتأخر موعد الولادة (٢٣ سيدة) وقلة حركة الجنين (١٧). وقد تم نجاح عملية التحريض ووضعت ٦٧ سيدة ولادة طبيعية عن طريق المهبل وفشلت عملية التحريض فى ٣٣ سيدة. وكان متوسط قياس طول عنق الرحم بواسطة السونار 0.14±2.63 سم فى السيدات اللآتى ولدن عن طريق المهبل و3.06±0.11cm سم فى السيدات اللآتى تعرضن لولادة قيصرية. كما كان مقياس بيشوب 8.30±1.79 فى السيدات اللآتى ولدن عن طريق المهبل و 0.11±3.06 فى السيدات اللآتى تعرضن لولادة قيصرية.

الاستنتاجات : ونخلص من هذه الدراسة بأن قياس طول عنق الرحم بواسطة الموجات فوق الصوتية يبدو أفضل من نقاط بيشوب فى التنبؤ بنجاح الولادة المهبلية.