BISHOP SCORE VERSUS ULTRASONOGRAPHIC TECHNIQUES FOR PREDICTION OF SUCCESSFUL INDUCTION OF LABOR

By

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ABSTRACT

Background: The process of labor has always been elusive and difficult to grasp till this current era. What is even more elusive knows when it would happen and when to intervene. Throughout the medical literature there has been reliance on clinical examination to predict successful induction. with the advent of ultrasonography this process of relying on subjective clinical data has shifted towards combining both the skills of the examiner with the subjective information from ultrasonography.

Objective: Comparing between Bishop Score and transvaginal cervical assessment of prior to induction of labor in prediction of successful.

Patients and methods: This study was conducted at Obstetrics and Gynecology Department, Damanhour Teaching Hospital, from January of 2018 and December of 2018 and included a sample of 200 pregnant women. The mean age of mother in our study was 24 ± 3.75 years, the mean BMI was 25.85 ± 4.33. The mean gestational age by U/S was 38.9 ± 2 weeks. The mean bishop score was 7.20 ± 1.80, the mean cervical length was 17.54 ± 4.64, the mean posterior cervical angle was 116.3 ± 14.23.

Results: The results of this study showed that the correlation between labor induction prediction of success using bishop score and ultrasound. The mean bishop score was 7.20 ± 1.80, the mean cervical length was 17.54 ± 4.64, the mean posterior cervical angle was 116.3 ± 14.23. it was found that there was a positive significant correlation between successful induction and pre-induction bishop score , posterior cervical angle and cervical length.

Conclusion: In this study we found that successful induction correlated significantly with the Bishop score and ultrasonographic cervical length & posterior cervical angle.

Keywords: Sonographic, Bishop Score, Cervical length, Posterior Cervical Angel.

INTRODUCTION

Induction of labor is considered justified when the benefits of prompt delivery outweigh the consequences of Caesarian Section (CS) *(Ara et al., 2018).*

Induction of labor is performed in about 20% of all pregnancies and successful induction is reported to be related to cervical characteristics, or 'ripeness' *(Groenevelda et al., 2010).*

Today, Bishop score remains the standard method to predict the duration and outcome of induced labor. However, the preinduction 'favorability' of the cervix as assessed by the Bishop score is very subjective and several studies have demonstrated a poor predictive value for the outcome of induction especially in

women with a low Bishop score *(Selhi and Surapaneni, 2010).*

In women undergoing induction of labor, pre-induction sonographic assessment of cervical length and posterior cervical angle is superior to the Bishop score in the prediction of outcome of labor *(Eid et al., 2017).*

In contrast transvaginal ultrasonographic cervical measurement is quantitative and easily reproducible *(Anikwe et al., 2020).*

In women undergoing induction of labor, significant prediction of the likelihood of vaginal deilvery within 24 hours and the likelihood of ceasarean section are provided by pre-induction cervical length, posterior cervical angle and maternal characteristics. Sonographic parameters were superior to the Bishop score in the prediction of the outcome of induction *(Khazardoost et al., 2016).*

The aim of this study was to compare between bishop score and ultrasonographic assessment in prediction of successful induction of labor.

PATIENTS AND METHODS

This study was conducted at Obstetrics and Gynecology Department, Damanhour Teaching Hospital, from January of 2018 and December of 2018, and included 200 pregnant women divided into two equal groups. Informed consents were obtained from all patients in the study.

Inclusion criteria:

Singleton pregnancies, living foetus, reassuring CTG and cephalic presentation.

Exclusion criteria:

Multifetal pregnancies, history of previous CS or myomectomy, congenital anomalies, malpresentations, IUFD, any degree of placenta previa or vasa previa, any non-reassuring CTG, active genital herpes or invasive cervical cancer which contraindicate vaginal delivery, extreme low birth weight defined as <1500g, previous operations on the cervix (e.g. cautery, cerclage, cervical amputation or conization), and patients already in active labor on admission.

All included women after informed consent were subjected to: written informed consent, complete history taking, complete general examination, abdominal ultrasound to assess fetal wellbeing, placenta, amount of liquor, vaginal examination: to exclude cephalopelvic disproportion, confirm presentation, position and detection of head station and to exclude contraindications of vaginal delivery.

Patients were divided into two equal groups:

Group 1 patients were subjected to bishops score evaluation via vaginal examination.

Group 2 patients were evaluated via transvaginal ultrasound using Logic C 5Q Premium GE USA Medical Systems (China) vaginal probe 7.5 MHz frequency to assess:

a. The cervical length was measured from internal to external os.

b. Posterior cervical angle was measured in a sagittal plane at the level of the internal os, as the angle between an imaginary line

traversing the cervical canal and another tangential to the posterior uterine wall at its junction with the internal os. Values were approximated to the nearest degree in the long axis of the cervical canal.

RESULTS

There was no significant difference between the two studied groups regarding mode of delivery, duration of labor, need for oxytocin augmentation and instrumental delivery **(Table 1)**.

Table (1): Comparison between the two studied groups according to labor events (time to reach 4 cm cervical dilatation, duration of labor, need for oxytocin augmentation, instrumental delivery by ventouse or forceps) and mode of delivery

Groups Parameters	Bishop (n = 100)	Ultrasound (n = 100)	p
Time to reach 4 cm cervical dilatation	12 ± 6 hours	10 ± 5 hours	0.326
Duration of labor	11 ± 5 hours	11 ± 6 hours	0.501
Need for oxytocin augmentation	45	49	0.342
Instrumental delivery (forceps, ventouse)	0	0	0.441
NVD	71	67	0.541
CS	29	33	0.541

There was a statistically significant positive correlation between Bishop score and labor success. At a bishop score >7 with the sensitivity was 78.87 %, specificity was 82%., positive predictive value was 91.8 %, and negative predictive value was 61.5 % to predict induction success **(Figure 1)**.
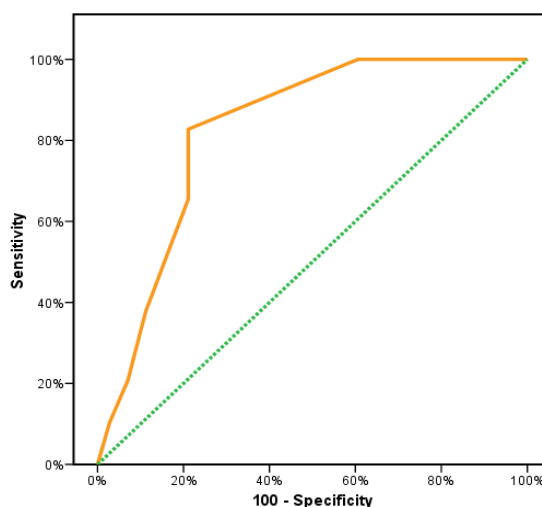

Figure (1): ROC curve for Bishop score to predict NVD cases (vs CS)

The cervical length ranged between 10.0 – 29.0 mm. The mean cervical length was 17.54 ± 4.64 mm. The posterior cervical angle ranged between 90.0 and 147.0. The mean posterior cervical angle was 116.3 ± 14.23 (**Table 2**).

Table (2): Descriptive of the studied cases according to CX length and posterior cervical angle in ultrasound group (n = 100)

	Min. – Max.	Mean ± SD.	Median
CX length (mm)	10.0 – 29.0	17.54 ± 4.64	17.0
Posterior cervical angle	90.0 – 147.0	116.3 ± 14.23	116.6

There was a statistically significant correlation between cervical length and labor induction success. At a cervical length ≤16.7 mm we were able to predict induction success with a 61.19 % sensitivity, 84.85% specificity, 89.1 % positive predictive value and 51.9 % negative predictive value (**Figure 2**).
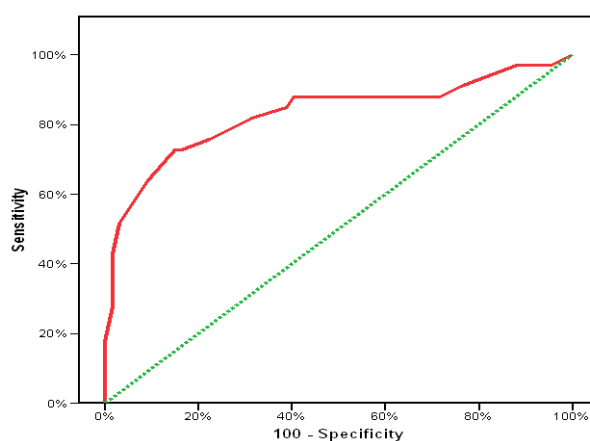

Figure (2): ROC curve for CX length (mm) to predict NVD cases (vs CS)

There was a statistically significant correlation between posterior cervical angle measurement and prediction of successful induction. Posterior cervical angle >116.8 had a sensitivity of 55.22%, specificity of 66.67 %, positive predictive value of 77.1% and negative predictive value of 42.3% to predict induction success (**Figure 3**).
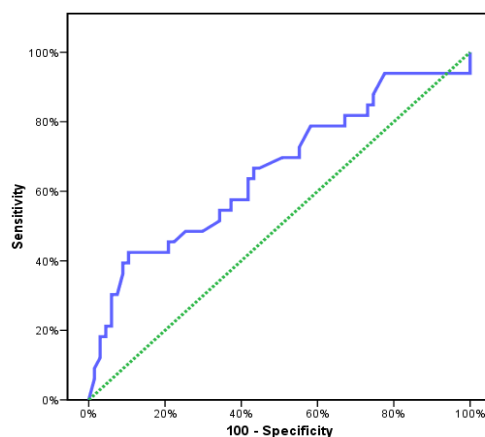

Figure (3): ROC curve for posterior cervical angle to predict NVD cases (vs CS)

Overall sensitivity, specificity, positive predictive value and negative predictive value of ultrasound were 89.55, 63.64, 83.33, and 75 respectively, while sensitivity, specificity, positive predictive value and negative predictive value of bishop score were 78.87, 82.76, 91.8 and 61.5 respectively **(Figure 4)**.
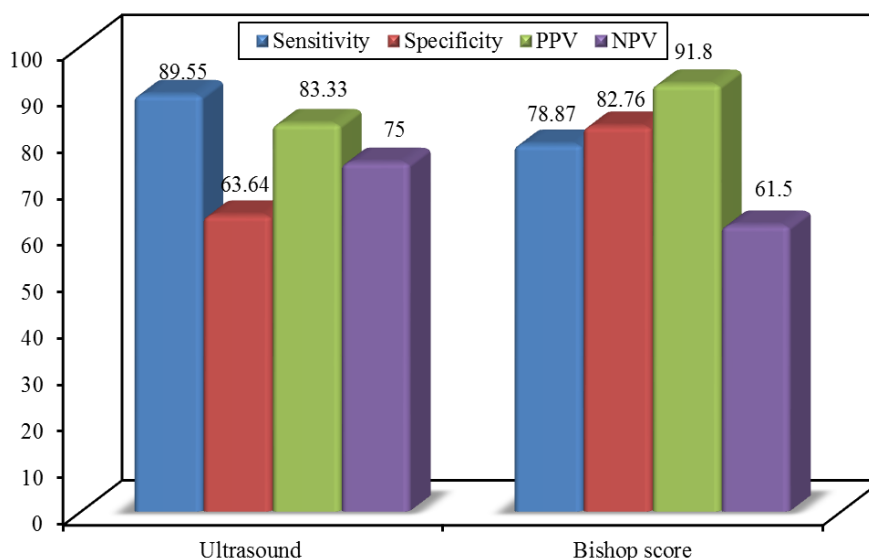

Figure (4): Comparison between ultrasound and bishop score

DISCUSSION

In our study, 69% of the participants were delivered vaginally, and 31% women were delivered by C.S.

Bishop score, ultrasonographic cervical length, and posterior cervical angel provided independent contribution in the prediction of the likelihood of delivering vaginally.

The present study found that successful induction of labor correlated significantly with the Bishop score.

The ultrasonographic cervical length did predict successful induction as the length of the cervical canal signifies the progression from the uneffaced prelabor long cervix to the cervical changes where the cervix is taken up by the process of labor into the formation of birth canal.

The posterior cervical angle rational for induction success prediction is because as the labor progresses with the cervix being taken up into the uterus, the posterior wall of the uterus becomes more aligned with the cervix forming the birth canal losing the natural angle of anteversion between the cervix and the uterus.

Wafa et al. (2018) found that the successful induction correlated significantly with transvaginal ultrasonography measurements of the posterior cervical angle and cervical length and Bishop Score. However Bishop Score appeared to be specific and accurate than the ultrasonographic measurements in prediction of successful vaginal delivery.

Bertossa et al. (2012) conducted a study to evaluate for a score of cesarean

delivery prediction and found that only the transvaginal ultrasonographic cervical length was associated with the risk of cesarean delivery. Using the different cutoffs of calculated risk of cesarean delivery (20%, 30%, and 40%), we calculated the sensitivity of 69.6%, 54.3%, and 45.7%, respectively, specificity of 42.0%, 58.2%, and 69.2%, respectively, and positive predictive value 19.9%, 21.0%, and 23.5%, respectively of the risk score. The area under the receiver operating characteristic curve was 0.59. There was a poor association between the outcome of labor induction (vaginal delivery or cesarean delivery) and the predicted risk.

Sevrin et al. (2019) evaluated the ultrasound characteristics of the cervix (cervical length, cervical funneling, internal os dilation, the presence or absence of the cervical gland area, and the morphological changes of the cervix as a result of applying fundal pressure) before the onset of labor induction among women with post term pregnancy to identify the possible predictors of failed labor induction. The Bishop score was used for comparison purposes. Three groups were evaluated: successful versus unsuccessful induction, vaginal delivery versus cesarean delivery (excluding cases of acute fetal distress), and vaginal delivery versus cesarean delivery (including cases of AFD). A fourth group including only the primiparous women from the three previous groups was also evaluated. They found based on the studied characteristics and combinations of variables, a cervical length $\geq$ 3.0 cm and a BS $\leq$ 2 were the best predictors of induction failure Groenevelda et al. (2010) evaluated transvaginal ultrasonographic

measurement of the cervical length versus the Bishop score, prior to induction of labor, in predicting the mode of delivery within four days. By studying women in whom induction of labor was performed at 37-42 weeks of gestation. The agents used for induction were dinoprostone gel on the first 2 days and, if necessary, misoprostol tablets intravaginal on the third or fourth day, the maximum dose of dinoprostone in 24 h was 3 mg given in two doses. On the third and fourth day a maximum of 75 µg misoprostol in 24 h could be applied intravaginally in three doses at intervals. Primary outcome criterion was successful vaginal delivery within 96 h. Vaginal delivery was successful in 73% nulliparous and in 91% multiparous women, i.e. in 80% of the total population. The overall rate of cesarean delivery was 17%. Only the Bishop score in nulliparous women showed a significant relationship between this variable and predicting successful labor induction. The best cut-off value for the Bishop score was 3, with a sensitivity of 56.3% and a specificity of 72.2%. Transvaginal ultrasonographic measurement of cervical length was not a significant independent predictor of vaginal delivery within 96 h. This disagreed with our results as they chose a longer interval (96h) between start of induction and vaginal delivery in order to avoid cesarean delivery as much as possible. Their cesarean delivery rate was 17.3% compared with 31% in our study. Long period may be considered extra burden on the participants comparing with our interval 48h as prolonged trial of labor leads to maternal exhaustion and longer hospitalization with consequent increased morbidity and financial cost.

Bastani et al. (2011) studied women with singleton pregnancies undergoing induction of labor at 37–42 weeks. Transvaginal ultrasound was done for all participants prior to induction. The AUC calculated for Bishop Score was 0.39 (95% confidence interval [CI] 0.3–0.48). The AUC for cervical length measured by ultrasonography was 0.69 (95% CI 0.6–0.77). Testing equality of the ROC curves for these two methods showed the ROC for cervical length to be statistically different from Bishop Score. Agreeing with our results, they found cervical length measured by transvaginal ultrasonography has the potential to replace the traditional Bishop score, provided that such a facility is available when needed.

Keepansereel et al. (2012) studied women undergoing induction of labor induction and were successful in 79.09%. A score was formulated using the parameters having independent association and weighting of individual components was given according to its regression coefficients. The best cut-off point for the Bishop's score was 5 &the best cut-off point new score in receiver operating characteristics curve was six with a sensitivity of 95.5% and specificity of 84.6%..The new score was found to have a better area under the curve than the conventional score. The new score of 6 had a sensitivity of 95.5%, and specificity of 84.6%, and a Bishop's score of 5 with 65.3% and 80.8%, respectively. In agreement with our study, regarding comparability of bishop score to ultrasonography and adding that a combination of both as practicality, suggest yields a better evaluation of the laboring mother.

CONCLUSION

Successful induction correlated significantly with the Bishop score and ultrasonographic cervical length and posterior cervical angle.

Conflicts of interest: No conflicts of interest were encountered.

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مقارنة بين معدل بيشوب والتقييم بالموجات الفوق صوتية لتوقع نجاح تحفيز المخاض

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خلفية البحث: إن تحفيز الولادة هو التدخل الطبي لبدء انقباضات الرحم بشكل مصطنع مما يؤدي إلى توسع تدريجي لعنق الرحم بالتالي ولادة الجنين.

الهدف من البحث: إستخدام الموجات الفوق صوتية عبر المهبل لقياس طول عنق الرحم وزاوية عنق الرحم الخلفية وذلك للتنبؤ بالولادة.

المريضات وطرق البحث: تم إجراء هذه الدراسة في قسم أمراض النساء والولادة بمستشفى دمنهور التعليمي في الفترة مابين يناير 2018 الى ديسمبر 2018 لمدة اثنى عشر شهرا والتى تضمنت عينة من 200 امرأة حامل. وقد تم قياس معامل بيشوب باستخدام الفحص المهبلي، وتم فحص طول عنق الرحم وزاويه عنق الرحم الخلفيه عن طريق الموجات فوق الصوتية.

نتائج البحث: تم نجاح عملية التحفيز، ووضعت 138 سيدة ولادة طبيعية عن طريق المهبل وفشلت عملية التحريض في 62 سيدة، وقد تنبأ كل مت معامل بيشوب وطول عنق الرحم وزاوية عنق الرحم الخلفية بنجاح تحفيز المخاض بنسب مختلفة.

الاستنتاج: قياس طول عنق الرحم وزاويه عنق الرحم الخلفية بواسطة الموجات فوق الصوتية يبدو أفضل من معامل بيشوب في التنبوء بنجاح الولادة المهبلية.