



2023

Section: Obstetrics and Gynecology

Manipal Cervical Scoring System by Transvaginal Ultrasound Versus Bishop Score in Predicting Successful Labour Induction

Mohammed Mohammed Gebreil

Department of Obstetrics and Gynecology, Faculty of Medicine for boys, Al-Azhar University , Cairo, Egypt

Ahmed Mohammed El-Sadek

Department of Obstetrics and Gynecology, Faculty of Medicine for boys, Al-Azhar University , Cairo, Egypt

Younis Gaber Younes Ahmed

Department of Obstetrics and Gynecology, Faculty of Medicine for boys, Al-Azhar University , Cairo, Egypt,
dr.younis.younisg@gmail.com

Follow this and additional works at: <https://aimj.researchcommons.org/journal>



Part of the [Medical Sciences Commons](#), [Obstetrics and Gynecology Commons](#), and the [Surgery Commons](#)

How to Cite This Article

Gebreil, Mohammed Mohammed; El-Sadek, Ahmed Mohammed; and Ahmed, Younis Gaber Younes (2023) "Manipal Cervical Scoring System by Transvaginal Ultrasound Versus Bishop Score in Predicting Successful Labour Induction," *Al-Azhar International Medical Journal*: Vol. 4: Iss. 6, Article 23.
DOI: <https://doi.org/10.58675/2682-339X.1873>

This Original Article is brought to you for free and open access by Al-Azhar International Medical Journal. It has been accepted for inclusion in Al-Azhar International Medical Journal by an authorized editor of Al-Azhar International Medical Journal. For more information, please contact dryasserhelmy@gmail.com.

Manipal Cervical Scoring System by Transvaginal Ultrasound Versus Bishop Score in Predicting Successful Labour Induction

Mohammed Mohammed Gebreil, Ahmed Mohammed El-Sadek,
Younis Gaber Younis Ahmed*

Department of Obstetrics and Gynecology, Faculty of Medicine for Boys, Al-Azhar University, Cairo, Egypt

Abstract

Background: The best time to induce labor is when the cervix is “ripe” at that particular moment. It is the mechanism through which the cervix changes in consistency before the beginning of labor.

Aim and objectives: To analyze cervical length and compare the Manipal Cervical Scoring System's accuracy to the Bishop score in order to choose the most effective way to induce labor.

Subjects and methods: A hundred women were included in this prospective trial who were being evaluated for labor induction. The investigation was carried out at AL-HUSSEIN University Hospital's obstetrics and gynecology department.

Result: While Bishop score and Manipal cervical score were substantially greater in success induction patients compared to failed induction, cervical length was considerably shorter in efficient induction patients. Manipal cervical score >5 and Bishop score >4 were significant in predicating success induction of labor with sensitivity of 90.7%, 94.3% and specificity of 91.5%, 78.8%, respectively.

Conclusion: Bishop score, cervical length, and posterior cervical angle obtained during ultrasonography were substantially linked with effective induction.

Keywords: Bishop's Score, Bimanual examination, Nulliparity, Manipal cervical score, Cervical length

1. Introduction

The best time to induce labor is when the cervix is “ripe” at that particular moment. It is the mechanism through which the cervix changes in consistency before the beginning of labor.¹

Over the last 20 years, the number of labor inductions has progressively climbed, with rates in several countries currently exceeding 20% of all deliveries. Nearly 20% of inductions result in cesarean sections.²

The two most frequently utilized methods for cervical examination before labor induction are the Bishop Score and transvaginal ultrasound (TVS).³

The bishop's score is taken into account while determining whether or not to initiate labor and if a lady is ready for a productive vaginal birth. Station,

dilatation, effacement, location, and uniformity make up Bishop's Score. Station describes the descent of the fetus into the pelvis.⁴

From 0 to 10, dilatation is expressed in centimeters. A thinned cervix results from effacement. When the cervix is 100% effaced, it completely softens out and is prepared for a normal delivery.⁵

Before 28 weeks of pregnancy, a TVS-measured cervical length below the 10th percentile (25 mm) is nearly invariably linked to a higher chance of premature labor starting. Cervical changes during pregnancy have been made clear through ultrasound imaging of the cervix.⁶

Even when the external os is closed, TVS is a tried-and-true technique for evaluating the full length and numerous aspects of the internal os.⁷

Accepted 11 December 2022.
Available online 5 September 2023

* Corresponding author at: Department of Obstetrics and Gynecology, Faculty of Medicine for Boys, Al-Azhar University, Obstetrics and Gynecology at Edfu General Hospital, Cairo, Egypt.
E-mail address: dr.younis.younis@gmail.com (Y.G.Y. Ahmed).

<https://doi.org/10.58675/2682-339X.1873>

2682-339X/© 2023 The author. Published by Al-Azhar University, Faculty of Medicine. This is an open access article under the CC BY-SA 4.0 license (<https://creativecommons.org/licenses/by-sa/4.0/>).

The utilization of intrapartum ultrasound to measure head-perineum distance and head-symphysis distance, cervical dilatation, the position of the fetus's occiput, and the angle of progression can be a suitable alternative to frequent pelvic examinations, which carry a higher risk of spreading infectious disease.⁸

The objective was to evaluate the Manipal Cervical Scoring System's and Bishop Score's accuracy in assessing cervical length in order to discover the most effective way to induce labor.

2. Patients and methods

This prospective research was done at the AL-HUSSIEN University Hospital's obstetrics and gynecology department on 100 women who were being evaluated for labor induction.

Inclusion Criteria for study group: Women older than 37 weeks who are induced into labor with a live fetus in the cephalic presentation and intact membranes.

Exclusion Criteria for groups: Women who have undergone uterine surgery or ruptured cesarean deliveries, had antepartum hemorrhages, abnormal fetal behavior or presentation, Category II or III non-stress tests, structural abnormalities of the pelvis, macrosomia or fetus growth restriction, active genital Herpes Simplex, or invasive cervical cancer.

Methods: Before allowing research participants to take part, informed permission was sought from them. Patients were made to endure:

thorough history-taking: personal background, such as Address, Name, Age, and Marital Status, menstrual history: such as Menarche age, irregular menstruation, dysmenorrhea, associated symptoms, gestation age, and contact, current history of chronic illnesses and medications, historical history of hypertension and diabetes, history of drug allergies and surgical procedures, interference from laparoscopy, and laser therapy of hirsutism.

2.1. Examination

General examination: Vital signs (Blood pressure, pulse rate, temperature, and respiratory rate) and signs of (Pallor, jaundice, cyanosis, and enlarged lymph nodes).

clinical examination of the abdomen and surrounding areas: **Abdominal inspection:** Examine the patient's belly for striae, abdominal distension, or scars that might indicate gastrointestinal disease. **Abdominal palpation:** Lightly palpate all nine areas of the abdomen, examining the clinical indications that might indicate gastrointestinal pathology:

Guarding, rebounding, being delicate, or Masses. **Abdominal percussion and abdominal auscultation,** **Vulvar Examination:** Simple development evaluation, symmetry, hair quality and growth pattern, skin anomalies, swelling, ulcerations, growths such external genital warts (EGW) or cancer, rashes, lacerations, piercings, bruises, and discharge are all part of the basic examination of the vulvar region. **Vaginal Examination:** To see the hymenal ring, gently split the labia minora. It is simpler to insert a speculum when the vaginal walls are relaxed, particularly posteriorly, thanks to light pressure on the bulbocavernosus muscle. It is possible to assess if a cystocele, urethrocele, cystourethrocele, or rectocele is present, whether or not there is a vaginal prolapse or vaginal wall defect. Checking the urethral aperture, the Skene glands, any discharge, discomfort, or erythema, or any eversion or prolapse of the meatus are all included in the urethral check.

Bimanual Examination: The bimanual examination's goals are to assess the uterus' size, structure, and existence or lack of adnexal masses.

Procedure: After requesting the patient to urinate, a transvaginal ultrasonography (TVS) scan was performed. To prevent excessive pressure, a Logic P5 transvaginal probe was softly inserted into the vagina right below the cervix. In order to determine the Manipal cervical score, a sagittal picture of the cervix was taken, and the image was expanded by zooming until the cervix took up at least two-thirds of the image⁷: Callipers were placed on the internal and external cervical os to determine the cervical length. The location of the cervix, the existence or absence of funnelling, the breadth and length of the funnel, if existent, at the internal os, and the distance from the presenting portion to the external os. In order to determine cervical consistency, effacement, dilatation, position, and station of the presenting component for the purpose of calculating the BS using the Burnett modification, a digital vaginal evaluation was done after the TVS assessment. IOL was conducted in accordance with the hospital's established protocol: An amniotomy was performed in conjunction with an oxytocin infusion (low dosage regimen commencing at 1 mU/min, increasing by 1–2 mU at 30 min intervals) for the women who had healthy cervixes (Bishop Score >6).

Dinoprostone 3 mg vaginal tablet (dinoglan-din E2VR) was inserted into the posterior vaginal fornix for women having a Bishop Score of 6. After 6 h, the cervical dilation and the existence of uterine contractions were examined again to determine if a second dosage of dinoprostone was necessary (maximum of two doses).

An amniotomy was performed when the cervix was 3 cm dilated, the present section was low ("0" station), and oxytocin drip was started after 6 h of dinoprostone. It was done to see how the labor was going. It was noted how long it took to reach the active phase of labor, when the baby was delivered, and how it was delivered. Failing to get normal (3 min or more apart) contractions and recorded cervical change with oxytocin treatment at 24 h following artificial membrane rupture was deemed a failed induction. The first-stage arrest was described as no changes in cervical dilatation for 4 h despite sufficient uterine contractions or for 6 h following the active portion of the first stage of labor if there were no sufficient contractions (the membrane has ruptured and the cervix is at least 6 cm dilated). If the descent or rotation failed for ≥ 4 h in a case of nulliparity with an epidural analgesia ≥ 3 h without an epidural analgesia, or ≥ 3 h in a case of multiparity with an epidural analgesia, or ≥ 2 h without an epidural analgesia, the second-stage arrest was recorded.

The Bishop scoring system: The Bishop scoring system has a zero point minimum and a 13 point maximum, and it is dependent on a patient's digital cervical exam. The fetal station, cervical dilation, position, effacement, integrity of the cervix, and effacement are all factors in the grading system. Scores range from 0 to 3 for cervical dilatation, effacement, and station, and from 0 to 2 for cervical position.

A Bishop score of 8 or above is seen as favorable for induction, meaning that there is a comparable likelihood of vaginal birth during induction as there is during spontaneous labor. If an induction is recommended and a score of 6 or less is obtained, cervical ripening drugs may be used.

A scoring system that only considers dilatation, effacement, and the station is the most typical variation to the Bishop score (each scored 0 to 3 points). A score of at least 5 is deemed favorable in this condensed alteration.

Ethical Consideration: The AL-HUSSEIN University Hospital's Institutional Review Board has requested permission of the study plan. Each individual engaging in the research has provided informed verbal permission.

Data management and Statistical Analysis: Microsoft Excel software was utilized to code, input, and analyze historical data, basic clinical examinations, laboratory tests, and outcome measurements. The Statistical Package for the Social Sciences (SPSS version 20.0) program was then utilized to import the data and perform analysis. The following tests were employed to evaluate variations for

significance; correlation by Pearson's correlation or Spearman's. Depending on the kind of data, qualitative data is represented as percentage and number, while quantitative maintains group representation by mean \pm SD. *P* value was chosen at <0.001 for very significant findings and <0.05 for outcomes that were significant.

3. Results

Table 1.

This table shows that mean age 29.11 ± 4.12 years with mean BMI of 28.61 kg/m^2 36% of the patients were primigravida and 64% were multiparous Table 2.

That mean cervical length was 20.13 ± 1.5 mm and mean Manipal cervical score was 6.2 ± 1.92 Table 3.

This table shows that mean bishop score was 5.27 ± 1.83 Table 4.

That mean Induction-to-delivery interval was 6.72 ± 18.34 h. Most of the patients underwent vaginal delivery (86%), while only 14% of the patients underwent CS Table 5.

This table shows that Success and failure induction patients varied considerably with relation to parity Table 6.

Regarding protracted pregnancy and GDM, the study groups varied substantially from one another Table 7.

While Bishop score and Manipal cervical score were considerably higher in successful induction patients compared to unsuccessful induction, cervical length was substantially smaller in successful induction patients Fig. 1.

Manipal cervical score >5 and Bishop score >4 were significant in predicating effective labor induction with sensitivity of 90.7%, 94.3% and specificity of 91.5%, 78.8%, respectively.

4. Discussion

As the supravaginal region makes up approximately 50% of the cervical length (CL) and cannot be measured digitally, transvaginal ultra-sonographic

Table 1. Demographic and clinical parameters of the examined individuals.

| | Patients (n = 100) |
|-------------------------|--------------------|
| Age (years) | |
| Mean \pm SD | 29.11 ± 4.12 |
| BMI (kg/m^2) | |
| Mean \pm SD | 28.61 ± 4.35 |
| GA (weeks) | |
| Mean \pm SD | 38.25 ± 1.23 |
| Parity | |
| Primigravida | 36 (36%) |
| Multiparous | 64 (64%) |

Table 2. Transvaginal ultrasound measurements of the studied patients.

| | Patients (n = 100) |
|---|--------------------|
| Cervical length (mm) | |
| Mean ± SD | 20.13 ± 1.5 |
| Funneling, n (%) | 85 (85%) |
| Cervix status | |
| Curved | 17 (17%) |
| Straight | 83 (83%) |
| Distance from presenting portion to external os (cm) | |
| Mean ± SD | 3.26 ± 1.37 |
| Manipal cervical score | 6.2 ± 1.92 |
| Mean ± SD | 3–10 |

Table 3. Bishop score distribution of the studied patients.

| | Patients (n = 100) |
|-------------------------------|--------------------|
| Dilation of the cervix | |
| Mean ± SD | 2.19 ± 0.741 |
| Cervical length | |
| Mean ± SD | 20.13 ± 1.5 |
| Cervix position | |
| Posterior | 73 (73%) |
| Mid | 7 (7%) |
| Anterior | 20 (20%) |
| Consistency of cervix | |
| Firm | 38 (38%) |
| Soft | 10 (10%) |
| Soft and stretchable | 52 (52%) |
| Station of the head | |
| Mean ± SD | −1.48 ± 0.493 |
| Bishop score | |
| Mean ± SD | 5.78 ± 1.85 |
| Range | 3–10 |

measures may provide a more precise evaluation of the cervix than digital tests. Furthermore, effacement is subjective, varies widely across examiners, and is hard to assess in the closed cervix.⁹

The aim is to establish the most effective technique for a successful labor induction; the Manipal Cervical Scoring System's accuracy will be compared to the bishop score.

This study showed that mean age 29.11 ± 4.12 years with mean BMI of 28.61 kg/m^2 36% of the patients were primigravida and 64% were multiparous.

Eid et al.¹⁰ 50 women were enrolled in a prospective trial that entailed labor induction. Bishop score evaluation and ultrasound measurements of

Table 4. Delivery characteristics of the studied patients.

| | Patients (n = 100) |
|---|--------------------|
| Induction-to-delivery interval (hrs) | |
| Mean ± SD | 6.72 ± 18.34 |
| Mode of delivery | |
| VD | 86 (86%) |
| CS | 14 (14%) |

Table 5. Demographic characteristics and clinical data according to induction outcome.

| | Success (n = 78) | Failure (n = 22) | t | P |
|-------------------------------|------------------|------------------|-------|-------|
| Age (years) | | | | |
| Mean ± SD | 27.98 ± 3.15 | 29.38 ± 5.27 | 1.56 | 0.121 |
| BMI (kg/m²) | | | | |
| Mean ± SD | 28.28 ± 4.63 | 27.64 ± 3.86 | 0.592 | 0.555 |
| Parity | | | | |
| Primigravida | 17 (21.8%) | 19 (86.4%) | 31 | 0.000 |
| Multiparous | 61 (78.2%) | 3 (13.6%) | | |

Table 6. Indications distribution according to induction outcome among the studied patients.

| | Success (n = 78) | Failure (n = 22) | χ^2 | P |
|---------------------------|------------------|------------------|----------|-------|
| Prolonged pregnancy | 34 (43.6%) | 4 (18.2%) | 4.7 | 0.030 |
| ROM | 21 (26.9%) | 2 (9.1%) | 3.1 | 0.079 |
| PIH | 12 (15.4%) | 3 (13.6%) | 0.041 | 0.839 |
| GDM | 2 (2.6%) | 8 (36.4%) | 22 | 0.000 |
| Small for gestational age | 3 (3.8%) | 2 (9.1%) | 0.994 | 0.319 |
| Large for gestational age | 2 (2.6%) | 1 (4.5%) | 0.232 | 0.630 |
| Fetal distress | 4 (5.1%) | 2 (9.1%) | 0.478 | 0.489 |

the cervical length, posterior cervical angle, and cervical funnelling were performed before to induction. The study group's age (n = 50) varied from 17 to 41 years old, with a median of 24.3 ± 5.7 . There were 30 multiparas and 20 primigravidas. The average BMI was $26.0 \pm 4.2 \text{ kg/m}^2$, with a range of 22–38 kg/m^2 .

Agrawal et al.¹¹ showed that the research population's median age was 25.87 years (SD: 4.35), and the gestation period varied from 37 to 41 weeks. 53% of the cases were between 40 and 41 weeks gestation. A greater percentage of cases (77%) were multigravida.

Table 7. Transvaginal ultrasound measurement and Bishop score among the patients according to induction outcome.

| | Success (n = 78) | Failure (n = 22) | t/ χ^2 | P |
|---|------------------|------------------|-------------|-------|
| Bishop score | | | | |
| Mean ± SD | 4.57 ± 1.45 | 3.21 ± 1.18 | 4.72 | 0.000 |
| Cervical length (mm) | | | | |
| Mean ± SD | 23.51 ± 2.84 | 26.34 ± 2.58 | 3.89 | 0.000 |
| Funneling | 75 (96.2%) | 10 (45.5%) | 42 | 0.000 |
| Cervix position | | | | |
| Curved | 4 (5.1%) | 13 (59.1%) | 35 | 0.000 |
| Straight | 74 (94.9%) | 9 (40.9%) | | |
| Distance from presenting portion to external os (cm) | | | | |
| Mean ± SD | 2.51 ± 1.13 | 3.47 ± 1.52 | 3.48 | 0.001 |
| Manipal cervical score | | | | |
| Mean ± SD | 4.83 ± 1.57 | 3.16 ± 1.05 | 4.94 | 0.000 |

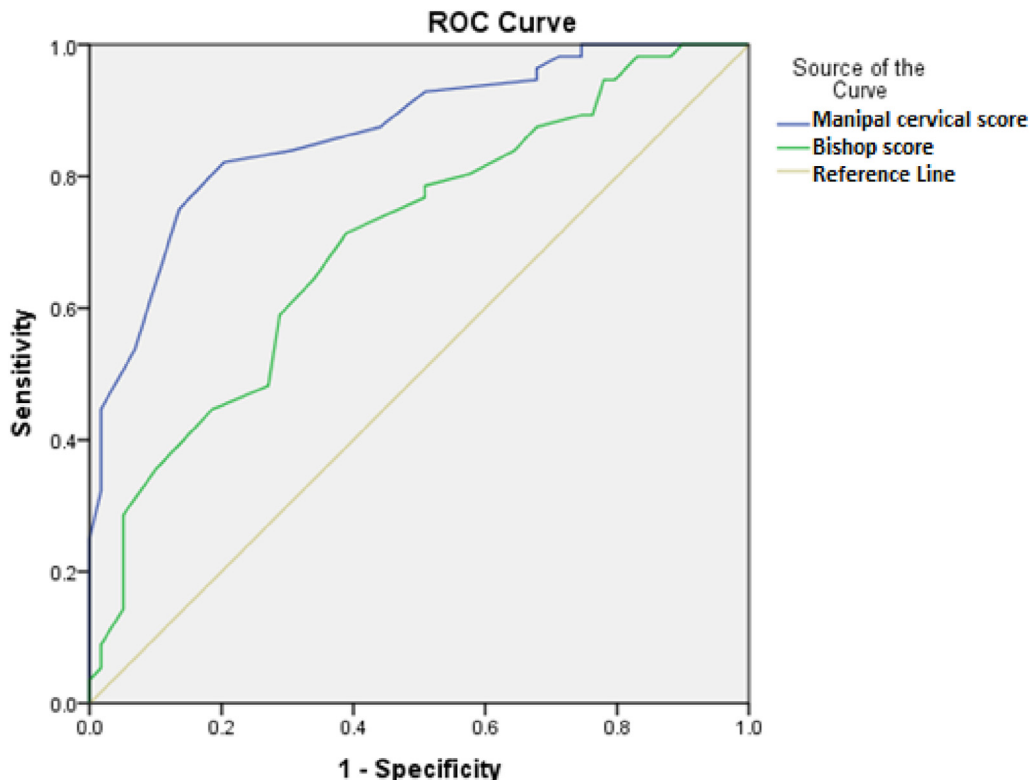


Fig. 1. ROCcurve for Bishop score and Manipal cervical score as indicators of a successful labor induction.

The most frequent sign was prolonged pregnancy (38%) followed by ROM (23%).

Eid *et al.*¹⁰ showed that in 19 women (38%), the due date had past, membranes had ruptured in 18 (36%), pregnancy-related hypertension had occurred in 11 (22%) women, and pregnancy diabetes had occurred in 2 (4%).

Agrawal *et al.*¹¹ showed that Postdatism (67%) was the most prevalent rationale for induction in their research; however, there are other indications as well.

That means cervical length was 20.13 ± 1.5 mm and means Manipal cervical score was 6.2 ± 1.92 . Mean bishop score was 5.27 ± 1.83 .

Agrawal *et al.*¹¹ showed that 63 instances had a Modified Bishop's Score of >4 , and 37 cases had a preinduction Score of ≤ 4 . 76 instances had a preinduction TVS Score of >4 on examination of the TVS cervical scoring system, whereas 24 cases had a TVS Score of ≤ 4 . 5 distinct factors were used to construct the TVS score, as explained in their paper.

Mohamed *et al.*¹² showed that cervical length more than 3 cm and funnel length 0.5 cm were related to unsuccessful induction in terms of the Manipal Score components. An effective induction was connected with a straight cervical posture, a

head-to-external-os distance of 2–3 cm, and a funnel width of 0.5 cm.

That mean Induction-to-delivery interval was 6.72 ± 18.34 h. Most of the patients underwent vaginal delivery (86%), while only 14% of the patients underwent CS.

Bajpai *et al.*⁷ Vaginal birth was described as the completion of the event and was thus officially regarded as a risk; therefore a parameter with a greater hazard ratio (HR) essentially implied having a successful vaginal birth. Bishop Score ≥ 4 (1.32, $P = 0.23$, N.S. - not substantial) and Score ≥ 4 (6.96, $P < 0.001$) for the cervix were substantially linked to greater hazard functions, suggesting quicker progression to vaginal birth.

This research revealed a substantial variation in parity between individuals who had successful induction and those who underwent unsuccessful induction.

In a study by Bajpai *et al.*⁷ 131 individuals who had labor induction at term with healthy membranes and a live fetus had transvaginal ultrasounds done. Pervaginal check was used to determine the Bishop Score, which was compared to the preinduction TVS cervical Score (cervical length, funneling, cervix location, and separation of the presenting section from the external os are the key

factors). A larger proportion of unsuccessful inductions observed to be strongly correlated with older maternal age (>30 years) and greater BMI (30). Despite the fact that primigravida had higher failed induction rates (16% vs. 6.3%), the variation was not statistically substantial.

Since 2006, studies have concentrated on combining a number of different characteristics, such as the history, specifics of the clinical assessment, and ultrasound results. Dietz *et al.*,¹³ did prospective observational research on 202 individuals with gestations ranging from 36 to 40 weeks at the University of Sydney in Australia. They evaluated the mother's age, parity, history of surgical delivery, Bishop Score, and translabial ultrasound results for the length of the cervix, the position of the bladder during Valsalva, and the involvement of the fetus' head. According to a multivariate logistic regression study, the greatest predictor of a successful vaginal birth was a model that included the mother's age, BMI, prior surgical deliveries, bladder position, head engagement, Bishop Score, and sonographic cervical length.

Regarding protracted pregnancy and GDM, the study groups varied substantially from one another.

In Bajpai *et al.*⁷ There were no side effects from intracervical PGE2 instillation, such as uterine hyperstimulation, amniotic fluid embolism, etc. Three instances of unexpected vaginal hemorrhage occurred, and they had cesarean sections right away. In their investigation, there was no maternal or perinatal fatality.

This research found that although Bishop and Manipal cervical scores were substantially greater in successful induction patients than in unsuccessful induction, cervical length was considerably shorter in successful induction patients than in unsuccessful induction.

Before, it was believed that the Bishop Score had certain benefits over ultrasound evaluation, such as the ability to determine factors like cervical consistency and position exclusively via a pervaginal exam. The outcomes of Bajpai *et al.*⁷ revealed that Cervical length, effacement, and station of the head are additional Bishop Score variables that can be assessed more precisely and objectively. These variables, along with others like cervical canal configuration and funnel length, can be used to build an ultrasound scoring system that can outperform digital scoring.

R Gabriel *et al.*,¹⁴ from France made similar findings and found that in their sample of 179 patients, women with poor Bishop Scores and cervical

lengths of less than 26 mm had lower cesarean rates and shorter labors.

Rane *et al.*,¹⁵ have also stated that, in their series of 382 extended pregnancies, cervical length estimate is superior to Bishop Score.

Eid *et al.*¹⁰ showed that In instances of failed induction, the cervical length was substantially longer and the posterior cervical angle was considerably higher ($P < 0.001$ for both). In relation to induction failure, both the Bishop score and the Kepansereel score were considerably lower ($P < 0.001$ for both). The proportion of funneling and induction failure did not substantially correlate ($P = 0.163$).

Bastani *et al.*¹⁶ agreed with Eid *et al.*¹⁰ outcomes as they discovered that TVS measurements of cervical length had the possibility of replacing the conventional Bishop score.

Rane *et al.*,¹⁵ also agreeing with Eid *et al.*¹⁰ as within 24 h of induction, they discovered that cervical length and parity are reliable indicators of successful vaginal birth.

Bishop score >4 and Manipal cervical score >5 were substantial in predicting effective induction of labor, with sensitivity and specificity of 90.7%, 94.3%, and 91.5%, 78.8%, respectively.

Bajpai *et al.*⁷ reflected diagnostic factors such as sensitivity, specificity, and others as determined by ROC analysis. For the Bishop Score and Ultrasound Score, they have condensed a large variety of cut points to a small number of cut-off values (three each), which have shown sufficient sensitivity and specificity. The link between the sensitivity and specificity 6 values in ROC analysis is generally known to be reciprocal, and the ideal cutoff value would be one that results in the highest possible sensitivity and specificity.

Eid *et al.*¹⁰ showed that when predicting effective induction at a cut-off of a Bishop Score of 5, the sensitivity was 56.0 percent, specificity was 98.4 percent, PPV was 86.7 percent, and the NPV was 47.11 percent. Utilizing a Keepanasseril score with a cut-off of 6, these scores were 61.2%, 91.3%, 88.6%, and 59.4 percent, respectively.

Agrawal *et al.*¹¹ showed that in their research, ROC curve correlated Bishop score with TVS score. The AUC for the TVS score was 0.909 and the AUC for the Bishop score is 0.791 ($P 0.05$).

A lot of research has been done on the transvaginal CL measure as a predictor of induction success. In the research by Kanwar *et al.*¹⁷ Transvaginal CL measurements demonstrated sensitivity and specificity of 57.38% and 100% compared to 34.43% and 93.88% for BS in predicting the effectiveness of induction.

4.1. Conclusion

This study found that Bishop Score, ultrasonographic cervical length, and posterior cervical tilt were substantially linked with effective induction. We argue that Keeganasseril Score, a more objective scoring system, may provide a better forecast of the result of labor.

Disclosure

The authors have no financial interest to declare in relation to the content of this article.

Authorship

All authors have a substantial contribution to the article.

Sources of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflicts of interest

The authors declared that there were NO conflicts of Interest.

References

1. Ali J, Hebbar S. Ultrasound assessment of foetal head–perineum distance prior to induction of labour as a predictor of successful vaginal delivery. *J Obstet Gynaecol India*. 2019;69:129–135.
2. Kehila M, Abouda HS, Sahbi K, Cheour H, Chanoufi MB. Ultrasound cervical length measurement in prediction of labor induction outcome. *J Neonatal Perinat Med*. 2016;9:127–131.
3. Ahmadi S, Rahmani E, Motamed N, Ghorbanpoor M, Maneshi H. Bishop score predictive value in success of induced labor process among full term pregnant women referred to Persian Gulf Martyrs' Hospital in Bushehr in 2013. *Int Sportmed J (ISMJ)*. 2016;19:620–628.
4. Wajid R, Hafeez S, Batool A. The accuracy of transvaginal ultrasound and bishop score to predict the successful induction of labor in primigravidas at term. *Ann King Edward Med Univ*. 2018;24:762–767.
5. Manso SD, Colomo CA, Tejedor JG, et al. Ultrasound examination of the cervix for predicting labor induction success: failed validation in a routine clinical setting of a successful previous pilot study. *Arch Gynecol Obstet*. 2020;301:75–84.
6. Belooesky R, Khatib N, Ganem N, et al. Cervical length measured before delivery and the success rate of vaginal birth after cesarean (VBAC). *J Matern Fetal Neonatal Med*. 2018;31:464–468.
7. Bajpai N, Bhakta R, Kumar P, Rai L, Hebbar S. Manipal cervical scoring system by transvaginal ultrasound in predicting successful labour induction. *J Clin Diagn Res: J Clin Diagn Res*. 2015;9:QC04.
8. Khazardoost N, Ghotbizadeh F, Latifi S, et al. The predictive value of trans-vaginal ultrasound measurements compared with bishop score in determining successful induction of labor. *J Obstet Gynecol Cancer Res (JOGCR)*. 2016;1, 0–0.
9. Khajotia SM, Khichar M, Gupta C. Study of pre induction transvaginal ultra-sonographic cervical length and its comparison with bishop score in predicting successful labor induction. *Int J Reprod Contraception Obstet Gynecol*. 2021;10:2335–2341.
10. Eid M, Abdallah A, ElHalwagy A. Value of transvaginal ultrasonography versus Bishop Score in predicting successful induction of labor. *Evid Based Women's Health J*. 2017;7:125–130.
11. Agrawal A, Tripathi PS, Bhandari G, Kheti P, Madhpuriya G, Rathore R. Comparative study of TVS cervical score and Bishop score in prediction of successful labour induction. *Egypt J Radiol Nuclear Med*. 2022;53:1–7.
12. Mohamed El Bishry G, Serag Allam I, Rasheedy R, Mahmoud A. Accuracy of the manipal cervical scoring system for predicting successful induction of labour. *J Obstet Gynaecol (Lahore)*. 2019;III:1–8. <https://doi.org/10.1080/01443615.2019.157873>.
13. Dietz HP, Lanzarone V, Simpson JM. Predicting operative delivery. *Ultrasound Obstet Gynecol*. 2006;27:409–415.
14. Gabriel R, Darnaud T, Gonzales N, Levmarie F, Quereux C. Transvaginal ultrasonography of the uterine cervix before induction of labour. *Gynecol Obstet Fertil*. 2001;29:919–923.
15. Rane SM, Guirgis RR, Higgins B, Nicolaidis KH. Models for the prediction of successful induction of labour based on pre-induction sonographic measurement of cervical length. *J Matern Fetal Neonatal Med*. 2005;17:315–322.
16. Bastani P, Hamdi A, Pourmousa, Ghatrehsamani. Transvaginal ultrasonography compared with Bishop Score for predicting cesarean section after induction of labor. *Int J Wom Health*. 2011;3:277.
17. Kanwar SN, Reena P, Priya BK. A comparative study of trans vaginal sonography and modified Bishop's Score for cervical assessment before induction of labour. *Scholars J Appl Med Sci*. 2015;3:2284–2288.