

## Comparing Cervical Length Measured by Transvaginal Ultrasound with Bishop Score for Predicting Successful Labor Induction

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### Abstract

**Background:** Labour induction is one of the most common obstetric interventions. The baby should be born naturally, as it would be the optimum situation. We have a wide range of tools at our disposal that can help us successfully induce labour. The current study sought to ascertain whether transvaginal ultrasound, which assesses cervical length, might predict labour induction outcomes more accurately than clinical evaluation as determined by the Bishop score.

**Methods:** A total of 100 eligible women participated and underwent cervical assessment using transvaginal ultrasound and Bishop score. Labor induction followed the hospital's standard protocol, including the use of Dinoprostone gel. Up to three doses of the gel were administered intracervically at 6-hour intervals if necessary. The progress of labor, time from induction to delivery, and mode of delivery were recorded.

**Results:** This study found that approximately 65% of primi singleton pregnancies undergoing induction of labor with dinoprostone gel resulted in successful vaginal delivery within 24 hours. The transvaginal cervical length showed better predictive value than the Bishop score for delivery within 24 hours ( $p=0.001$ ). While the Bishop score had higher sensitivity, the transvaginal cervical length had higher specificity and positive predictive value. Both cervical length and Bishop score were significant predictors of successful induction of labor ( $p=0.01$ ).

**Conclusion:** According to the study, there is a substantial correlation between both transvaginal sonography measures and the time from induction until delivery. Within 24 hours of induction, transvaginal cervical length assessment offers the highest sensitivity for predicting vaginal births.

**Keywords:** Labour Induction, Bishop Score, Transvaginal Ultrasound Cervical Length.

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### Introduction

To achieve a vaginal delivery, induction of labour refers to the artificial initiation of labour before the start of spontaneous labour. The use of labour induction is advised when the advantages of a prompt

birth outweigh the possible hazards of a prolonged pregnancy for either the mother or the baby. [1-3]

It is generally acknowledged that INDUCTION OF LABOUR is indicated

when it is believed that the results for the mother, the foetus, or both are better than with expectant management, which is waiting for the spontaneous commencement of labour.[4-6] It is anticipated that this procedure will lead to a vaginal delivery. It is important to induce labour because of several underlying maternal and foetal problems. Membrane rupture without labour, gestational hypertension, oligohydramnios, a non-reassuring foetal state, post-term pregnancy, and a number of maternal medical problems, such as chronic hypertension and diabetes, are common reasons for inducing labour (ACOG 2013b). [7]

The Bishop score (BS), the most common and conventional approach for determining the preinduction favorability of the cervix, is used to determine whether an induced labour would result in a successful vaginal delivery. [8] Although the Bishop score continues to be the gold standard for cervical status, concerns have been raised about its subjectivity and interobserver variations. [9-11] Bishop score is a poor predictor and shouldn't be used to choose whether or not to induce labour, according to a number of studies.[12-13] A number of clinical and biochemical markers have been included in an effort to improve its ability to predict outcomes. [14-15]

Transvaginal cervical length measurements have been used largely to identify cervical abnormalities in women who are at risk for preterm delivery.[16] According to several research, TVS is less uncomfortable than computerised evaluation for bishop score. [17-18] This study was created to see if clinical evaluation using the bishop score could predict the outcome of labour induction better than transvaginal ultrasonography, which can measure the cervical length objectively.If so, TVS measurements of cervical length can be utilised as a supplement to the conventional Bishop

score and as yet another source of data for successful labour induction.

### Material and Methods

It was a prospective, hospital based, comparative study. After approval of ethics committee Primi gravida with gestational age ranging between 37-42 weeks with a single live fetus in vertex presentation who are admitted for labour induction enrolled in this study. Total 100 subjects were enrolled. Primigravida women with Gestational age between 37-42 weeks, singleton pregnancy, live fetus with vertex presentation, intact amniotic membranes, mild preeclampsia and Gestational hypertension, well controlled gestational diabetes included in this study. Patients who were multiparous, not given consent for study, malpresentation, antepartum hemorrhage, severe IUGR, allergic to prostaglandins, in active phase of labour, history of uterine surgery like myomectomy, presence of severe maternal or fetal compromise such as severe PIH, cardiac disease, uncontrolled diabetes, renal disease and other medical disorders were excluded from the study. Cervical assessment by both transvaginal ultrasound and Bishop score. Sonography was performed first using a GE VOLUSON 730 PRO ultrasound machine equipped with a 5-9 MHz transvaginal probe.

Measurement of cervical length was performed with the standard longitudinal view of the cervix while the patient's bladder is empty. Cervical length was measured by keeping the probe 3 cm away from the posterior fornix. The cervical length is defined as the length between the internal and external OS. Three consecutive cervical images were obtained and three separate readings of cervical length were taken. Then average cervical length was considered for the study. After transvaginal sonography the Bishop Score was determined by the digital examination by the resident physician responsible for

the induction. Physicians were masked to the cervical length measurement. Induction of labour was carried out according to the standard protocol.

Primary outcome measures assessed are

1. Induction to delivery interval < 24 hrs

**Secondary outcome measures assessed are:**

1. Induction Active phase interval < 12hrs
2. Number of vaginal deliveries <48 hrs

The difference in the two groups will be tested for Statistical significance using Parametric tests such as t-test, categorical variables tested by chi square test. P-value less than 0.05 considered to be statistically significant.

**Results**

**Table 1: Distribution of patients based on the total Bishop score**

		Frequency	Percent
<b>Bishop score- Total</b>	1	4	4.0%
	2	5	5.0%
	3	22	22.0%
	4	20	20.0%
	5	24	24.0%
	6	25	25.0%
	Total	100	100.0%

Total bishop score is 1 in 4% patients, 2 in 5% patients,3 in 22% patients,4 in 20%

**Table 2: Distribution of patients based on the Transvaginal Cervical Length**

		Frequency	Percent
<b>Transvaginal Cervical Length (cm)</b>	<=2.6	50	50.0%
	>2.6	50	50.0%
	Total	100	100.0%
<b>Mode of Delivery</b>	<b>Vaginal Delivery</b>	<b>Frequency</b>	<b>Percent</b>
	LSCS	69	69.0%
	Outlet Forceps Delivery	26	26.0%
<b>Total</b>		5	5.0%
		100	100.0%

Mode of delivery was vaginal delivery in 69% patients, caesarean section in 26%

**Table 3: Comparison of Bishop and Cervical Length for Mode of delivery**

	Mode of Delivery	N	Mean	SD	SE	P Value
<b>Bishop score</b>	Vaginal Delivery	69	1.7681	0.425	0.051	0.004
	LSCS	26	1.4615	0.508	0.099	
<b>Transvaginal Cervical Length (cm)</b>	Vaginal Delivery	69	2.616	0.458	0.055	0.001
	LSCS	26	3.285	0.563	0.110	

Mean bishop score in patients with vaginal delivery was  $1.76 \pm 0.42$  and in patients with LSCS was  $1.46 \pm 0.50$  with p value of 0.004. Mean transvaginal cervical length in patients with vaginal delivery was  $2.61 \pm 0.45$  and in patients with LSCS was  $3.28 \pm 0.56$  with p value of 0.001.

**Table 4: Comparison of Bishop score and transvaginal cervical length for induction to delivery interval**

	Induction to interval (hrs) delivery	N	Mean	SD	P Value
Bishop score- Total	<=24 hrs	65	4.54	1.288	0.24
	>24 hrs	4	3.75	1.500	
Transvaginal Cervical Length (cm)	<=24 hrs	65	2.555	0.390	0.001
	>24 hrs	4	3.600	0.365	

Mean bishop score in patients with induction to delivery interval of  $\leq 24$  hrs was  $4.54 \pm 1.28$  and in patients with  $> 24$  hrs was  $3.75 \pm 1.50$  with p value of 0.24. Mean transvaginal cervical length in patients with induction to delivery interval of  $\leq 24$  hrs was  $2.55 \pm 0.39$  and in patients with  $> 24$  hrs was  $3.60 \pm 0.36$  with p value of 0.001

### Discussion

In this study, dinoprostone (PGE<sub>2</sub>) gel was used to induce labour in primiparous singleton pregnancies. Within 24 hours following induction, the researchers discovered that about 65% of women had successful vaginal deliveries. Additionally, they discovered two elements linked to the time between induction and delivery: the cervical length evaluated by sonography and the preinduction Bishop score. A greater chance of vaginal birth was linked to higher Bishop scores and shorter cervical lengths. It has been discovered that transvaginal cervical length is a stronger indicator of effective labour induction within 24 hours.[19]

Women in the study had a mean age of 23.84 years; the majority of them were between the ages of 21 and 25. The gestational age varied, with a mean of 38.85 weeks based on ultrasound measures and 39.49 weeks based on the last menstrual period (LMP). The various factors that could warrant induction included, among others, those with gestational diabetes mellitus, a protracted pregnancy, diminished foetal movements, gestational hypertension, and borderline amniotic fluid index.[20]

69% of patients gave birth naturally through vaginal delivery, 26% received caesarean sections, and 5% used instruments. Foetal discomfort was the most frequent reason for a caesarean delivery, followed by labour not progressing, second-stage arrest, and thick meconium-stained alcohol. At 1 and 5 minutes, the APGAR scores were predominately 8 or higher, indicating good neonatal outcomes. At 1 minute, the scores were predominately 8 or higher.[21]

The Bishop score and transvaginal cervical length were examined by the researchers as indicators of labour induction success. The total scores ranged from 1 to 6, and the mean Bishop score was 4.30. Bishop ratings of 4 or 5 applied to the majority of cases. About half of the patients had transvaginal cervical lengths of 2.6 cm or less, with a mean transvaginal cervical length of 2.78 cm.[22]

The time from induction until delivery was also looked at in the study. The majority of patients had an induction to active phase interval of 12 hours or fewer, and about 65% of patients delivered within 24 hours of induction. Patients with various induction to delivery periods were compared for the Bishop score and transvaginal cervical length. The Bishop score and the interval did not significantly correlate, however there was a significant correlation between cervical length and the interval, suggesting that a shorter length was related with a shorter interval.[23]

The study's results agree with those from earlier studies. According to additional research, the Bishop score and cervical

length can both predict a successful induction and the time between the induction and delivery. The predictive power of these characteristics differs between studies, though. While other studies found no significant link, some identified a substantial correlation between cervical length and labour outcomes. Similar to this, many studies have found differing degrees of association between the Bishop score and induction success and the time between induction and delivery.[24]

In conclusion, our study shows that dinoprostone gel labour induction in primi singleton pregnancies can, in about 65% of cases, result in a successful vaginal delivery within 24 hours. Higher Bishop scores and lower cervical lengths indicate a higher likelihood of vaginal birth, which is correlated with the preinduction Bishop score and sonographically assessed cervical length. Contrary to the Bishop score, transvaginal cervical length was revealed to be a more accurate predictor of effective labour induction within 24 hours. The predictive power of these variables, however, may change between research.[25]

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