Research Article

A Comparative Study of Trans vaginal Sonography and Modified Bishop's Score for Cervical Assessment before Induction of Labour

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Abstract: This study is to compare and assess the affectivity of Trans vaginal ultrasonography and the Modified Bishop's Scoring System in predicting success of labor induction. In this hospital based analytic type of observational study, nulliparous term pregnant women admitted for induction of labor, undergo pelvic examination and cervical assessment by Modified Bishop's Scoring System and Trans vaginal sonography. Successful induction is vaginal delivery within 24 hrs from induction of labor. In our study cervical length by TVS is useful and independent predictor of successful labor induction. When CL < 3.5 cm, 88% (66/75) delivered vaginally and when CL > 3.5 cm only 11.42% (4/35) delivered vaginally. Concluding Trans vaginal sonographic measurement of cervical length as a better predictor of the likelihood of vaginal delivery within 24 hrs of induction when compared to Modified Bishop's Score.

Keywords: Induction of labor, Trans vaginal sonography, Modified Bishop's Score.

INTRODUCTION

Induction of labor is an intervention to artificially initiate uterine contractions leading to progressive dilatation and effacement of cervix and birth of baby [1].

Effacement is thinning out, like disappearing of cervix, where as externum is at the same place as os internum. Dilatation is opening of os externum cervicis from diameter 1 cm to 10 cm. [2].

Induction is performed in about 20% of pregnancies and postdatism is the leading indication for induction [3]. The goal of induction is to prevent postdated pregnancy with its associated increased perinatal morbidity, mortality and operative delivery rates [4]. Successful induction depends on cervical assessment or ripeness. Ripeness is defined as decrease in collagen concentration and increase in elastin / collagen ratio resulting in softening of the rigid structure of cervix [5].

The goal of labour induction is to achieve a successful vaginal delivery and reduce caesarean section.

Methods for predicting pre induction favorability of cervix are: -

Bishop's Score a subjective method to assess cervical status to predict outcome of labor [6]. But it has a high inter and intra observer variability. The Bishop's Score was developed in 1964 as a predictor of success of an elective induction.

The initial scoring system used 5 determinants: -

- Dilatation
- Effacement
- Station
- Position
- Consistency
- Each contributing a value of 0 to 2 or 3 points each (for a maximum score of 13).

In 1966, Burnett modified the scoring system (known as MBS) so that each valuable was assigned a maximum value of 2 points (for a maximum score of 12) [7]. A favorable pre-induction Bishop's Score of >6 is predictive of a successful vaginal delivery. Of the Bishop's Score criteria for predicting successful induction, the most important is, cervical dilatation, followed by length, station, position, with the least important being consistency.

Tran's vaginal ultrasonography has been known as an objective method to assess cervical length, because the supravaginal portion of cervix, usually comprising about 50% of cervical length, is very difficult to assess digitally. The assessment of effacement which starts at the internal os will be difficult to predict in a closed cervix. In contrast, sonographic measurement of cervical length is quantitative. Digital examination

underestimates cervical length by an average of 13.6 mm and is significantly shorter than ruler measurement.

The present study has been done to determine if Trans vaginal Ultrasound, with its ability to objectively measure the cervical length, could predict the outcome of induction better than clinical assessment obtained by the Modified Bishop's Score.

MATERIAL AND METHODS

This hospital based analytic type of observational study was conducted in the Department of Obstetrics and Gynaecology, SMS Medical College, Jaipur. After taking informed consent, 110 nulliparous women, below 35 years of age, with singleton live pregnancy, fulfilling inclusion criteria admitted for induction of labor were recruited for our study. A detailed history was taken and thorough general, abdominal and pelvic examination was done.

Digital cervical evaluation was performed at the initiation of induction of labor and score assigned as per Modified Bishop's Scoring System. Trans vaginal sonography was performed, equipment used the Aloka Ultrasound System equipped with 4-7 MHz Trans vaginal probe.

MODIFIED BISHOP'S SCORING SYSTEM

Cervical Feature	Pelvic Score			
	0	1	2	3
Dilatation of cervix	< 1 cm	1-2 cm	2-4 cm	>4 cm
Length of cervix	4 cm	2-4 cm	1-2 cm	<1 cm
Station of presenting part (related to ischial spine)	-3 cm	-2 cm	-1 cm	+1 cm, +2 cm
Consistency of Cervix	Firm	Average	Soft	-
Position of Cervix	Posterior	Mid Anterior	-	-
Test Score	0-5 unfavorable, 6-12 favorable			

The following parameters were noted: -
   a. Cervical length which is the length between internal and external cervical os.
   b. Presence or absence of funneling - Presence of funnel adds to the predictive accuracy of cervical length.

Induction of labour was done using PGE$_2$ Gel, Inj. oxytocin and Sweeping & Stretching. Successful induction was taken as vaginal delivery within 24 hrs from induction of labour. The data were collected and entered in the proforma. The parameters of TVS findings were compared with Modified Bishop's Score.

Sensitivity, specificity, PPV and NPV for the test were calculated.

RESULTS

Vaginally delivered cases were more compared to LSCS when CL < 3.5 cm with 86.67% v/s 13.33% respectively and when CL >3.5 cm LSCS cases were more with 91.42% v/s 8.57% respectively. While outcome of the cases were almost equal according to presence of funneling with 57.89% for vaginally delivered and 42.68% for cases delivered by LSCS, so presence of funneling was not a predictor of successful induction of labour (Table-1).

Table 1: Comparing TVS Findings with Mode of Delivery

S. No.	TVS Findings	Outcome							
		Vaginal Delivery (N=68)		LSCS (N=42)					
				Failed Induction (N=17)		Fetal Distress (N=25)		Total	
		No.	%	No.	%	No.	%	No.	%
1.	**Cervical Length**								
a)	< 3.5 cm (N = 75)	65	86.67	5	6.67	5	6.67	10	13.33
b)	> 3.5 cm (N = 35)	3	8.57	12	34.28	20	57.14	32	91.42
2.	**Funneling**								
a)	Present (N = 76)	44	57.89	14	18.40	18	23.68	32	42.08
b)	Absent (N = 34)	24	70.50	3	8.82	7	20.50	10	29.41

Cervical Length - $\chi^2 = 58.39$ d f. = 1   P < 0.001   HS
Funneling - $\chi^2 = 1.11$ d f. = 1   P < 0.001   HS

Out study demonstrated that 73.25% cases with Bishop's Score >6 delivered vaginally, while 26.74% underwent LSCS. On the contrary, 79.17% cases with Bishop's Score <6 had to undergo LSCS and only 20.83% delivered vaginally, P-value < 0.001 which is highly significant (Table-2).

Table-2: Comparing Bishop's Score with Mode of Delivery

S. No.	Bishop's Score	Outcome							
		Vaginal Delivery (N = 68)		LSCS (N = 42)					
				Failed Induction (N = 17)		Fetal Distress (N = 25)		Total	
		No.	%	No.	%	No.	%	No.	%
1.	> 6 (N = 86)	63	73.26	9	10.47	14	16.28	23	26.74
2.	< 6 (N = 24)	5	20.83	8	33.33	11	45.83	19	79.17

$\chi^2 = 19.682$ d.f. = 1   P < 0.001   HS

Comparing relationship of cervical length by TVS and Modified Bishop's Score on successful induction of labour, cervical length by TVS was found useful and independent predictor of successful labour induction. When cervical length <3.5 cm 88% (66/75) delivered vaginally and when cervical length >3.5 cm only 11.42% (4/35) delivered vaginally (Table-3).

Table-3: Comparing Relationship of Cervical Length by TVS and Modified Bishop's Score on Successful Induction of Labour

S. No.	Cervical Length	Bishop's Score	Outcome							
			Vaginal Delivery (N = 68)		LSCS (N = 42)					
					Failed Induction (N = 17)		Fetal Distress (N = 25)		Total	
			No.	%	No.	%	No.	%	No.	%
1.	<3.5 cm (N = 75)	a) <6 (N = 5)	5	6.67	0	0.00	0	0.00	0	0.00
		b) >6 (N = 70)	61	81.33	5	6.67	4	5.33	9	12.00
2.	>3.5 cm (N = 35)	a) <6 (N = 18)	0	0.00	11	31.42	7	20.00	18	51.43
		b) >6 (N = 17)	4	11.42	8	22.86	5	14.29	13	37.14

After logistic regression analysis between successful induction of labour and clinical and ultrasonographic independent variables such as maternal age at induction, Bishop's Score, the presence of funneling and cervical length, Only cervical length was found significantly independent predictor of successful induction of labour with odds ratio 0.018 and 0.001 significance. 95% confidence interval being 0.004 and 0.079 (Table-4).

Table-4: Relationship between Successful Labour Induction and Independent Variables Analyzed by Multiple Logistic Regressions

Variable	OR	Significance	95.0% Confidence Interval	
			Lower Bound	Upper Bound
Cervical Length	.018	0.001, Sig	0.004	0.079
Funneling	1.332	0.657, NS	0.376	4.721
Modified Bishop's Score	.307	0.142, NS	0.063	1.486
Gestational Age	1.050	0.613, NS	0.869	1.270

110 nulliparous women at term and on statistical analysis found that ultrasonographic parameters (CL and funneling) were better predictor of successful labour induction than clinical evaluation of cervix by Bishop's Score with cut off value of Bishop's Score being >6 and of cervical length being <3.5 cm. Sensitivity and specificity of cervical length being 57.35% and 100% respectively and of funneling being 55.74% and 100% respectively which was almost equal.

Sensitivity and specificity of Bishop's Score being 34.43% and 93.88% respectively (Table-5).

Table 5: Diagnostic Indices of the Bishop's Score and Ultrasonographic Parameters in the Prediction of Successful Labour Induction

Diagnostic Values	Bishop's Score (≥ 6)		Presence Funnelling		Cervical Length (≤ 3.5 cm)	
Sensitivity, % (n)	34.43	(21/61)	55.74	(34/61)	57.38	(35/61)
Specificity, % (n)	93.88	46/49)	100	(49/49)	100	(49/49)
PPV	87.5	(21/24)	100	(34/34)	100	(35/35)
NPV	53.49	(46/86)	64.47	(49/76)	65.33	(49/75)

DISCUSSION

Labour induction is one of the most common interventions in obstetric practice. Assessment of cervix has been used as a prediction of the successful vaginal delivery. Labour induction with a low cervical score has been associated with failure of induction, prolonged labour and a high rate of caesarean deliveries. Traditionally, the Bishop's Score has been used to assess the cervix.

So, this study was designed to investigate trans vaginal Ultrasonographic cervical measurement as a predictor of duration of labour and successful induction resulting in vaginal delivery and also compare the performance of ultrasonographic cervical measurement with that of the Modified Bishop's Score in predicting the outcome of labour induction.

In this study, cervical assessment by transvaginal ultrasonography, particularly the measurement of cervical length, showed a significant predictability for successful labour induction.

Cervical assessment before labour induction is essential to select candidates for elective induction and to determine the most appropriate method for inducing labour or ripening an unfavorable cervix. The Bishop's Score by digital cervical examination has been the most popularly used method for cervical assessment before induction of labour.

However, digital examination has limitations on objectivity and reliability. In addition, the predictive value of the Bishop's Score for successful labour induction has been reported to be poor, especially in cases with low scores.

Digital examination has limitation in assessing the change of the internal os when the external os is closed. The ability of ultrasonography to visualize the internal os can help differentiate the patients with different outcomes in labour induction.

In this study, the presence of funneling, which has been considered one of the important ultrasonographic parameters, was not found to have a significant relationship with either successful induction of labour or the duration of induction of labour. Near the end of pregnancy, the fetal head descends into the pelvic cavity and compresses the upper part of the cervix where the funneling process begins. As the fetal head descends, funneling may become compressed and may finally disappear, whereas cervical length becomes shortened. In addition, funneling may be obscured with mucus or cervical glands on ultrasonograpy. On the basis of this mechanism our result suggests that the funneling would be a less reliable parameter than cervical length in term or post-term pregnancy.

So, in the setting where trans vaginal sonographic measurement of cervical length can be achieved easily, correctly and with minimal discomfort to the patient, it provides useful prediction of the likelihood of vaginal delivery within 24 hrs of induction and of induction to delivery interval.

CONCLUSION

Our data suggest that the measurement of cervical length by trans vaginal ultrasonography provides a better prediction of the likelihood of vaginal delivery within 24 hrs of induction. In addition, ultrasonographic cervical assessment has been known as a reproducible, objective and quantitative method and can be performed easily in the setting where the appropriate equipment and expertise are available.

Therefore, more liberal application of ultrasonography for pre-induction cervical assessment in term pregnancy would enable obstetricians to predict the outcome of labour induction and to select a safer and more efficient policy of induction.

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