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Original Research Article

## A study of preinduction transvaginal ultrasonographic cervical length and its comparison with bishop score in predicting successful labour

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### ABSTRACT

**Background:** Significant number of induced pregnancies land in caesarean delivery. Cervical assessment is integral to successful outcome of induction of labour. Objective of this study was to study preinduction transvaginal ultrasonographic cervical length and to compare it with Bishop Score in predicting successful labour.

**Methods:** This prospective study was conducted at the department of obstetrics and gynaecology, MMIMSR, Mullana, Ambala on 150 patients. A total of 150 women were studied from January 2015 to June 2016 after taking an informed consent. The sociodemographic particulars were recorded, detailed history was taken and examination performed. Transvaginal ultrasound was done to assess cervical length after evacuation of bladder. Bishop score was then determined by separate observer. The occurrence of vaginal delivery was considered as primary outcome. All statistics collected were entered in statistical software SPSS-15. ROC curves were constructed for both Bishop Score and TVS.

**Results:** The mean gestational age was 38 week 6 days, majority 134 (89.3%) being less than 40 weeks of gestation. The ROC curve for Bishop Score demonstrated better predictability compared to cervical length by TVS. Optimized cut off for Bishop score in addition to TVS was determined by ROC curve to predict successful vaginal delivery, it was  $\geq 6$  for Bishop score (sensitivity 90.7%, specificity 68.6%, positive predictive value 91.5% and negative predictive value 66.7%) and  $\leq 3.0$  cm for cervical length on TVS (sensitivity 74.6%, specificity 51.6%, positive predictive value 74.5% and negative predictive value 51.6%). The relation of both cervical length and Bishop score with successful vaginal delivery was found to be statistically significant with p value of 0.0001.

**Conclusions:** The present study indicates that Bishop Score is a better predictor for successful vaginal delivery as compared to cervical length by transvaginal ultrasonography.

**Keywords:** Bishop Score, Cervical length, Induction of labour, Transvaginal sonography

### INTRODUCTION

In obstetrics induction of labour is done in approximately 20% of pregnant women for variety of indications. However, a significant number (20%) of induced pregnancies land in caesarean delivery.<sup>1</sup> Cervical assessment is integral to successful outcome of induction of labour. Bishop Score is the traditional method used for

assessing cervix, but it is subjective. Transvaginal sonography (TVS) cervical length measurement is quantitative method and lacks interobserver variation. It allows assessment of supravaginal portion of cervix which is difficult to assess digitally. The studies comparing the two methods of cervical assessment show conflicting results, some favours Bishop's Score, while others TVS.<sup>1-3</sup> The variability in results can be because of

other factors like inducing agents used, parity and differing definition of successful induction. The study was designed to further compare Bishop Score and TVS cervical length as predictors of normal delivery.

**METHODS**

MMIMSR, Mullana, Ambala. A total of 150 women were studied from January 2015 to June 2016 after taking an informed consent. Women with singleton pregnancy of 37-42 weeks gestation, cephalic presentation, intact membranes and cervical dilatation of 3cm or less were included in the study. Exclusion criteria were multiple pregnancies, abnormal presentation, placenta praevia, abruptio placentae, cephalopelvic disproportion and previous cesarean delivery. The sociodemographic particulars were recorded, detailed history was taken and examination performed. Transvaginal ultrasound was done to assess cervical length after evacuation of bladder and cervix was visualized to get the best longitudinal axis. The cervical length was considered as hyper echoic line extending from internal os to external os. The cervical length was measured three times by single observer and mean length recorded. The Bishop score was then determined by separate observer. The method of labour induction was decided after the initial vaginal examination and was done using either 25microgram Misoprostol (PGE1) in Bishop score  $\leq 6$  or intravenous oxytocin is Bishop score  $>6$ . Amniotomy was usually performed when the cervix is  $> 3$  cm dilated and vertex at Ostation. The active labor was diagnosed as cervical length  $\geq 4$  cm dilatation and effacement of  $\geq 80\%$  with adequate uterine contractions of 3 contractions in 10 minutes lasting 40-45 seconds. The occurrence of vaginal delivery was considered as primary outcome.

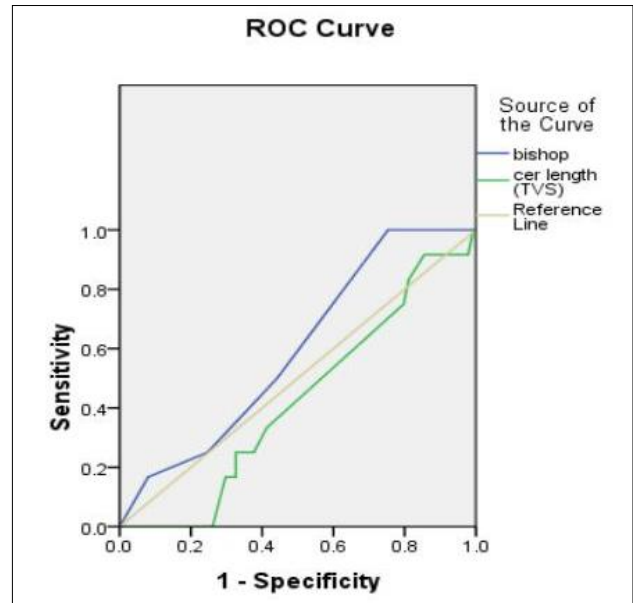
**Statistical analysis**

All statistics collected were entered in statistical software SPSS-15. ROC curves were constructed for both Bishop Score and TVS. The p values were calculated for variables using chi square test and sensitivity, specificity, positive predictive value, negative predictive value were assessed for both methods.

**RESULTS**

A total of 150 women were studied. Most of cases 135 (90%) were of age  $\leq 30$  years, mean age being 26 years. The mean gestational age was 38 week 6 days, majority 134 (89.3%) being less than 40 weeks of gestation. The parity was studied, 89 (59.3%) were nulliparous and 61 (40.7%) were multipara. ROC curves (Figure 1) were constructed for Bishop Score and cervical length (TVS) with normal vaginal delivery as outcome. The curve for Bishop score demonstrated better predictability compared to cervical length by TVS, the Bishop Score curve being above 45 degree line. Optimized cut off for Bishop Score in addition to TVS was determined by ROC curve to

predict successful vaginal delivery, it was  $\geq 6$  for Bishop Score (sensitivity 90.7%, specificity 68.6%, positive predictive value 91.5% and negative predictive value 66.7%) and  $\leq 3.0$ cm for cervical length on TVS (sensitivity 74.6%, specificity 51.6%, positive predictive value 74.5% and negative predictive value 51.6%). A similar cut off value of 6 for Bishop Score was taken by Strobel E et al and Gomes F et al in their studies.<sup>4,5</sup> Anish et al and Yang et al took a cut off of 3 and 3.1 cm for cervical length respectively.<sup>6,7</sup>



**Figure 1: Diagonal segments are produced by ties.**

At admission TVS cervical length was  $\leq 3.0$  cm in 88 (58.7%) and  $>3.0$  cm in 62 (41.3%) of cases respectively. The Bishop score on admission was  $\geq 6$  in 117 (78%) and  $< 6$  in 33 (22%) of cases respectively.

**Table 1: Clinical characteristics of women included in study.**

Characteristic	Number	Percentage
<b>Age</b>		
$\leq 30$	135	90%
$>30$	15	10%
<b>Parity</b>		
Nullipara	89	59.3%
Multipara	61	40.7%
<b>Gestational age at induction (in weeks)</b>		
37-39+ 6	134	89.3%
40-42	16	10.7%
<b>Cervical length (in cm)</b>		
$\leq 3$	88	58.7%
$>3$	62	41.3%
<b>Bishop score</b>		
0-5	33	22%
$\geq 6$	117	78%

**Table 2: Distribution of cervical length according to mode of delivery.**

TVS cervical length in cm	Vaginal delivery	LSCS	Total	P value
≤ 3	87	1	88	.0001
>3	31	31	62	
<b>Total</b>	<b>118</b>	<b>32</b>	<b>150</b>	

**Table 3: Distribution of Bishop's Score according to mode of delivery.**

Bishop score	Vaginal delivery	LSCS	Total	p value
≥ 6	107	10	117	0.0001
<6	11	22	33	
<b>Total</b>	<b>118</b>	<b>32</b>	<b>150</b>	

**Table 4: Diagnostic indices of Bishop's Score and TVS Cervical length in prediction of successful Labour Induction.**

Diagnostic indices	Bishop's Score	Cervical length
Sensitivity (%)	90.7	74.6
Specificity (%)	68.6	51.6
Positive predictive value (%)	91.5	74.5
Negative predictive value (%)	66.7	51.6

**Table 5: Relation of mode of delivery with parity.**

Parity	Vaginal delivery	LSCS	Total	P value
Nullipara	68	21	89	0.414
Multipara	50	11	61	
<b>Total</b>	<b>118</b>	<b>32</b>	<b>150</b>	

The mode of delivery was vaginal in 118 (78.7%) cases and caesarean section in 32 (21.3%) cases. A comparable rate of LSCS of 29.6% was reported in a study by Gabriel R et al.<sup>8</sup> The relation of both cervical length and Bishop score with successful vaginal delivery was found to be statistically significant with p value of 0.0001 as shown in Table 2 and 3. The indication for induction of labour were hypertensive disorders of pregnancy in 35 cases, gestational diabetes mellitus in 33, intrahepatic cholestasis of pregnancy in 15, prolonged pregnancy in 15, intrauterine growth restriction in 26 and oligohydroamnios in 26 cases respectively. The indication for LSCS was fetal distress in 22 (68.8%) cases, non-progress of labour in 10 (31.2%) cases and no case of failed induction was observed.

## DISCUSSION

In our study the results suggest a statistically better significance for Bishop Score as compared to the cervical length on TVS. The studies in literature show variable results some favouring Bishop Score and others TVS.

Groeneveld YJB et al observed that Bishop score was a significant independent predictor of vaginal delivery only in nulliparous women (sensitivity 56.3%, specificity 72.2%) while TVS cervical length was not a significant

independent predictor.<sup>9</sup> Khandelwal R et al reported Bishop score as superior predictor for response to induction compared to TVS. Although the latter study considered the ability to induce active labour as the primary outcome.<sup>2</sup>

Rane SM et al found TVS cervical length and parity were independent predictors of vaginal delivery within 24 hours; however the only indicator for induction of labour was prolonged pregnancy.<sup>10</sup> Tan PC et al in 2007 observed that TVS was better tolerated than Bishop Score but both are useful predictors of the need for caesarean section following induction of labour.<sup>3</sup>

We included both multipara and primipara in our study but it was observed that the relation of parity to successful delivery outcome was not significant (p value = 0.414).

A cochrane review did not demonstrate superiority of one method over the other in terms of the main outcomes assessed; both methods could be complimentary.<sup>11</sup>

## CONCLUSION

The present study indicates that Bishop Score is a better predictor for successful vaginal delivery as compared to

cervical length by transvaginal ultrasonography. The best cut off value for Bishop score in present study was  $\geq 6$ . Similarly best cut off value for TVS cervical length was  $\leq 3$  cm for successful pregnancy outcome.

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*Ethical approval: The study was approved by the Institutional Ethics Committee*

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