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Research Protocol

Prediction of Successful Induction Using Preinduction Cervical Length Estimation by TVS

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Abstract

Objective: To use the preinduction cervical length measured using a TVS to predict the success of induction.

Materials and Methods: The study was conducted on 47 women with singleton pregnancies at 37 - 42 weeks of gestation, admitted for induction of labour in the Department of Obstetrics and Gynaecology at Cheluvamba hospital, Mysuru, India. All women underwent cervical assessment by both transvaginal ultrasound and Bishop Score and the outcome of labour induction was determined.

Results: Of the 47 women, 36 women had vaginal delivery and 11 landed into LSCS. Bishop score < 5 with a sensitivity of 63.6% and specificity of 61.1% and cervical length > 2.8 cm with a sensitivity of 90.9% and specificity of 75% are cut off values of cervical unfavorability. Successful induction was achieved among 96.42% with favourable Cervical length of < 2.8 cm.

Conclusion: Hence, cervical length by transvaginal ultrasound is a better predictor for the success of induction of labour as compared with assessment by Bishop Score alone.

Keywords: *Bishop Score; Cervical Length; Labour Induction; Transvaginal Ultrasound; Vaginal Delivery*

Introduction

Induction of labour is stimulation of uterine contractions before the spontaneous onset of labour with or without ruptured membranes. About 20% of pregnancies undergo labour induction for various indications [1] with prolonged pregnancy being the commonest reason [2]. The factors that help predict the success of induction are multiparity, BMI, favourability of the cervix and the weight of the fetus. Favourability of the cervix is traditionally assessed by Bishops score, first published by Dr Edward Bishop in 1964 which has 5 components namely position, consistency, dilatation, effacement of the cervix and the station of the fetal head with a score >= 6 being considered favourable for induction. Owing to the high interobserver variability, estimation of preinduction cervical length via TVS began being explored as a more objective method to predict the success of labour induction with variable results.

This study was done to predict the success of vaginal delivery based on the preinduction cervical length as determined by a transvaginal ultrasound.

Materials and Methods

A total of 47 women with singleton, term gestations were admitted to the department of OBG, Cheluvamba hospital, Mysore from 1st October 2018 to 31st December 2018 with indications for induction of labour. They were subjected to cervical length estimation by TVS and induction was done with intracervical prostaglandin E2 gel (Dinoprostone) 0.5 mg within an hour of estimation of cervical length after assessing bishops score. They were reassessed after 6 hours to assess the need for 2nd dose of intracervical PGE2 gel. Results of successful induction were computed as women setting into active labour within 24 hours of induction of labour and delivering vaginally.

Inclusion criteria:

- Singleton, cephalic presentation, term gestation, EFW < 4 kg.

Exclusion criteria:

- Multifetal gestation, non-vertex presentation, previous caesarean section, anomalous fetus, obstetric contraindications for normal delivery.

Results

The 47 women studied had a mean age of 26.5 +- 2.34 years. The mean gestational age was 39.32 +- 1.27. 53.2% were multipara and 46.8% were primipara. The reasons for induction were GHTN (17%), oligohydramnios (12.8%), PROM (15%), mild PE (17%), severe PE (8.5%) and postdated pregnancy (31.9%). 76.6% (36) of women delivered vaginally and 23.4% (11) underwent a caesarean section, 6 which were due to failed induction and 5 due to fetal distress. Receiver operator characteristics curve analysis show that a cervical length of < 2.8 cm had a 75% sensitivity and 90.9% specificity in predicting successful induction with 96.4%of women delivering vaginally with a cervical length of < 2.8 cm whereas Bishop score > 5 had a sensitivity of 61.1% and specificity of 63.6% to predict failure of induction with 84.6% of women delivering vaginally with a bishops score of > 5. The cervical length determined by TVS had greater sensitivity and specificity in prediction of successful induction.

	N	Minimum	Maximum	Mean	Std. Deviation
Gestational age	47	37	42	39.32	1.270

Table 1: *Distribution based on mean age.*

Parity	Frequency	Percent
Multi	25	53.2
Primi	22	46.8
Total	47	100.0

Table 2: *Distribution based on parity.*

Reason for induction	Frequency	Percent
GHTN	8	17.0
Mild pe	8	17.0
Oligo	6	12.8
Postdated pregnancy	6	12.8
Prom	15	31.9
Severe pe	4	8.5
Total	47	100.0

Table 3: *Distribution based on reason for induction.*

Result of induction	Frequency	Percent
c section	11	23.4
Delivered	36	76.6
Total	47	100.0

Table 4*: Distribution based on result of induction.*

Bishops Score		Result of induction		Total
		C section	Delivered	
3	Count	2	0	2
	Percent	18.2%	0.0%	4.3%
4	Count	2	7	9
	Percent	18.2%	19.4%	19.1%
5	Count	3	7	10
	Percent	27.3%	19.4%	21.3%
6	Count	2	13	15
	Percent	18.2%	36.1%	31.9%
7	Count	2	4	6
	Percent	18.2%	11.1%	12.8%
8	Count	0	5	5
	Percent	0.0%	13.9%	10.6%
Total	Count	11	36	47
	Percent	100.0%	100.0%	100.0%
Chi-square value- 9.50				
P value- 0.091				

Table 5: *Cross-tabulation of result of induction and bishops score.*

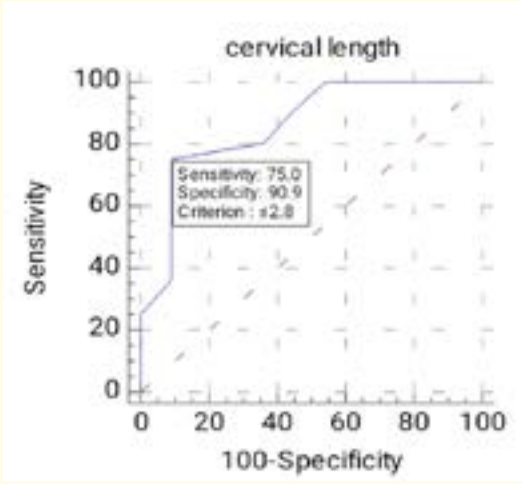

Figure 1: *ROC curve of cervical length in predicting vaginal delivery.*

The best cut off of cervical length was < 2.8 cm to predict vaginal delivery post induction with 75% sensitivity and 90.9% specificity.

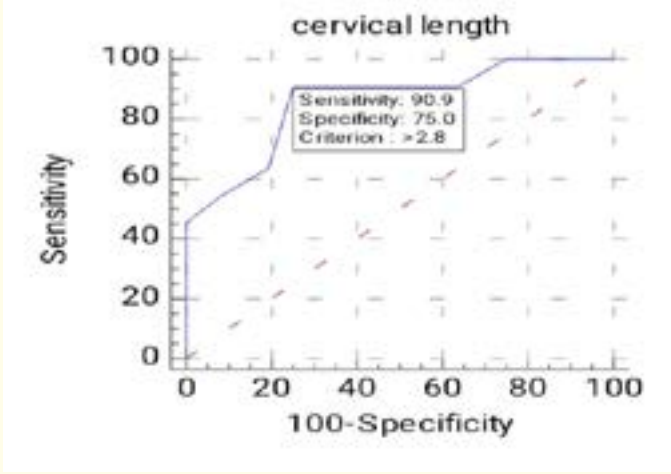

Figure 2: *ROC curve of cervical length in predicting LSCS.*

The best cut off of cervical length was > 2.8 cm to predict LSCS post induction with 90.9% sensitivity and 75% specificity.

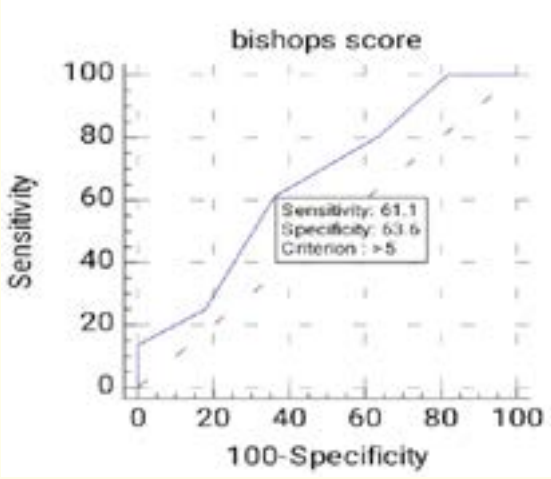

Figure 3: *ROC curve of bishops score in predicting vaginal delivery.*

The best cut off of Bishops score was > 5 to detected vaginal delivery post induction with 61.1% sensitivity and 63.6% specificity.

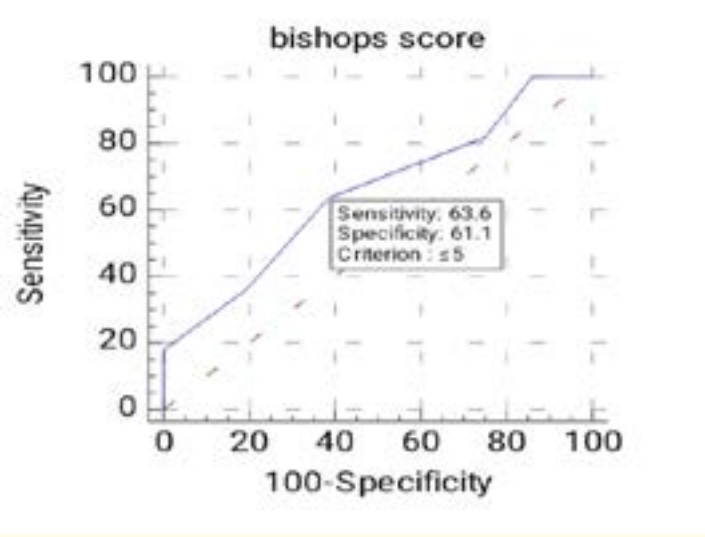

Figure 4: *ROC curve of bishops score in predicting LSCS.*

The best cut off of Bishops score was < 5 to detected LSCS post induction with 63.6% sensitivity and 61.1% specificity.

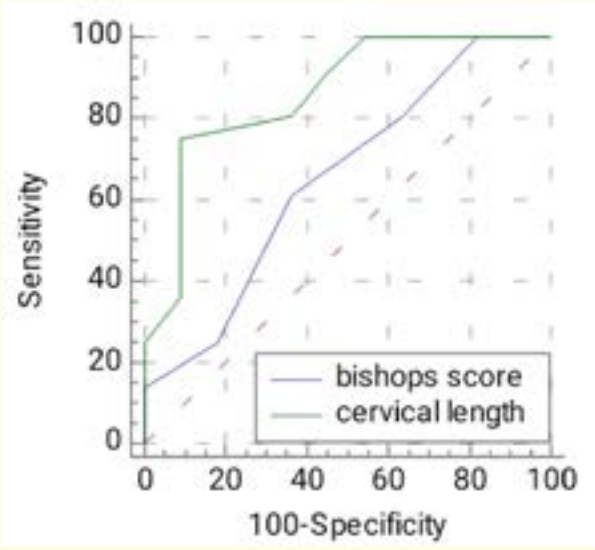

Figure 5: *Comparison of ROC curve of cervical length and bishops score.*

	AUC	95% CI	P Value
Cervical length	0.860	0.727 to 0.944	< 0.001
Bishops score	0.653	0.500 to 0.786	< 0.001

Area under the curve (AUC) for cervical length was 0.860 which was better than Bishops score Area under the curve (AUC) 0.653. Hence, cervical length is a better predictor than Bishops score.

Discussion

This study has demonstrated that in singleton pregnancies undergoing labour induction at term with intracervical dinoprostone gel, the caesarean section rate was 23.4% and successful vaginal delivery occurred in 76.6% of women. This study also proves that the preinduction cervical length measured sonographically is a better indicator to predict the success of induction than the Bishops score. Previous studies evaluating the role of preinduction cervical length in the prediction of successful vaginal delivery showed conflicting results. Gonen., *et al*. [3] examined 86 women before induction and reported significant associations between both the bishops score and sonographically measured cervical length with successful induction and induction to delivery interval. Study by Sonali Kaur Sharma., *et al*. [4] showed that cervical length by transvaginal ultrasonography proved to be better in predicting the success of induction of labour by having significant relation with vaginal delivery. The study by Aeli Ryu., *et al*. [5] showed no difference in the rates of induction success and cesarean delivery, and the induction to delivery intervals between the two groups.

Conclusion

Cervical length by transvaginal ultrasonography proved to be better in predicting the success of induction of labour by having significant relation with vaginal delivery with a cut off > 2.8 mm predicting the need for LSCS with 90.9% specificity and 75% sensitivity.

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