

Comparative Study of Pre-Induction Cervical Length Measured By Transvaginal Ultrasonogram and Modified Bishop's Score in Predicting Vaginal Delivery

¹Dr. Josephine Rosy, Associate Professor of Obstetrics and Gynaecology, Madha Medical College & Research Institute, Kovur-Thandalam, Chennai 600128.

Corresponding Author: Dr. Josephine Rosy, Associate Professor of Obstetrics and Gynaecology, Madha Medical College & Research Institute, Kovur-Thandalam, Chennai 600128.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Introduction

The traditional method of predicting successful induction of labour resulting in vaginal delivery is based on the 'favourability' of the cervix before induction which is assessed by the Modified Bishop's score. If the score is low before induction, the cervix is unfavourable and cervical ripening agents are used. Calculation of Bishop's score by digital examination is a subjective method to assess the cervical status to predict the success of labour induction (1). A score of 5 or less suggests that labour is unlikely to start without induction. Scores between 5 and 9 require additional consideration and professional judgement for clinical management. A score of 9 or more indicates that labour will most likely commence spontaneously. This method has a high inter and intra observer variability (2).

The supravaginal portion of the cervix usually comprising about 50% of the cervical length is very difficult to assess digitally. Transvaginal ultrasonogram (TVS) is an objective method to assess the cervical length. Transvaginal assessment of cervical length is always better than transabdominal (TA) assessment (3). As the probe is closer to the cervix, better visualisations with better measurements are possible. Recent studies suggest that ultrasonographic measurement of cervical length may

provide a more sensitive assessment of successful induction of labour.

Hence this study focuses on studying the modified Bishop's score and cervical length measured using transvaginal ultrasonogram before induction of labour and to compare the efficacy of these two measurements to establish which is better in predicting successful induction of labour, eventually resulting in vaginal delivery (4). Even though the definition of labour induction is simple, there is no fixed criterion for what constitutes a successful or a failed IOL. For a successful IOL outcome, a variety of endpoints have been suggested such as mode of delivery in which a vaginal delivery is considered as successful IOL and cesarean section is considered as failed IOL. Other endpoints like vaginal delivery within a certain time interval or achievement of the active phase of labour have also been suggested. But till date no consensus has been reached.

Though most authors suggest achieving vaginal delivery as the main IOL outcome, it depends on many other factors during labour which may not be related to the induction process. The latent phase is defined as the period of time, when there are painful contractions and some cervical changes including some effacement and dilatation of the cervix (5). Active labour is defined as the period when there are regular painful contractions and

there is progressive cervical dilatation. Women who progressed into active labour within 12 hours had a 67–86% probability of achieving vaginal birth, whereas only 31–33% of women who reached active labour after 18 hours had a vaginal delivery. Consequently, failed IOL diagnosis does not always involve performing a caesarean section for failed IOL per se (6).

Despite the lack of specific recommendations, a definition of failed IOL as the inability to achieve active phase of labour seems to be the best option. Adverse outcomes also increase with the increase in the dose of the induction agent used. All these prognostic factors should be taken into account while deciding whether to continue the induction process or not (7). It is essential to diagnose failed IOL at an appropriate time in order to counsel the patients and to decide whether to continue with the IOL or to perform a caesarean section based on the low probability of entering the active phase of labour without increasing the adverse outcomes (8). Consequently, failure to achieve active phase and thereby leading to caesarean section is taken as a failure of induction of labour in this study.

A large number of studies have been conducted to successfully identify the group of patients who will or will not respond to mechanical or pharmacological induction and achieve active phase of labour. Cervical status measured by the Bishop's score has been shown to be the main predictor of successful labour induction historically. Other predictors such as maternal age, weight, height, body mass index, ethnicity and socioeconomic status have also been reported (9). As cervical status has been recognized as the most important predictor of successful induction, many studies have been done to evaluate the relationship between the Bishop's score and sonographic cervical assessment (10).

Procedure

Study site: This study was conducted in the Department of Obstetrics and Gynaecology, Public Health Centre, West Mambalam, Chennai.

Study population: The study population constituted of term antenatal mothers attending our antenatal department who were induced electively for various indications. The study was conducted after approval from Institutional Ethics and Scientific committee and after taking informed consent from the participants. The sample size for the study is 100 primiparous women, who satisfy the inclusion and exclusion criteria and are willing to be a part of the study.

Study design: Prospective observational comparative study

The sample size of 200 was arrived with n Master software Version 2.0

Sampling procedure: Among the antenatal mothers admitted to the hospital for induction, 100 patients satisfying the inclusion and exclusion criteria will be included in the study and examined.

- Patients undergoing elective induction of labour at term gestation are assessed for the pre induction cervical length by Transvaginal ultrasonography by EXAMINER 1.
- Cervical assessment by Modified Bishop's score is done by EXAMINER 2.
- These patients undergo induction of labour with Dinoprostone Gel (PGE2 GEL).

The outcome of induction is studied and the efficacy of predicting successful induction and vaginal delivery is compared between the two measurements (11).

Figure 1: Ultrasound machine with transvaginal probe



Inclusion criteria

- Nulliparous women less than 35 years of age with 37 to 42 weeks gestation admitted for induction of labour
- Women with singleton live pregnancy
- Women with cephalic presentation
- Women with intact membranes with no vaginal bleeding

Exclusion criteria

- Multiparous women
- Women with multiple pregnancy
- Women with non cephalic presentation
- Women in labour with > 3 cm cervical dilatation
- Women with prelabour rupture of membranes
- Women with previous uterine or cervical surgeries

Methodology

Women who fulfilled the above criteria were included in the study. Informed consent was obtained from the patient and family members after explaining about the study in detail.

History and clinical examination

A detailed history of the patient including age, socio-economic status and other relevant medical history were obtained. The gestational age of the patient was confirmed with her dates and first trimester ultrasound. General examinations including weight, height, pallor, pedal oedema, pulse rate, blood pressure were measured.

Systemic examination of cardiovascular, respiratory and central nervous system was done and details were noted. Obstetric examination and assessment of cervical status was done.

Cervical assessment

The patient underwent a transvaginal sonography for cervical length assessment. The probe was placed in the vagina approximately 3 cm proximal to the cervix to avoid any distortion of its position or shape and a sagittal view of the cervix, with the echogenic endocervical mucosa along the length of the canal, was obtained. The calipers were used to measure the distance between the internal os and external os and the furthest points at which the cervical walls were juxtaposed. Three measurements were obtained and the shortest, technically best measurement in the absence of uterine contractions was taken as the final measurement. Pre induction favourability of the cervix was assessed digitally with the modified Bishop's score and both these measurements were recorded (12).

In our institution, patients who cross their dates by 3 days (40 weeks+3 days) were induced in view of postdatism. Induction was done with PGE₂- DINOPROSTONE Gel 0.5 mg by intracervical application. With the patient in a lithotomy position, the cervix is exposed using a Sims speculum and anterior lip is held with sponge holding forceps. The tip of the PGE₂ gel dispensing cannula, which is attached to the pre-filled syringe, is inserted gently to just below the internal os. The gel is then instilled into the cervix. The patient is kept in a reclining position for the next 30 minutes. The women had further vaginal examination after 6 hours and depending upon the Bishop's score, further doses of dinoprostone gel were considered.

The maximum recommended dosage is 1.5 mg (three doses) within a period of 24 hours. Oxytocin augmentation was started in cases of unsatisfactory

progress of labour and artificial rupture of membranes (amniotomy) was performed as and when required. The indication for induction, number of PGE2 gel doses, achievement of active phase, need for oxytocin, mode of delivery, induction delivery interval, number of lower segment cesarean sections (LSCS) and their indications and birth weight were noted and tabulated (13).

The comparison of TVS cervical length with Modified Bishop’s score in predicting vaginal delivery was assessed

Results

Table 1: Comparison of bishop and cervical length for mode of delivery

Group Statistics						Independent t test
		N	Mean	Std.	Std. Error Mean	
Bishop Score	Vaginal	85	4.5176	1.28741	.13964	2.202*
	LSCS	15	3.6667	1.83874	.47476	
Cervical Length	Vaginal	85	2.6376	.48794	.05292	5.374*
	LSCS	15	3.3667	.46240	.11939	

Table 2: Group Statistics

Group Statistics						
	Induction to delivery interval	N	Mean	Std. Deviation	Std. Error Mean	Independent t test
Bishop Score	>= 24.00	11	4.1818	1.16775	.35209	0.926
	< 24.00	74	4.5676	1.30417	.15161	
Cervical Length	>= 24.00	11	3.4545	.31101	.09377	7.778*
	< 24.00	74	2.5162	.38107	.04430	

The above table depicts that bishop score was not significant differ for the woman whose delivery interval was within 24 hrs and more than 24 hrs. But cervical length shows there is significant difference in interval (within 24 />24hrs).i.e. if cervical length is more means period of delivery will be increased (15, 16).

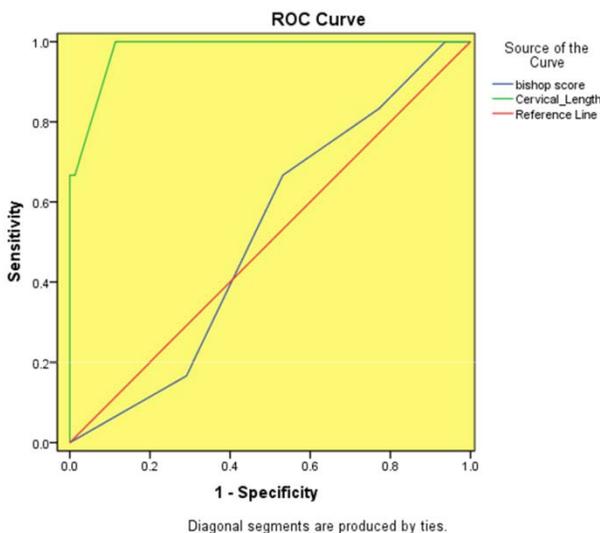
Table 3: Correlation of the Variable measures with mean bishop score & cervical length

VARIABLE	MEAN ±SD
BISHOP SCORE	4.04± 0.99
CERVICAL LENGTH(TVS)	2.85± 0.46

Table 4: Correlation of the outcome measures with mean bishop score & cervical length

Outcome Measures	Bishop Score	Cervical Length In Cms
Induction to delivery interval <24hrs(74)	4.1± 1	2.5± 0.4
Induction to active phase interval <12hrs (55)	4.6± 0.7	2.4± 0.3
Total number of vaginal deliveries	4.0±1	2.6±0.5

Receiver – operating characteristic curves for the correlation of bishop score and Induction to delivery interval <24 hrs.



Bishop score around 4 and transvaginal cervical length around 2.6 are found to be best cut-off values for the pre induction cervical condition. Taking Bishop Score 4 and Cervical length 2.6 as the cut off and taking successful induction of labour as delivery within 24hrs (17,18). Though Bishop score has more sensitivity than cervical length, specificity and positive predictive value of the trans vaginal cervical length is 100%. Significant predictive value is obtained for cervical length <0.001. P value for Bishop Score is 0.296. So trans vaginal cervical

length found to be better predictor of successful induction of labour in terms of delivery within 24hrs when compared to Bishop Score.

Discussion

This study has demonstrated that, in primi singleton pregnancies undergoing induction of labor with dinoprostone gel at 37-42 wks, successful vaginal delivery within 24hrs of induction occurred in approximately 74%. The study has also demonstrated that induction to delivery interval is significantly associated with both the pre induction bishop score and the sonographically measured cervical length, higher the Bishop score and lesser the cervical length better the likelihood of vaginal delivery. TVS cervical length was a better predictor of successful labour induction in terms of delivery within 24hrs of induction

Conclusion

This study suggests that both Bishop's score and TVS measurement of cervical length are good predictors of vaginal delivery (19). However statistically, pre-induction cervical length measured by transvaginal ultrasonogram is a better predictor of successful induction of labour and eventually vaginal delivery when compared to digital

assessment of the cervical status by Modified Bishop's score (20, 21)). Higher cervical lengths of more than 2.25 cm measured by transvaginal ultrasonogram before induction can be considered as an independent predictor of probability of caesarean section in patients who are electively induced (22). The study has also demonstrated that induction to delivery interval is significantly associated with both the pre induction bishop score and the sonographically measured cervical length, higher the Bishop score and lesser the cervical length better the likelihood of vaginal delivery. TVS cervical length was a better predictor of successful labour induction in terms of delivery within 24hrs of induction.

References

1. G. Ramanathan, C. Yu, E. Oseiand K. H. Nicolaides. Ultrasound examination at 37weeks gestation in the prediction of pregnancy outcome: the value of cervical assessment. *Ultrasound in Obstetrics and Gynaecology*. 2003; Vol 22(6): 555-663.
2. Strobel E, Sladkevicius P, Rovas L, De Smet F, Karlsson ED, Valentin L. Bishop score and ultrasound assessment of the cervix for prediction of time to onset of labour and time to delivery in prolonged pregnancy. *Ultrasound in Obstetrics Gynecology*.2006; 28(3): 298-305.
3. H. Roman, E. Verspyck, L. Vercoustre, S. Degre, J. Y. Col ,J. M. Firmin ,P.Caron and L. Marpeau. Does ultrasound examination when the cervix is unfavourable improve the prediction of failed labour induction? *Ultrasound in Obstetrics and Gynecology*. 2004; Vol 23(4): 357-362.
4. Tan PC, Vallikkannu N, Suguna S, Quek KF, Hassan J. Transvaginal sonographic measurement of cervical length vs. Bishop score in labour induction at term: tolerability and prediction of Cesarean delivery. *Ultrasound in Obstetrics Gynecology*.2007; 29(5): 568-73.
5. Rane SM, Guirgis RR, Higgins B, Nicolaides KH. The value of ultrasound in the prediction of successful induction of labour. *Ultrasound in Obstetrics Gynecology*.2004; 24(5): 538-49.
6. Patrick Rozenberg, Sylvie Chevret, Claude Chastang and Yves Ville. Comparison of digital and ultrasonographic examination of the cervix in predicting time interval frominduction to delivery in women with a low Bishop score. *BJOG*. 2005; Vol 112(2):192-196.
7. M. Meijer – Hoogeveen, C.Roos, B.Arabin, P.Stoutenbeek and G.H.A Visser. Transvaginal ultrasound measurement of cervical length in the supine and upright positions versus Bishop's score in predicting successful induction of labour at term. *Ultrasound in Obstetrics and Gynecology*. 2009; 33: 213-220.
8. Vankayalapati P, Sethna F, Roberts N, Ngeh N, Thilaganathan B, Bhide A. Ultrasound assessment of cervical length in prolonged pregnancy: prediction of spontaneous onset of labour and successful vaginal delivery. *Ultrasound in Obstetrics Gynecology*. 2008; 31(3): 328-31.
9. Keepanasseril A, Suri V, Bagga R and Aggarwal N. Pre-induction sonographic assessment of the cervix in the prediction of successful induction of labour in nulliparous women. *Australian New Zealand Journal of Obstetrics and Gynaecology*.2007; 47(5): 389-93.
10. Gómez Laencina, Sánchez FG, Gimenez JH, Martínez MS, Valverde Martínez JA,Vizcaíno VM. Comparison of ultrasonographic cervical length and the Bishop score in predicting successful labour induction. *Acta Obstetricia et Gynecologica Scandinavica*. 2007; 86(7): 799-804.

11. N. Maitra, D. Sharma and S. Agarwal. Transvaginal measurement of cervical length in the prediction of successful induction of labour. *Journal of Obstetrics and Gynaecology*. 2009; Vol 29(5): 388-391.
12. Ibrahim A. Abdelazim and Mohannad Lutfi Abufaza. Sonographic assessment of the cervical length before induction of labour. *Asian Pacific Journal of Reproduction*. 2012; Vol 1(4): 253-257.
13. Neha Bajpai, Rajesh Bhakta, Pratap Kumar, Lavanya Rai, and Shripad Hebba. Manipal Cervical Scoring System by Transvaginal Ultrasound in Predicting Successful Labour Induction. *Journal of Clinical and Diagnostic Research*. 2015; 9(5): QC04–QC09.
14. Ahmed S.A. Ashour, Rana M.A. Abdella, Hassan O. Ghareeb, and Fouad A Abohamila. Pre induction Ultrasonographic Measurements as a Predictor of Successful Induction of Labour in Prolonged Pregnancy in Primi gravidas. *Medical Journal of Cairo University*. 2013; Vol 81(1): 915-921.
15. Mohamed S. Ali, Mohamed A. Abdelhafeez and Medhat A. El-Sayed. The Distance from Maternal Perineum to Fetal Head as a Predictive of Successful Induction of Labour. *Nature and Science*. 2013; 11(5): 19-25.
16. Shekhawat Niteshkanwar, Pant Reena and Banerjee Krishna Priya. A comparative study of transvaginal sonography and Modified Bishop's score for cervical assessment before induction of labour. *Scholars Journal of Applied Medical Sciences*. 2015; 3(6B): 2284-2288.
17. Yigal Ben-Harush, Roy Kessous, Adi Y. Weintraub, Barak Aricha-Tamir, Naama Steiner, Efrat Spiegel and Reli Hershkovitz. The use of sonographic cervical length assessment for the prediction of time from induction to delivery. *The Journal of Maternal-Fetal & Neonatal Medicine*. 2016; Vol 29(14): 2332-2336.
18. Ronak Khandelwal, Purvi Patel, Dipa Pitre, Tosha Sheth and Nandita Maitra. Comparison of Cervical Length Measured by Transvaginal Ultrasonography and Bishop Score in Predicting Response to Labour Induction. *The Journal of Obstetrics and Gynecology of India*. 2018; Vol 68(1): 51–57.
19. Núria Baños, Federico Migliorelli, Eduardo Posadas, Janisse Ferreri and Montse Palacio. Definition of Failed Induction of Labour and Its Predictive Factors: Two Unsolved Issues of an Everyday Clinical Situation. *Fetal Diagnosis and Therapy*. 2015; 38: 161–169.
20. Renu Misra. *Ian Donald's practical obstetrical problems*. 2014; 7th edition, Wolters Kluwer.
21. Cunningham, Leveno, Bloom, Spong, Dashe, Hoffman, Casey and Sheffield. *Williams Obstetrics*. 2014; 24th edition, McGraw Hill.
22. Edwards RK and Richards DS. Pre induction cervical assessment. *Clinical Obstetrics and Gynaecology*. 2000; 43(3): 440–6.

How to citation this article: Dr. Josephine Rosy, “Comparative Study of Pre-Induction Cervical Length Measured By Transvaginal Ultrasonogram and Modified Bishop's Score in Predicting Vaginal Delivery”, *IJMACR*- July- August - 2020, Vol – 3, Issue -4, P. No. 12– 18.

Copyright: © 2020, Dr. Josephine Rosy, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License 4.0. Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.
