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Labor outcome in women by measuring foetal head to perineal distance by transperineal ultrasound

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Abstract
Introduction: Some of the term gestations will need induction of labor due to various reasons. The outcome of these pregnancies is not known beforehand. Engagement of fetal head is assessed clinically by abdominal and vaginal examination, but clinical assessment is a poor predictor for the course of labor Per vaginal examinations are done after induction/active labor for assessment of progression of labor and bishop score calculation, but this score varies from examiner to examiner. With advancement in technology there are improved procedures to assess the progression of labor by measuring foetal head to perineal distance by trans perineal ultrasound. The Trans perineal ultrasound is simple easy, reliable and done only once prior to the induction or augmentation of labor. This can be used to remove the observer bias in per vaginal examination and also multiple per vaginal examinations can also be avoided. The aim of the study is to measure the foetal head to perineal distance by transperineal ultrasound prior to induction or augmentation of labor for better outcome.
Methods & Methodology: Prospective study done over18 months with sample size of 150 pregnant women with singleton pregnancy in cephalic presentation at 38 or more than 38 weeks period of gestation planning for induction or in early labor at Dr. PSIMS & RF.
Result: In our study 150 pregnant women with singleton pregnancy, cephalic presentation at or more than 38 weeks period of gestation prior to induction or augmentation of labor in patients with FHPD < 7cm 95.24% had vaginal deliveries and 4.76% has caesarean section in patients with FHPD > 7 cm had 22.2%vaginal deliveries, 55% caesarean section, 22.22% instrumental deliveries.
Conclusion: In this study it is seen that FHPD has more predictability than bishop score when measured at 38 or more than 38 weeks period of gestation planning for induction or in early labor but Pelvic examinations are mandatory to rule out the colour of liquor in foetal distress or cord prolapse.In settings where the relevant technology and experience are available, foetal head to perineal distance can be utilised as an adjunct method to bishop score in predicting the mode of delivery and in selecting patients for trail of labour.

Keywords: Labor induction, transperineal ultrasound, digital examination, vaginal examination

Introduction

Labor is process by which foetus moves from the intrauterine to the extra uterine environment. Bishop score is used to predict whether a labour results in vaginal delivery before induction. Digital vaginal examinations (VE) are the "gold standard" approach for monitoring labour progress and assessing descent of foetal head, cervical effacement and dilatation, foetal position before and during labour around the world [1, 2]. However, using digital VE to estimate cervical dilatation is inaccurate [3]. Digital examination for assessing the station is both subjective and unreliable [4]. Inconsistent findings among examiners cause women in to distress and a lack of faith in their health-care providers [5]. Digital VE can be unpleasant for the patient, when repeated, insufficient regional analgesia, and psychological effects can be present [6, 7]. Subjective methods used for determining labor progress and labor parameters is extensive. Bishop score is an observer-based assessment [8]. This has an impact on the outcomes of inducing labour vaginally, many of the women end up having a surgical delivery because of non-progression of labor and foetal distress. It is leading to the rising trend of caesarean deliveries, and the risks of emergency caesareans are well documented [9]. These decisions have effect on women's health and future pregnancies.
Intrapartum ultrasound, which eliminates subjective inaccuracies of digital pelvic inspection, is being used to predict the labor outcome.

Ultrasound can examine all aspects of the bishop score, including length of the cervix, so dilatation and position of the cervix, consistency, and foetal head station, and are used for ultrasound based prediction for assessment of outcome of labour induction [10].

New ultrasonography methods like position of foetal head to pelvic girdle, position of the foetal spine, the head to symphysis distance, progression angle and the headperineum distance have been added, have been thoroughly investigated [11, 12, 13]. Distance between the presenting portion, outlet is a crucial factor in determining success of a labor.

The distance of the presenting part above or below the ischial spine, as measured by per vaginal examination, was used to assess this. However, many times throughout the intrapartum period, a digitally measured head station is incorrect, inaccurate, and inconsistently repeatable by multiple examiners [14].

Ultrasound evaluation during intrapartum period is more specific, correlates well with different examiners, assessment performed vaginally and assessment by ultrasound differ significantly [15].

Ultrasound is becoming a more significant adjunct tool for practising obstetricians to use when counselling patients before labor induction and likelihood of a successful induction and mode of delivery depending on imaging findings.

Aim & Objectives

Evaluation of foetal head to perineal distance in early stage of labor for prediction of outcome of labor by trans perineal ultrasound at or after 38 completed weeks in the patients planned for induction of labor in early stage of labor and to study the outcome of labor in the above-mentioned patients

Materials & Methods

A Prospective study with a study period of 18 months in sample size of 150 pregnant women with singleton pregnancy in cephalic presentation at 38 or more than 38 weeks period of gestation planning for induction or in early labor at Dr. PSIMS &RF

Methodology

150 Pregnant women prior to induction and early labor were examined by taking informed and written consent of the patient. Prior to induction/augmentation of labor, transperineal ultrasound was performed using PHILLIPS AFFINITI 50G ultrasound machine. A linear probe of frequency 4-12MHz was used to measure foetal head–perineum distance Patient bladder was emptied prior to the measurement. Patient was placed in lithotomy position and a linear probe was put on the perineum and pressed firmly against the presenting part. In a transverse view, the shortest distance between the outer bony limit of the foetal skull and the skin surface of the perineum was measured to indicate Foetal head to perineum distance. Three measurements are taken, and mean value was considered. Midpoint of pelvic canal is at the ischial spines. The distance from perineum to the ischial spines is 5 cm according to WHO stages of descent. Patient were followed till the delivery

Inclusion criteria

Pregnant women with Singleton foetus in cephalic presentation, Gestational age at 38 weeks /more than 38 weeks, adequate pelvis, Rupture membranes, No contraindication for vaginal delivery, Induced labor

Exclusion criteria

Pregnant women with Previous Cesarean delivery / other uterine surgeries, multiple gestation, Foetal Malpresentations, Placenta previa, IUGR, Intrauterine foetal death

Results

In this study the FHPD is measured and the mean FHPD is 6.27 ± 1.60 it is seen that in patients with < 7cm 95.24% had vaginal deliveries, 4.76% had LSCS it is seen that in patients with > 7 cm 22.22% had vaginal deliveries, 5.56% had LSCS, 22.2%had assisted vaginal deliveries the sensitivity, specificity of FHPD < 7 cm for predicting vaginal deliveries is 91% and 83%

Table 1: Association between FHPD and mode of delivery

Crosstab					
FHPD score		Mode of delivery			
		LSCS	FTVD	Forceps	Total
< 7cm	Count	5	100	0	105
	% Within Mode of delivery	4.76	95.24		100.0
> 7cm	Count	25	10	10	45
	% Within Mode of delivery	55.56	22.22	22.22	100.0
Total	Count	30	110	10	150
	% Within Mode of delivery	20.0	73.33	6.67	100.0

In this study, in patients with FHPD < 7cm 42.85% has bishop score < 6, 57.15% has bishop score >6. In patients with FHPD > 7cm 44.44% has bishop score < 6.55.56 has bishop score > 6.

Table 2: Association between FHPD and bishop score

Crosstab				
FHPD score		Bishop Score		Total
		< 6	> 6	
< 7cm	Count	45	60	105
	% Within Bishop Score	42.85	57.15	100.0
> 7cm	Count	20	25	45
	% Within Bishop Score	44.44	55.56	100.0
Total	Count	65	85	150
	% Within Bishop Score	43.33	56.67	100.0

In this study Bishop score is measured and mean bishop score is 6.63±1.85 it is seen that in patients with < 6 69.23% had vaginal deliveries, 23.07% had LSCS, 7.69% had assisted vaginal deliveries it is seen that in patients with > 6 74.47% had vaginal deliveries, 17.64% had LSCS, 5.88% had assisted vaginal deliveries The sensitivity, specificity of bishop score > 6 for prediction of vaginal deliveries is 97% and 88%

Table 3: Association between bishop score and mode of delivery

Crosstab				
Bishop Score	Mode of delivery			Total
	LSCS	FTVD	Forceps	
< 6cm	15 (23.07%)	45 (69.23%)	5 (7.69%)	65 (100.0%)
> 6cm	15 (17.64%)	65 (76.47%)	5 (5.88%)	85 (100.0%)

Discussion

In our study of 150 pregnant women in patients with FHPD<7 cm 95.24% had vaginal deliveries and 4.76% has caesarean section in patients with FHPD > 7 cm had 22.2% vaginal deliveries, 55% caesarean section, 22.22% instrumental deliveries Jijisha Ali *et al*. [16] in 2018 at a tertiary care hospital in India has done research. When FHPD was less than 4 cm, everyone had a vaginal delivery; greater than 6.1 cm, almost everyone had a caesarean delivery. It was discovered that FHPD B 5.5 cm had the highest sensitivity (93%) and specificity

(94.4%). It was discovered that with FHPD B 5.5 cm, only 7.1 percent had LSCS, when its beyond 5.5 cm, 95 percent had LSCS.

Present study	FHPD	Bishop Score
Cut off taken for Vaginal delivery	< 7cm	≥ 6
Sensitivity	91%	41.6%
Specificity	83%	50%

TM Eggeb *et al.* [17] conducted a study in 2008 at Stavangar University in Norway. The best cut-off levels for predicting vaginal delivery were foetal head–perineum distance of 40 mm, the mean was 47.5mm from the foetal head to the perineum. Caesarean deliveries were performed 4% of the time with a little distance (40mm) and 16% of the time with a long distance.

Torkildsen *et al.* [18] conducted a study in 2009 at Stavangar University in Norway. The foetal head–perineum distance was 40mm in 50% of the women, and 93 percent of them delivered vaginally, compared to 67 percent if the distance was between 40 and 50 mm, and 18 percent if the distance was >50 mm, according to 2D ultrasound measurements.

YB Saroyo *et al.* [19] conducted a study in 2016 at Karavang Hospital in Indonesia. When the cut-off is taken at 4.34cm, 306 vaginal deliveries, 4 caesarean deliveries, and 13 instrumental deliveries.

In present study, 150 pregnant women with singleton pregnancy, cephalic presentation at or more than 38 weeks of gestation prior to induction or augmentation of labour, when FHPD cut off is taken as 7cm for prediction of vaginal deliveries, the sensitivity is 91 percent and specificity is 83 percent when FHPD cut off is taken as 7cm for prediction of vaginal delivery

In a study by Jijisha Ali *et al.*, [16] done in 2018, at a tertiary care hospital in India When the FHPD cut-off of 5.5 cm is used to predict vaginal deliveries in 250 women with a singleton pregnancy and cephalic presentation prior to induction of labour, the sensitivity is 97 percent, specificity is 88.1 percent, PPV is 92.9 percent, and NPV is 94.9 percent.

TM Eggeb *et al.* [17] conducted a study in 2008 at Stavangar University in Norway. When the FHPD cut-off is set at 4cm for predicting vaginal deliveries in 275pregnant women with singleton cephalic presentation prior to induction of labour, the sensitivity is 29.3%, the PPV is 95.9%, and the NPV is 16.3%. When the cut off is set at 4.5cm, the sensitivity is 49.4%, the PPV is 88.7%, and the NPV is 14.8%.

In a study by Torkildsen *et al.*, [18] done in 2009 at Stavangar university in Norway, the sensitivity is 67.4 percent, the PPV is 90.4 percent, and the NPV is 19.6 percent when the cut off is 5cm. When the FHPD cut-off of 4cm is used to predict vaginal deliveries in 110 pregnant nulliparous women with singleton term cephalic presentation, the sensitivity is 62 percent, the PPV is 93 percent, and the NPV is 19.6 percent.

In a study by Y B Saroyo *et al.* [19], done in 2016 at Karavang hospital, Indonesia, when FHPD cut off is taken as 4 cm for prediction of vaginal deliveries, the sensitivity is 69 percent, PPV is 92 percent, and NPV is 48 percent. When the FHPD cut-off of 4.35 cm is used to predict vaginal deliveries in 323 pregnant women with singleton cephalic presentation, the sensitivity is 91% and the specificity is 78%.

In a study by Torkildsen *et al.*, [18] the FHPD threshold for predicting vaginal delivery was set at 4cm, with a sensitivity of 62 percent and a specificity of 85 percent. The PPV is 93% while the NPV is 43%.

According to Mohamed *et al.* [20], the FHPD cut-off for predicting vaginal delivery is 4.8cm, with a sensitivity of 84.7 percent, specificity of 84 percent, PPV of 94.7 percent, and NPV of 61.8 percent.

In a study by Eggebo and Hassan [21], the FHPD cut-off for predicting vaginal delivery was set at 4cm, with a sensitivity of 69 percent, specificity of 82 percent, PPV of 92 percent, and NPV of 48 percent.

According to Yudianto *et al.* [19], the FHPD cut off for predicting vaginal delivery is 4.35cm, with sensitivity of 98 percent, specificity of 80 percent, PPV of 99.6%, and NPV of 44 percent.

According to Kasbaoui *et al.* [22], the FHPD cut off for predicting vaginal delivery is 4cm, with sensitivity of 73.3 percent, specificity of 47.6%, PPV of 23.7 percent, and NPV of 88.7%.

Limitations

In light of foetal distress, FHPD cannot be utilised to rule out meconium tainted fluid. In a free-floating head, FHPD cannot be precisely measured. Because of the blood stained liqor, it cannot be utilised to rule out abruptio placenta.Per vaginal examinations to be done if fetal distress occurs to rule out meconium stained liqor, cord prolapse as USG cannot predict the color of liqor. FHPD is estimated at 38 weeks POG, irrespective of which stage of labor. Did not analyze the different components of bishop score separately, the other parameters of the transvaginal cervical assessment like dilation, presence of wedging, or cervical angle.

Conclusion

In this study it is seen that FHPD has more predictability than bishop score when measured at 38 or more than 38 weeks period of gestation planning for induction or in early labor but Pelvic examinations are mandatory to rule out the colour of liquor in foetal distress or cord prolapse. SPER vaginal examinations are done after induction/active labor for assessment of progression of labor and bishop score calculation, but this score varies from examiner to examiner. The trans perineal ultrasound is done only once prior to the induction or augmentation of labor. This can be used to remove the observer bias in per vaginal examination. Maternal discomfort can be reduced by not doing repeated per vaginal examinations.In settings where the relevant technology and experience are available, foetal head to perineal distance can be utilised as an adjunct method to bishop score in predicting the mode of delivery and in selecting patients for trail of labour. Foetal head to perineal distance could be used as a better alternative to Bishop Score for successful prediction of labour outcome in the setting where the appropriate equipment and expertise are available

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Author's Contribution

Not available

Conflict of Interest

Not available

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