BISHOP SCORE AND RISK OF HAVING CESAREAN DELIVERY AFTER INDUCTION OF LABOR IN NULLIPAROUS WOMEN

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ABSTRACT

Background

Induction of labor (IOL) refers to the stimulation or artificially initiating uterine contractions before its spontaneous onset, to effect progressive effacement and dilatation of the cervix and, ultimately, delivery of a baby. The Bishop's Score also known as the cervical score is a pre-labor scoring system to assist in predicting the success of labor induction.

Objectives

To assess the outcome of induction of labor (whether vaginal delivery or Cesarean Section) concerning Bishop Score.

Patients and Methods

This is a prospective cohort study, conducted at Sulaimani maternity teaching hospital for 10months startingfrom 1st April 2019 till 30th of January 2020. The study included 152 pregnant nulliparous women with singleton viable fetus, cephalic presentation, and intact membranes with no medical disease who were admitted to hospital for induction of labor because of postdate pregnancy (gestational age> 40 weeks). The studied women were divided into two groups according to their Bishop Score on admission. Group (1) are women with Bishop Score < 6 who underwent Labour induction with 25 microgram misoprostol followed by oxytocin drip. Group (2) are womenwhose Bishop Score ≥ 6 underwent induction of labor by oxytocin drip. Women in both groups were followed up throughout induction till delivery and the outcome of labor was compared between the two groups.

Results

There was statistically significant association between the bishop score at time of induction and mode of delivery since (40.4%) of women in group (1) delivered by C/S and (59.6%) delivered vaginally, while the majority (80.9%) of women in group (2) had successful induction of labor and delivered vaginally and only 19.1% delivered by C/S, (P value = 0.005). The main cause of C/S in group(1)was failure of progress in first stage of labor (38.8%), followed by meconium stained liquor (27.7%) and fetal distress (25.2%). While for group (2), the main cause of C/S was meconium stained liquor (50.0%), followed by fetal distress (33.4%) .The difference was statistically highly significant (p-value =0.01) also the duration of labor was significantly related to bishop score, women with bishop score < 6 has longer duration of labor compared to women with bishop score ≥ 6 in spite of using misoprostol as a ripening agent (p- value=0.05).

Conclusion

Assessment of bishop score at the time of induction of labor can predict the outcome of induction. Nulliparous woman with a low bishop score (<6) at the time of IOL is at risk of failure of induction and delivery by C/S despite using cervical ripening agents.

Keywords: *Bishop Score, Having Cesarean Delivery, Nulliparous women.*

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INTRODUCTION

Induction of labor (IOL) refers to the stimulation or artificially initiating uterine contractions before its spontaneous onset, to effect progressive effacement and dilatation of the cervix and, ultimately, delivery of a baby. It is indicated when it is considered that there are benefits to the baby and/or the mother if the baby is delivered, compared to that if the baby remaining in the uterus [1]. IOL is a common procedure in modern obstetric with approximately one in five deliveries in the United Kingdom occur following induction of labor [2, 3]. There are many indications for IOL, e.g.: prolonged pregnancy (which is one of the most common indications), pre-labor rupture of membranes, intrauterine fetal growth restriction, intrauterine fetal death, medical condition complicating pregnancy like diabetes mellitus, hypertension, and pre-eclampsia [4, 5].

The Bishop's Score also known as the cervical score is a pre-labor scoring system to assist in predicting whether induction of labor will be required. The total score is calculated by assessing the following five components on manual vaginal examination by a trained professional: cervical dilation in centimeters, cervical effacement as a percentage, cervical consistency,cervical position, and Fetal station (the position of the fetal head concerning the pelvic bones) [6,7]. Cervical dilation is determined by estimating the diameter of the cervical opening on one side to that on the opposite side by digital examination. The position of the cervix is determined by the relationship of the cervical os to the vagina and is categorized as posterior, mid-position, or anterior. Along with position, the cervical consistency is determined to be soft, firm, or medium. Effacement usually experienced in term of the cervical canal length when the length reduced by half it is considered 50% effaced, when the cervix becomes thin it is completely effaced [6,7,8].

The examiner assigns a score to each component of 0 to 2 or 0 to 3. The highest possible score is 13 and the lowest possible score is 0, Table [1]

The Bishop score grades patients who would be most likely to achieve a successful induction. The duration of labor is inversely correlated with the Bishop score; a score that exceeds 6 describes the patient most likely to achieve a successful vaginal birth. Bishop scores of less than 6 usually require that a cervical ripening method (pharmacologic or non pharmacologic) be used before other methods. Successful induction of labor is related to the Bishop score, women with Bishop score less than six may have failed induction with increased risk of cesarean section. Nulliparous women are particularly at increased risk for cesarean section during induction of labor with Bishop score less than six. Many factors increase the success rate of labor induction such as multiparty, body mass index less than 30,with favorable cervix and birth weight less than 3500kg [10].

Methods of induction of labor depend on Bishop Score.If it is >6, induction of labor is likely to result in vaginal delivery, and any method of induction tends to work well.with favorable cervix, induction of labor undertaken with oxytocin [11].

If a cervix is considered to be unfavorable (Bishop Score <6), no method is highly effective for induction so that patient is a candidate for cervical ripening.Cervical ripening is a process that helps prepare the cervix for labor and can result in a more favorable cervix. There are two main types of cervical ripening, prostaglandin (PG) use, and mechanical methods. Prostaglandin E2 (PGE2) acts on the cervix by dissolving the collagen structural network of the cervix it can be given intra-vaginally or intracervical to a patient with a Bishop Score <6 that can help the cervix progress to a more favorable Bishop score in 12 to 24 hours. Mechanical methods such as a balloon catheter and hygroscopic dilators can be used as well. Mechanical methods, such as a balloon catheter, have shown to have similar outcomes to prostaglandins. Mechanical methods can be used in conjunction with prostaglandins in certain cases[12].

Misoprostol is a synthetic PGE1 analog that has been approved to be an effective agent for cervical ripening and labor induction [13].

Benefits of misoprostol include its stability at room temperature, rapid onset of action, and multiple routes of administration (oral, sublingual, vaginal, and rectal) and cheep. Dose of misoprostol in induction of labor is ranging from 50 microgram (5 doses of misoprostol administer every 4 hours per vagina) to 100 microgram (as single or repeat doses) [4].

Serious adverse effects of misoprostol use similar to those of other PGS, like uterine tachysystole with potential fetal and mother defect and meconium staining of liquor. It is potent uterotonic and should not be used in women with previous cesarean section because it will lead to uterine rupture [5].

Table 1. Modified Bishop Scoring System.

Factor	score 0	Score 1	Score 2	Score 3
Dilation of cervix (cm)	0	1-2	3-4	5 or more
Station	-3	-2	-1,0	Below spines
Consistency of cervix	firm	medium	soft	-
Effacement%	0-30	40-50	60-70	>80
Position of cervix	Posterior	Central	Anterior	-

PATIENTS AND METHODS

This a prospective cohort study conducted in Sulaimani maternity teaching hospital over 10 months starting from 1st April 2019 till 30th of January 2020. The study protocol was approved by the regulatory committee of the Kurdish Board of Medical Specialties (KBMS). The study included a group of pregnant women who were primigravidae with a singleton pregnancy, vertex presentation with postdate pregnancy (gestational age>40 weeks) who were admitted to the hospital for induction of labor. Exclusion criteria include multiple pregnancies, malpresentation, pre-labor rupture of membranes, and medical diseases complicating pregnancy like hypertension, diabetes mellitus, heart and thyroid diseases. All women included in the study were seen by two senior obstetricians and after taking full history and confirmation of gestational age (by early ultrasound scan before 20weeks gestation), the full examination was done including general examination with taking vital signs also obstetrical abdominal examination to assess the lie and presentation of the fetus.

Then pelvic digital examination was done to assess the bishop score and according to the bishop score, the method of induction was decided. So, the women included in the study were divided into two groups according to their bishop score. Group (1): women with bishop score < 6 who underwent induction of labor by misoprostol tablet 50 microgram given vaginally every six hours up to 4 doses for ripening the cervix then the continuation of induction by oxytocin infusion according to the response. Group (2): women with a bishop score ≥ 6 who underwent induction of labor with oxytocin infusion and artificial rupture of the membranes. Verbal consent was taken from all women included in the study. Then the women were followed up throughout the induction process till delivery with monitoring the progress of labor and fetal heart rate by sonicaid, and the following parameters were recorded and compared between the two groups: the mode of delivery whether vaginal delivery or cesarean section (C.S.), duration of labor (1st and 2nd stage of labor), and fetal heart rate abnormalities during labor, the indication of C.S., fetal outcome including gender, weight, any congenital abnormalities, and APGAR score at 1st and 5th minute and admission to the neonatal care unit.

Statistical analysis

The "IBM SPSS Statistics version 22" was used for the analysis of the data and both descriptive and inferential statistics were used. Furthermore, P-values of (≤0.05, and <0.001) were considered as statistically significant, and highly significant associations, respectively. Besides, Pearson Chi-Square and T-test were used to find out the significance of the association between independent and dependent items.

RESULTS

The study included a total of 152 pregnant women who were divided into two groups according to their bishop score. Group (1) included 89 pregnant women whose bishop score was <6 and group (2) included 63 pregnant women whose bishop score was ≥ 6.Table (2) illustrates the demographic characteristics of women in both groups. No statistically significant differences were found between the two groups concerning their mean age (24.94± 4.21 years versus23.69±5.04 years), occupation, and gestational ages. However, concerning their residence higher number of women in the group (2) were resident in rural area {17 (26.9%)} in comparison to group (1) which was {10 (11.2%)}, the difference was statistically significant (P-value = 0.012)

Regarding the outcome of induction of labor (mode of delivery) for women in both groups is shown in table (3):there was a statistically highly significant association between the bishop score at the time of induction and mode of delivery since 36 (40.4%) of women in the group (1) delivered by C/Sand 53 (59.6%) delivered

vaginally, while the majority (80.9%) of women in the group (2) had successful IOL and delivered vaginally and only 19.1% delivered by C/S, (P-value = 0.005).

The duration of induction of labor for women who delivered vaginally is shown inTable (4): group (1) versus (2): 43.4% versus 54.9% the duration was between 5- 10 hours, 30.2% versus 27.4% the duration was 10-15 hours, 11.3% versus 15.6% the duration was 15-20 hoursand 15.1% versus 2.1% was≥ 20 hours.The difference was statistical significance (p-value =0.05). The indications of cesarean section in both groups are shown in Table (5): for women in the group (1), the main cause of C/S was a failure of progress in the first stage of labor (38.8%), followed by meconium-stained liquor (27.7%) and fetal distress (25.2%). While for the group (2), the main cause of C/S was meconium-stained liquor (50.0%), followed by fetal distress (33.4%) and there was no case of failure of progress in the first stage of labor. The difference was statistically significant (p-value =0.01).

Table 6, illustrate fetal outcome in both groups, regarding fetal gender, 46.1% of babies in both groups were males and 53.9% of them were females. Regarding birth weight, 43 (48.3%) babies in group (1) weighed between 3-3.5kg versus 29 (46.1%) babies in group (2), while 35 (39.3%) of babies in group (1) weight 3.5-4kg versus 26 (41.3%) in group (2), moreover babies who weighed more than 4kg were 9 (10.2%) and 6 (9.4%) in group (1) and (2) respectively, the difference was statistically not significant (p-value = 0.97). finally, for Apgar score at 5th minute was as follow: the majority of babies in a group (1) and group (2) have Apgar score >7 at 5th minute {77 (86.5%) and 52 (82.5%) respectively}, while the others have Apgar score less than 7 {12 (13.5% and 11 (17.5%) respectively}.The deference was also statistically not significant (p-value = 0.5).

Table 2.Demographic characteristics of women in both groups.

Characteristics	Group (1) Bishop score<6	Group (2) Bishop score ≥ 6	P-value
Age (Mean ±S.D)	24.94± 4.21	23.69± 5.04	0.292
Resident	No (%)	No (%)	
Rural	10 (11.2)	17 (26.9)	0.012
Urban	79 (88.8)	46 (73.1)	
Occupation			
House wife	68 (76.4)	47 (74.6)	
Student	5 (5.6)	6 (9.5)	0.641
Employee	16 (18.0)	10 (15.9)	
Gestational age (weeks)			
40 - 40^{+6}	73 (82.1)	56 (88.8)	0.245
41 - 41^{+6}	16 (17.9)	7 (11.2)	

Table 3. Association of Outcome of induction (mode of delivery) with the bishop score

Mode of delivery	Group (1) Bishop score < 6 No (%)	Group (2) Bishop score ≥ 6 No (%)	p-value
Cesarean section	36 (40.4)	12 (19.1)	
Vaginal delivery	53 (59.6)	51 (80.9)	0.005
Total	89	63	

Table 4. Association of Duration of indication (hours) and bishop score.

Duration of induction (hours)	Bishop Score		P-value
	Group (1) < 6	Group (2) ≥ 6	
Less than 5	0 (0.0%)	0 (0.0%)	
5- 10	23 (43.4%)	28 (54.9%)	
10- 15	16 (30.2%)	14 (27.4%)	0.05
15- 20	6 (11.3%)	8 (15.6%)	
20 and more	8 (15.1%)	1 (2.1%)	
Total	53	51	

Table 5. Indications of C/S in both groups

Indications of C/S	Group (1) Bishop score < 6	Group (2) Bishop score ≥ 6	P-value
FOP in 1st stage	14 (38.8%)	0 (0.0%)	
FOP in 2nd stage	3 (8.3%)	1 (8.3%)	
Meconium	10 (27.7%)	6 (50.0%)	0.01
Fetal distress	9 (25.2%)	4 (33.4%)	
APH	0 (0.0%)	1 (8.3%)	
Total	36	12	

Table 6. Comparison in the fetal outcome in both groups.

Outcome	Group (1) No (%)	Group (2) No (%)	P-value
Male	41 (46.1%)	29 (46.1%)	0.997
Female	48 (53.9%)	34 (53.9%)	
Birth weight (kg)			
Less than 3 kg	2 (2.2%)	2 (3.2%)	0.976
3.0 -3.5 kg	43 (48.3%)	29 (46.1%)	
3.5- 4.0 kg	35 (39.3%)	26 (41.3%)	
4.0 kg and more	9 (10.2%)	6 (9.4%)	
Apgar core at 5th minute			
< 7	12 (13.5%)	11 (17.5%)	0.500
> 7	77 (86.5%)	52 (82.5%)	

DISCUSSION

A prospective cohort study was performed to evaluate the effect of Bishops score on the outcome of induction for postdate nulliparous women. In this study, no statistically significant difference found in maternal age, occupation, and gestational age between two groups, but concerning the residence, there were differences between rural area and urban and the difference was statistically significant (P-value =0.01), that is women with bishop score ≥ 6 were resident in a rural area more than women with low bishop score (< 6). This may be related to the fact that women in the rural area are more active and this may improve their bishop score.This result agreed with the study of Francis P.J.M. Vrouenraets and Eline S. A. van den Akker (2005) [14] who found no significant difference in maternal age in both groups but maternal age was a significant independent risk factor.

Regarding the correlation between bishop score and outcome of induction (mode of delivery), was highly significant, since 36 (40.4%) of women in group one (bishop score< 6) delivered by C/S and 53 (59.6%) delivered vaginally, while the majority (80.9%) of women in group 2 (bishop score ≥ 6) had successful IOL and delivered vaginally and only 19.1% delivered by C/S and the (P-value = 0.005), this mean that low bishop score is a risk factor for failed IOL and delivery by C/S.

The result is compatible with the study performed by Francis P.J.M. Vrouenraets(14). In their study, A bishop score of 5 or less was a predominant risk factor for cesarean delivery and cesarean delivery rate was significantly related to the Bishop score at admission P-value <0.001. Moreover, a similar result was found in the study performed by David P. Johnson (2003) [15] his result was the cesarean delivery rate was 32.5% among patients whose Bishop score was <5 versus 18.1% for a patient with a score >=5 (p <0.001). Also agree with the study of ArinzechidiebeleIkeotuonye (2018) [16] who found success of induction was most likely at Bishop score >8. Therefore, a low Bishop Score increase risk of cesarean section to double.

About the duration of induction among women who get successful induction and delivered vaginally, there was a statistically significant correlation between bishop score and duration of induction, that is women with low bishop score havea longer duration of labor despite using cervical ripening with misoprostol.This result agreed with the study of AnjelVaharatian(2005) [17]. he discusses in his result that induction in nulliparous women with unfavorable cervix has a high rate of the slow progress of labor. This prolonged duration of induction in group 1 is related to the unfavorable cervix and the cervix takes more time to become soft and progress. On the other hand,induction for group 2 has faster labor and shorter duration of labor because the cervix is soft with quick response.

About indication of cesarean section, the most common cause of cesarean section in the group with low bishop score (group 1) was a failure of progress in 1st stage, (38.8%) while in group 2 it was (0.0%), also meconium-stained liquor was more in groups 1.This may go back to a longer duration and more doses of misoprostol (P-value 0.01). this result compatible with the study of AnjelVahratian [(17)] explains very higher percentage of women with unfavorable cervix will develop dystocia (failure to progress in 1st stage).

About fetal outcome in both groups in the analysis, no statistically significant difference was found between both groups. This result agreed with the study of Francis P.J.M. Vrouenraets and Eline S. A. van den Akker in 2005 [(14)].

In conclusion, assessment of bishop score at the time of IOL can predict the outcome of induction. Nulliparous woman with a low bishop score (<6) at the time of IOL is at risk of failure of induction and delivery by C/S despite using cervical ripening agents.

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