



PREDICTING CESAREAN DELIVERY AFTER INDUCTION OF LABOR IN SINGLETON PREGNANCIES AT TERM

Gynaecology

Dr Sujata Sharma Professor & Head of department, Deptt. of Obstetrics & Gynecology, GMC Amritsar

Dr Anita Madan Associate Professor, Deptt. of Obstetrics & Gynecology, GMC Amritsar

Dr Rinku Jaiswal* Junior Resident, Deptt. of Obstetrics & Gynecology, GMC Amritsar *Corresponding Author.

ABSTRACT

BACKGROUND:- Induction of labor (IOL) refers to artificial stimulation of uterine contractions before the spontaneous onset of labor, with or without rupture of membranes. Goal of induction of labor is to achieve vaginal delivery and it is indicated in conditions where continuation of pregnancy might pose a risk to mother or fetal wellbeing.^{1,2,3}

MATERIAL AND METHODS:- In our study, 271 patients were selected for induction due to various indications. Different methods of induction were used depending upon the Bishops score.

RESULT:- Among 271 induced cases, 205 cases (75.64%) were delivered by vaginal route and 66 (24.36%) cases delivered by cesarean section. Among them 27.7% (75 cases) were induced with Dinoprostone gel inserted intra-cervically. Most of the induced cases were in the age group of 21-30 years of age and 65.7% (178 cases) were primigravida. Among them 33.5% were between 39-40 weeks of gestation. 76.38% cases had poor Bishops score. Common indications for LSCS was fetal distress with meconium stained liquor. 20.30% newborn needed admission and 82.29% had the good apgar score.

CONCLUSION: Though the cesarean section rate is higher in this study in comparison to WHO references of 15%. This being a tertiary care hospital gets mostly high risk referral cases.

KEYWORDS

apgar score, fetal outcome, Induction of labor, maternal outcome.

INTRODUCTION

Induction of labor (IOL) refers to artificial stimulation of uterine contractions before the spontaneous onset of labor, with or without rupture of membranes. Goal of induction of labor is to achieve vaginal delivery and it is indicated in conditions where continuation of pregnancy might pose a risk to mother or fetal wellbeing.^{1,2,3}

The proportion of infants delivered at term following induction of labour can be as high as one in four deliveries.⁴ In developed countries, up to 25% of all deliveries at term now involve induction of labor.

Different methods of inductions include tablet mifepristone / infusion oxytocin / tablet misoprostol / dinoprostone gel / infusion oxytocin / intracervical foley's catheter / sweeping of membranes depending on pre-induction Bishop's score.

According to recent studies, induction fails in 20% of induced pregnancies.⁵ Multiple Risk factors for failed induction have been identified like high BMI, Nulliparity, advanced maternal age, short stature, and increase weight gain during pregnancy, hypertension, and diabetes mellitus, unfavourable modified bishop score or fetal indications like fetal growth restriction and post-term inductions, which have been found to increase the risk of caesarean delivery.⁶⁻⁸

An accurate prior prediction of the chances of caesarean delivery by using Modified Bishop Score and Partograph following induction of labor may prevent complications due to emergency caesarean.

This study co-relates various factors like Maternal age, height, BMI, Gravida, Para, Bishop's score, maternal conditions like gestational hypertension, gestational diabetes and predicts the rate of risk factors for caesarean delivery after induction of labor in singleton term pregnancy with vertex presentation.

MATERIAL AND METHODS

This study was conducted from April 2019 to June 2020 with duration of one year in the Department of Obstetrics and Gynecology, Bebe Nanaki Maternal and Child Healthcare Centre of Government Medical College, Amritsar. This is a prospective observational study. In course of study, 271 pregnant women at term between 37-42 weeks were induced, out of which 75 were induced with Dinoprostone gel, 112 were induced with Misoprostol given by per-vaginum, per-oral or sublingual, 64 by infusion oxytocin, 13 by tablet mifepristone and rest by intra-cervical foley's depending on pre-induction cervical status assessed by BISHOP'S score.

Prior to induction Details including patient's antenatal history, Maternal Age, Weight, Height, Body mass index (BMI), Socioeconomic status, Parity, Period of Gestation, Medical conditions – Gestational diabetes mellitus, Hypertension, Hypothyroidism etc., Presence of premature rupture of membrane or not. Pelvic Examination at time of induction of labor to note Cervical dilatation, Cervical length, Fetal station, Membranes status, time of rupture of membranes (spontaneous or artificial), nature of liquor after rupture of membranes, indication of induction of labor, Modified Bishop Score at time of induction was noted.

Written consent was taken, basic requirements and contraindications for induction was assessed. The induced patients were monitored in labor room for progress of labor by plotting partogram. Misoprostol tablet was given 4 hourly per-vaginum and dinoprostone gel was used intra-cervically every 6 hourly with the maximum of 3 doses.

Maternal and fetal outcome were observed. Maternal outcomes included mode of delivery, incidence of reasonable induction and Fetal outcomes includes one and five minutes Apgar score and NICU stay required.

RESULT

During our study period, 271 pregnant women with term gestation were induced for the various indications.

TABLE 1

Method of induction of labor		No. of cases	%age
Tab. Misoprostol	Tab. Misoprostol per vaginum	47	17.3
	Tab. Misoprostol per oral	64	23.6
	Tab. Misoprostol sublingual	1	.4
Dinoprostone gel		75	27.7
Infusion oxytocin		64	23.6
Tab. Mifepristone followed by	Tab. Misoprostol	9	3.3
	Infusion oxytocin	4	1.5
Intracervical foleys catheter followed by	Tab. Misoprostol	2	0.7
	Infusion oxytocin	1	0.4
	Dinoprostone gel	4	1.5
Total		271	100.00

Table 1 showing different methods of induction.

The most common indication for induction was PROM >12 hours

(Premature/ Prelabor rupture of membrane) which included 75 (27.7%) cases. The next common indication for induction of labor was post dated pregnancy which included 56 (20.7%) cases. Other indications for induction were gestational hypertension at term, pre-eclampsia, eclampsia, gestational diabetes at term, Intrauterine growth restriction (IUGR), intra-hepatic cholestasis of pregnancy, Rh negative pregnancy at term gestation.

Out of total 271 cases, 14.4% (39) cases were under the age of 20 years, 79.3% (215) cases in the age group 21-30 years, 6.3% (17) cases were more than 30 years of age.

TABLE 2

Obstetric formula		Mode of delivery						Total	P value	
		NVD		LSCS		Forceps VD				
		No.	%age	No.	%age	No.	%age			
Gravida	Primi	116	65.17	55	30.90	7	3.93	178	100.00	0.001
	Multi	81	87.10	11	11.83	1	1.08	93	100.00	
Parity	Nullipara	128	65.31	60	30.61	8	4.08	196	100.00	0.003
	Para 1	51	92.73	4	7.27	0	0.00	55	100.00	
	Para 2	17	89.47	2	10.53	0	0.00	19	100.00	
	Para 3	1	100.00	0	0.00	0	0.00	1	100.00	
	Total	197	72.69	66	24.35	8	2.95	271	100.00	

Table 2 showing correlation of gravidity and parity with different modes of delivery.

Table 3

BMI (Kg/m ²)	Mode of delivery						Total	P value	
	NVD		LSCS		Forceps VD				
	No.	%age	No.	%age	No.	%age	No.		%age
<18.5	1	33.33	2	66.67	0	0.00	3	100.00	
18.5-24.9	135	83.33	24	14.81	3	1.85	162	100.00	
≥25	61	57.55	40	37.74	5	4.72	106	100.00	
Total	197	72.69	66	24.35	8	2.95	271	100.00	

Table 3 showing correlation of pre-pregnancy BMI with mode of delivery after induction.

Table 4

Medical history		Mode of delivery						Total		P value
		NVD		LSCS		ForcepVD				
		No.	%age	No.	%age	No.	%age	No.	%age	
Diabetes mellitus	absent	194	74.04	61	23.28	7	2.67	262	100.0	0.002
	Present	3	33.33	5	55.55	1	11.1	9	100.0	
Hypertension	absent	136	79.06	30	17.44	6	3.48	172	100.0	
	Present	61	61.61	36	36.36	2	2.02	99	100.0	
	TOTAL	197	72.69	66	20.66	8	2.95	271	100.0	

Table 4 showing co-relation of medical history with mode of delivery.

In Diabetic group, 33.33% (3cases) delivered by vaginal route and 55.55% (5 cases) cases underwent caesarean section after induction of labor with 'p-value' of 0.02 which is significant. That means maternal diabetic is a risk factor (almost 3 fold) for undergoing caesarean after induction. (Table 4)

In hypertensive group, 61.61% (61 cases) delivered by vaginal route, 36.36% (36 cases) underwent caesarean section, 2.02% (2 cases) delivered by applying forceps. The 'p value' is 0.002 which is significant showing that maternal hypertension is a risk factor (2 fold) for undergoing caesarean section after induction of labor. (Table 4)

Table 5

Pre- induction status		Mode of delivery						Total		P value 0.009
		NVD		LSCS		Forceps VD				
		No.	%age	No.	%age	No.	%age	%age	No.	
Cervical dilatation	<3.0	166	72.17	60	26.09	4	1.74	230	100.00	0.009
	>3.0	31	75.61	6	14.63	4	9.76	41	100.00	
Bishop score	<6.0	148	71.50	56	27.05	3	1.45	207	100.00	
	>6.0	49	76.56	10	15.63	5	7.81	64	100.00	
Total		197	72.69	66	24.35	8	2.95	271	100.00	

Table 5 showing :-

In group with initial cervical dilatation less than 3 cm (230 cases), there were 72.17% (166 cases) delivered vaginally, 26.09% (60 cases)

underwent caesarean sections and 1.74% (4 cases) delivered by forceps delivery after induction of labor. The 'p-value' is 0.009 which was significant statistically.

In cases with Bishop's score less than 6 (total 207 cases), 71.50% (148 cases) delivered vaginally, 27.05% (56 cases) underwent caesarean section, 1.45% (3 cases) had forceps delivery. The low Bishop's score (less than 6 score) act as a predictor for caesarean section following induction of labor was statistically significant.

DISCUSSION

Mode of delivery included normal vaginal delivery, ventouse delivery, forceps delivery or caesarean section. Various predictors of caesarean after induction of labor were then analysed statistically.

In this study, out of 271 cases, 197 cases (72.7%) delivered vaginally, 8 cases (3%) had forceps delivery and rest 66 cases (24.36%) underwent caesarean sections.

This study included various antepartum factors that were reliably known prior to the start of induction of labor and then analysed according to outcome of induction.

In this study, mean maternal age was 25 years with both extremes (<20 years and >30 years) included; 39 cases below 20 years of age and 17 cases above 30 year of age. There was no significant relationship found with maternal age as a predictor for caesarean section after induction in our study. There was maximum number of cases around age of 25 years, there was no significant age group distribution. Out of 17 cases above age of 30 years, there were only 6 cases (35.3%) who underwent caesarean section after induction as compared to 50 cases out of 215 cases (23.3%) who were under age group of 21 to 30 year, which shows slight increase in caesarean sections after induction above the age of 30 years which is not statistically significant. According to a study by Grazzale et al.,⁹ the rate of caesarean section was not influenced by maternal age (that was 45.5% caesarean in cases with age ≥35 years vs. 40.0% in cases with age <35 years group, p=0.33, insignificant statistically) but was influenced by pre-induction Bishop's score.

In this study, height of cases was between 145 cm to 165 cm. There were only 14 cases below 155 cm height, out of which 11 cases (78.57%) delivered vaginally and only 3 cases (21.43%) underwent caesarean section. According to the study of Tolcher et al.,⁶ short height was associated with increased rate of caesarean section after induction. But there was no such correlation found out in our study as there were less number of cases in the group with short height.

In our study, strong correlation ('p value'-0.001) was found with high maternal body mass index (BMI) and rate of caesarean section. The rate of later in overweight (≥25 kg/m²) and obese cases almost doubled up (37.74%) than the group with normal body mass index (18.5 to 24.9 kg/m²) (14.81% caesarean section). Similarly, Poobalan et al.¹⁰ concluded in his study that caesarean delivery risk increased by 50% in overweight and obese women as compared with women with normal BMI.

Maternal hypertension was found to be associated with almost two fold increased risk of caesarean section after induction. 36.36% cases underwent caesarean section in hypertensive group after induction of labour. According to study done by Tolcher et al.,⁶ hypertension was associated with a nearly two fold risk of caesarean delivery.

In our study, Maternal diabetes mellitus (including both gestational diabetes as well as overt diabetes) was also found to be associated with almost three fold increase in number of caesarean sections after induction. 55.55% cases underwent caesarean sections in diabetic group. According to study by Tolcher et al.,⁶ maternal diabetes was associated with an increased risk of caesarean section by eight fold.

In present study, there was increased rate of caesarean section among primigravida as compared to multigravida, which was almost three fold. There were 30.90% caesarean sections among primigravidae whereas only 11.83% caesarean sections were done among multigravida after induction of labor. ACOG 2009 review 20 cohort studies and found out that the rate of caesarean section was 28% among primigravida and 10% among multigravida.

No correlation was found between gestation age and caesarean section in our study. There were 49.88% (15 cases) cases who underwent

cesarean section above 40 weeks of gestation with 'P-value' 0.773. Study by Nilesh et al,¹¹ showed that post-term pregnancy was not associated with significant increase in cesarean after induction of labor (30.8% cesarean in postdated pregnancies vs. 41.9% cesarean sections in cases within due date, with CI-1.0370).

In the present study, 27.05% cesarean sections were done in patients with Bishop's score < 6 whereas 15.63% cesarean sections were done in the group with pre-induction Bishop's score $\geq$ 6. Cesarean section rate increased 1.5 fold with bishop score less than 6. According to study by Grazelda et al,⁹ it was found that there was higher incidence of cesarean section among cases with pre-induction Bishop score less than 5 with $p=0.02$, which was strongly significant statistically.

CONCLUSION-

This study was intended to predict the risk factors for cesarean section after induction of labor. In this study, most common indication for induction was PROM. In our study, Maternal BMI, Medical conditions like hypertension and diabetes, Nulliparity, , initial cervical dilatation < 3 cm, Pre-induction Bishop score < 6 have been found to be significantly associated with increased risk of cesarean sections after induction of labor whereas maternal age, height and post term are not associated with significant increase in cesarean section.

In this study, cesarean section rate was higher (24.36%) in comparison to WHO references of 15% ,as this hospital being a tertiary care center gets mostly high risk referral cases.

As induction of labor will continue to be a therapeutic tool and alternative to cesarean delivery for pregnancies at risk of maternal or neonatal morbidity, it is worth studying whether induction is the safest option for all women depending on assessing the pre-induction risk factors.

REFERENCES:

1. American College of Obstetricians and Gynecologists. ACOG practice bulletin no. 107: induction of labor. *Obstet Gynecol.* 2009;114:386-97.
2. Cunningham FG, Leveno KJ, Bloom SL, Spong CY, Dashe JS, Hoffman BL et al. Williams Obstetrics. Chapter 26, Induction and Augmentation of labour. 24th edition. USA. McGraw-Hill Education. 2014;p.523.
3. Tenore JL. Methods for cervical ripening and induction of labor. *American Family Physician.* 2003;67(10):2123-8.
4. Martin JA, Hamilton BE, Sutton PD, Ventura SJ, Menacker F, Kirmeyer S et al. Births: final data for 2005. *National vital Statistics Reports.* 2007;56(6):1-03.
5. Gülmezoglu AM, Crowther CA, Middleton P. Induction of labour for improving birth outcomes for women at or beyond term. *The Cochrane Database of Systematic Reviews.* 2006 Oct 18(4):CD004945.
6. Tolcher MC, Holbert MR, Weaver AL, McGree ME, Olson JE, El-Nashar SA et al. Predicting cesarean delivery after induction of labor among nulliparous women at term. *Obstetrics and Gynecology.* 2015;126(5):1059.
7. Parkes I, Kabiri D, Hants Y, Ezra Y. The indication for induction of labor impacts the risk of cesarean delivery. *The Journal of Maternal-Fetal & Neonatal Medicine.* 2016;29(2):224-8.
8. Levine LD, Downes KL, Parry S, Elovitz MA, Sammel MD, Srinivas SK. A validated calculator to estimate risk of cesarean after an induction of labor with an unfavorable cervix. *American Journal of Obstetrics and Gynecology.* 2018;218(2):254-7.
9. Kwayke-Ackah G, Burger A, de la Vega G, Kainz G, Rochon M, Quiñones JN. Influence of maternal age in mode of delivery after term induction of labor. *The Journal of Maternal-Fetal & Neonatal Medicine.* 2020:1-6.
10. Poobalan AS, Aucott LS, Gurung T, Smith WC, Bhattacharya S. Obesity as an independent risk factor for elective and emergency caesarean delivery in nulliparous women—systematic review and meta-analysis of cohort studies. *Obesity Reviews.* 2009;10(1):28-35.
11. Mhaske N, Agarwal R, Wadhwa RD, Basannar DR. Study of the risk factors for cesarean delivery in induced labors at term. *The Journal of Obstetrics and Gynecology of India.* 2015;65(4):236-40.