Assessment of the Influence the Risk of Emergency Cesarean Delivery in Induced Labors at Term: An Observational Study

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Abstract:

Aim: The aim of this study was to identify those factors which influence the risk of emergency cesarean delivery in induced labors at term.

Material & Methods: A case–control study was conducted in the Department of Obstetrics and Gynaecology over a period of one year. A total of 350 women were studied, out of which 150 women delivered by emergency caesarean section and 200 women delivered vaginally. The cohort included all women with a live singleton fetus in the cephalic position and induced at term (C37 weeks). Cases were women who delivered by emergency caesarean section and controls were women with a vaginal delivery among the cohort. Informed consent was taken for all patients.

Results: Using logistic regression analysis, all comparisons are estimated and expressed as OR with 95 % CI. Factors associated with cesarean delivery were analysed. Our study had shown that maternal age C35 years, BMI C30 kg/m2, nulliparity, preinduction Bishops score less than 5, gestational diabetes mellitus, and intrauterine growth restriction are significantly associated with caesarean delivery. The presence of epidural analgesia, gestational hypertension, postterm pregnancy, and premature rupture of membranes was not associated with significant increase in cesarean delivery if labor was induced at term.

Conclusion: A vaginal delivery is the best choice for both mother and child. However, it is better to take those patients with multiple risk factors for elective cesarean section rather than inducing them at term. Women with multiple risk factors for caesarean can be taken up for elective cesarean section rather than inducing them at term.

Keywords: Induction of labor; Cesarean section; Term pregnancy; Risk factor.

Introduction

The history of labor induction dates back to the time of Hippocrates' original descriptions in which mammary stimulation and mechanical dilation of the cervical canal are used methods of induction. [1] Induction implies stimulation of contractions before the spontaneous onset of labor, with or without ruptured membranes. Augmentation refers to stimulation of spontaneous contractions that are considered inadequate. Induction is indicated when the benefits to either mother or fetus outweigh those of continuing the pregnancy. Cesarean delivery rates have risen in all age, racial, and ethnic groups. Many factors have contributed to this trend, including the adoption of evidence-based recommendations encouraging cesarean delivery for a breech presentation and concerns over the safety of a trial of labor for women with a previous cesarean delivery. [2] The increasing use of labor induction and the greater burden of chronic health risks, such as obesity, diabetes, and hypertension,

among women of childbearing age may also play a role. [3– 6] Studies analyzing birth certificate data could not attribute the rise in primary cesarean delivery to increases in maternal health risks. [7,8] Although cesarean delivery has led to improvements in outcomes for women and neonates with medical indications, the potential benefits must be weighed against the health risks to the mother in their absence. These include higher rates of hysterectomy, postpartum hemorrhage, venous thromboembolism, wound complications, and hospital readmission. [9,10]

Not much is known about factors related to a cesarean delivery after induction of labor in multiparous women. In women where cesarean delivery is required, the procedure not only carries the operative risks in the index pregnancy, but also increases risks for future pregnancies. [11] WHO recommends IOL procedure to be done only when it is more advantageous to terminate the pregnancy

than to let it progress and it also recommends non-clinical interventions to reduce unnecessary CS delivery. [12] As the main goal of IOL is to help the mother to start labor and attain vaginal delivery, the intervention may fail to achieve this goal and hence necessitate CS intervention. [13,14] CS is a medical procedure which involves delivery of a baby through an incision made in the mother's abdomen and uterus. [15,16] The frequency of CS has been steadily increasing globally in the past several decades with a rate of 32.8%. [17]

Adverse effects of CS compared to vaginal delivery include; higher costs of surgery, slower recovery for the woman, increased risk of adverse events in subsequent pregnancies, increased rate of infections, injury to nearby organs, an increased need for blood transfusion and death. [18-20] Induction of labor has been associated with a risk of emergency cesarean delivery. The decision to induce a delivery in less imminent situation is often difficult. If induction fails, an emergency cesarean delivery has to be performed, and maternal risks are greater in emergency cesarean delivery than those in elective cesarean deliveries.

So, the aim of this study was to identify those pregnancies which are associated with greater risk of cesarean delivery when induced at term.

Material & Methods

A case–control study was conducted in the Department of Obstetrics and Gynecology, ICARE Institute of medical sciences and Research & Dr Bidhan Chandra Roy Hospital,Haldia, West Bengal, India over a period of one year. A total of 350 women were studied, out of which 150 women delivered by emergency caesarean section and 200 women delivered vaginally. The cohort included all women with a live singleton fetus in the cephalic position and induced at term (C37 weeks). Cases were women who delivered by emergency caesarean section and controls were women with a vaginal delivery among the cohort. Informed consent was taken for all patients. All subjects were enrolled after they agreed to participate in the study after signing written informed consent.

Exclusion Criteria

The exclusion criteria include previous cesarean section, uterine scar (myomectomy), multifetal gestation, malpresentation, and where vaginal delivery was otherwise contraindicated.

Information of women induced was obtained from case records and antenatal cards. All women enrolled were examined prior to induction and induced using Dinoprostone gel (0.5 mg) intracervically (doses may be repeated after 6 h, with a maximum of two doses in 24 h) and if required, labor was augmented using oxytocin (starting dose of 6 mU/min, with 6 mU/min increase every 40 min, but employs flexible dosing based on uterine response).

Statistical Analysis

The data were modeled through multiple logistic regressions, and adjustments were made for independent variables that had a significant influence on the risk of cesarean delivery in the univariate analysis. The data analysis was performed using IBM SPSS Statistics version 18 software and Hosmer and Lemeshow Test. Student's t-test was performed to see mean difference. Chi-square test was performed to see difference in proportions.

Results

Table 1: Analysis of risk factors for cesarean delivery

Risk factors	Cesarean delivery (N = 150) N%	Vaginal delivery (N = 200) N%	Crude odds ratio (95 % CI)
Maternal age			
<35 years	135 (90)	196 (98)	7.345 (1.586–34.367)
>35 years	15 (10)	4 (2)	
Body mass index (Kg/M²)			
<30	105 (70)	190 (95)	5.80 (2.934–11.996)
>30	45 (30)	10 (5)	
Parity			
Nullipara (0)	135 (90)	124 (62)	0.175 (0.092–0.355)
Multipara (C1)	15 (10)	76 (28)	
Bishops score			
<5	48 (32)	106 (53)	0.4245 (0.2559–0.6879)
>5	102 (68)	94 (47)	
Epidural analgesia			
No	45 (30)	64 (32)	1.1570 (0.6908–1.9360)
Yes	105 (70)	136 (68)	
Hypertensive disorders in pregnancy			

Yes	40 (26.66)	60 (30)	0.8589 (0.5032–1.4453)
No	110 (73.34)	140 (70)	
Gestational diabetes mellitus			
Yes	33 (22)	40 (20)	1.9830 (1.0587–3.7244)
No	117 (78)	160 (80)	
Postterm pregnancy			
Yes	45 (30)	60 (30)	1.0335 (0.6177–1.7411)
No	105 (70)	140 (70)	
IUGR			
Yes	2 (1.34)	20 (10)	0.0813 (0.0108–0.6402)
No	148 (93.34)	180 (90)	
PROM			
Yes	30 (20)	24 (12)	1.3889 (0.7389–2.6019)
No	120 (80)	176 (88)	

Using logistic regression analysis, all comparisons are estimated and expressed as OR with 95 % CI. Factors associated with cesarean delivery were analysed. Our study had shown that maternal age C35 years, BMI C30 kg/m2, nulliparity, preinduction Bishops score less than 5, gestational diabetes mellitus, and intrauterine growth restriction are significantly associated with caesarean delivery. The presence of epidural analgesia, gestational hypertension, postterm pregnancy, and premature rupture of membranes was not associated with significant increase in cesarean delivery if labor was induced at term.

Table 2: Multivariate analysis of risk factors for cesarean delivery

Risk factors	Adjusted odds ratio (95 % CI)	Sig.
Maternal age	8.532	0.003
Body mass index	28.448	0.000
Nulliparity	27.033	0.000
Bishops score	12.058	0.001
Epidural analgesia	0.312	0.536
Hypertensive disorders in pregnancy	0.386	0.542
Gestational diabetes mellitus	4.642	0.034
Postterm pregnancy	0.014	0.846
IUGR	9.012	0.003
PROM	1.048	0.344

Multivariate analysis showed statistically significance in terms of maternal age, BMI, nulliparity, Bishops score, gestational DM and IUGR.

Discussion

The history of labor induction dates back to the time of Hippocrates' original descriptions in which mammary stimulation and mechanical dilation of the cervical canal are used methods of induction. [21] Induction implies stimulation of contractions before the spontaneous onset of labor, with or without ruptured membranes. Augmentation refers to stimulation of spontaneous contractions that are considered inadequate. Induction is indicated when the benefits to either mother or fetus outweigh those of continuing the pregnancy. Common indications include gestational hypertension, premature rupture of membranes, non-reassuring fetal status, postterm pregnancy, intrauterine growth restriction, and various maternal medical conditions such as chronic hypertension and diabetes. Women with a previous preterm delivery had a higher risk of cesarean delivery after induced labor than those with at least one previous term delivery. This finding corresponds with the results of the study of Park et al. [22] He examined the predictive value of previous obstetric history, Bishop score and sonographic measurement of cervical length for predicting failed induction of labor in parous women at term. Induction failed in 15 women (14%) of whom 13 delivered vaginally after 24 hours and two had a caesarean delivery (1.8%). Our results are in line with the results of Park, indicating that the course of induction in women with a history of preterm delivery differs from women with a term delivery.

Using logistic regression analysis, all comparisons are estimated and expressed as OR with 95 % CI. Factors associated with cesarean delivery were analysed. Our study had shown that maternal age C35 years, BMI C30 kg/m^2, nulliparity, preinduction Bishops score less than 5, gestational diabetes mellitus, and intrauterine growth restriction are significantly associated with

caesarean delivery. The presence of epidural analgesia, gestational hypertension, postterm pregnancy, and premature rupture of membranes was not associated with significant increase in cesarean delivery if labor was induced at term. Poobalan et al [23] did a systematic review on the effect of BMI in nulliparous women on mode of delivery. They concluded that cesarean delivery risk is increased by 50 % in overweight women (BMI 25–30 kg/m2), and is more than double for obese women (BMI 30–35 kg/m2) compared with women with normal BMI (20–25 kg/m2). Study by Sheiner et al [24] and Ehrenberg et al [25] also showed significant association between obesity and caesarean delivery even after the exclusion of hypertensive disorders and diabetes mellitus. Our study also has shown significant association between high BMI (>30 kg/m2) and cesarean delivery.

As far as role of preinduction Bishops score is concerned, our study has showed significant association between low preinduction Bishops score (<5) and caesarean delivery. Similar results were seen in study by Johnson et al. [26] Study by Ehrenberg et al [25] and Rosenberg et al [27] has shown significant association between cesarean delivery and pregestational as well as gestational diabetes mellitus. Our study has concluded the same results. The increased risk of CS on high birth weight infants may be explained by the high risk of labor obstruction that may be caused by shoulder dystocia which happens when the baby's anterior shoulder gets caught above the mother's pubic bone, leading to complications including brachial plexus injury or clavicle fracture, vaginal tears, and excessive bleeding. This obstruction eventually led to failure in vaginal delivery and hence, necessitates emergency CS delivery. [28]

In our study, postterm pregnancy is not significantly associated with cesarean delivery. Similar results were seen in a study by Sanchez-Ramos et al. [29] They recommended that labor induction at 41-weeks' gestation for otherwise an uncomplicated singleton pregnancy reduces cesarean delivery rates without compromising perinatal outcomes. Our study has shown that IUGR and cesarean deliveries are significantly associated. However, K E Boers and associates [30] have shown that there is no increase in operative and instrumental delivery rates in induced labors in pregnancies complicated by IUGR. In our study, pregnancies with PROM and induction of labor were not significantly associated with cesarean deliveries. Induction of labor in such cases reduces risk of maternal infections. Systematic review by Dare et al[31] concluded the same results.

Conclusion

A vaginal delivery is the best choice for both mother and child. However, it is better to take those patients with multiple risk factors for elective cesarean section rather than inducing them at term. Women with multiple risk factors for caesarean can be taken up for elective cesarean section rather than inducing them at term.

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