Original Article

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Induction of Labor and Risk for Emergency Cesarean Section in Women at Term Pregnancy

Gomathy Ethiraj[a, b], Aditi C. Ramachandra[a], Sandhya Rajan[a]

Abstract

Background: Induction of labor has become one of the most common interventions in obstetrics, and because of this we have the increasing number of Cesarean sections. Identifying these risk factors which increase the risk of Cesarean section has become important so that we can induce patients putting them in lower risk of Cesarean section. Cesarean sections should be audited using the obstetrical concepts and parameters for induction of labor.

Methods: A prospective case-control study has been conducted among pregnant women between 37 - 42 weeks of gestation, who were recruited from the labor ward for a period of 1 year. All women enrolled for the study were clinically examined to assess for Bishop's score, obstetric scan and cardiotocography (CTG). Induction was done using tab misoprostol 50 µg 6th hourly for a maximum of four doses in 24 h and augmented with oxytocin if required. In our tertiary hospital in Kolar district of Karnataka we decided to conduct a study with a sample size of 178 patients. We assessed the risk factors in term pregnancies and their delivery outcome following induction. Baseline demographic details along with pregnancy risk factors were taken into account. Induction agent as well as induction to delivery interval with those that underwent Cesarean section was also taken into account. Pregnancy outcome was determined.

Results: This study concluded that significant risk factor for Cesarean was primigravida with fetal distress due to oligohydramnios, compared to other risk factors such as preeclampsia, gestational hypertension, post-dated pregnancy and gestational diabetes mellitus. Bishops score prior to induction was < 6. Out of these women 43 underwent Cesarean after induction in view of fetal distress for non reassuring nonstress test (NST). Primigravida had a risk of 4.4 times for Cesarean after induction, and absence of oligohydramnios was a protective factor in the study with odds ratio of 0.2.

Conclusions: Induction of labor at term has reduced the number of Cesarean sections in our study with a single risk factor.

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[a]Department of Obstetrics and Gynaecology, Sri Devaraj Urs Medical College, Kolar- 563101, India
[b]Corresponding Author: Gomathy Ethiraj, Department of Obstetrics and Gynaecology, Sri Devaraj Urs Medical College, Kolar- 563101, India.
Email: egomathy72@gmail.com

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Introduction

Induction of labor has become one of the most common interventions in obstetrics, and with this we have the increasing number of Cesarean sections. Identifying these risk factors which increase the risk of Cesarean section has become important so that we can induce patients putting them in lower risk of Cesarean section.

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 of labor is defined as the process of artificially stimulating the uterus to start labor. 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, post-term pregnancy, intrauterine growth restriction, and various maternal medical conditions such as chronic hypertension and diabetes.

The past few decades have witnessed an increase in Cesarean section rate. This increase has resulted from evidence-based recommendations on how to handle certain conditions, such as anomalous fetal position, major placental abruption, placenta previa and prolapsed cord; however it is mainly the consequence of a growing number of women presenting at labor with uterine scars, delivering at advanced ages, or demanding surgical delivery. Although increased frequency of obstetric interventions, induction of labor appears to have contributed to current trends in Cesarean section rates [2].

Obstetric interventions are considered justified when benefits of prompt delivery outweigh the consequences of a Cesarean section. There is evidence for an increase in the frequency of labor induction without any such agreed upon indication [3]. There is a lot of variability in respect to the geographic location and hospital protocols regarding induction of patients and hence this observational study was conducted in R.L Jallapa Hospital and Research Centre, Kolar to assess the risk of Cesarean section following induction of labor.

Table 1. Baseline Demographic Details of the Subjects

Baseline demographics	Number	Percentage
Age		
< 20 years	32	17.90%
21 to 30 years	141	79.20%
> 30 years	5	2.80%
Parity		
Primigravida	112	62.90%
Multigravida	66	37.10%
Bishop's score		
1	4	2.2
2	30	16.8
3	70	39.3
4	53	29.7
5	17	9.5
6	4	2.2
Gestational age		
37 - 38 weeks 6 days	35	19.50%
39 - 40 weeks 6 days	88	49.40%
41 - 42 weeks	55	30.80%
Indication for induction of labor		
GDM	2	1.10%
GHTN	4	2.20%
IE	2	1.10%
OLIGO	106	59.50%
PDP	43	24.10%
PE	16	8.90%
PROM	4	2.20%

GDM: gestational diabetes mellitus; GHTN: gestational hypertension; IE: imminent eclampsia; IUD: intrauterine fetal demise; OLIGO: isolated oligohydramnios; PDP: post-dated pregnancy; PE: preeclampsia; PROM: premature rupture of membranes.

Materials and Methods

With the approval by the Ethical Committee Board, this observational study was conducted at the Department of Obstetrics and Gynaecology, R.L.JALLAPA Hospital, Kolar for a period of 1 year from November 2015 to October 2016. The study included all singleton live term pregnancies (37 - 42 weeks) with cephalic presentation and excluded malpresentations, previous Cesarean, multiple pregnancies and uterine malformations. Informed consent was taken for all patients.

All women enrolled for the study were clinically examined to assess for Bishop's score, obstetric scan and cardiotocography (CTG). Induction was done using tab misoprostol 50 µg 6th hourly for a maximum of four doses in 24 h and augmented with oxytocin if required. The sample size was calculated to be 178 based on prevalence of 18% Cesarean section in urban India [4]. Sample size was taken from prevalence and determinants of Cesarean section in private and public health facilities in South Asian communities. We assessed the risk factors in term pregnancies and their delivery outcome following induction.

Data was entered into Microsoft Excel data sheet and was analyzed using SPSS 22 version software for comparing proportions. Student's *t*-test was performed to see mean difference. Chi-square test was performed to see difference in proportions.

Table 2. Association Between Mode of Delivery and Induction Method

Mode of delivery	Misoprostol	Syntocinon	Total
Vaginal delivery	127	8	135
Cesarean	43	0	43

$\chi^2 = 2.593$, df = 2, P = 0.274.

Results

A total of 178 patients were included in the study group. Demographic data were tabulated (Table 1).

From them 79.2% of the patients included in the study were of the age group 21 to 30 years. Primigravida women made up 62.9% of the total study population, and 49.4% of all women were of the gestational age group of 39 weeks to 40 weeks 6 days.

The most common indication of induction was oligohydramnios (59.5%) followed by post-dated pregnancy.

Out of the 178 patients induced as shown in Table 2, only 43 patients ended up having Cesarean compared to the 127 patients who delivered vaginally. The most common risk associated with induction for taking these patients for Cesarean section was fetal distress in the form of non-reassuring non-stress test (NST).

When we compared the mode of delivery to the mean induction delivery in each group we found that patients who were induced and delivered vaginally had a mean induction delivery interval lesser compared to the Cesarean group which was statistically significant. As shown below in Table 3.

The Apgar score was average between both the groups (> 7) and showed no statistical significance. The percentage of

Table 3. Mode of Delivery and Mean Induction Delivery Interval Between Both Groups

Mode of delivery	Number of deliveries	Mean induction delivery interval	P value
Vaginal delivery	135	12.21 h	< 0.001
Cesarean	43	19 h	

Table 4. Association Between Mode of Delivery and Baby Condition

Baby condition	Vaginal delivery	Cesarean
NICU	1.5%	38.5%

Chi-square test (χ^2) = 47.07, df = 2, P < 0.001.

babies admitted to neonatal intensive care unit (NICU) was 1.5% vs. 38.5% in vaginal delivery and Cesarean delivery group, which was statistically significant (Table 4).

Discussion

This study was conducted at R.L.Jallappa Hospital to determine the risk of Cesarean after induction. Baseline demographic details (Table 1) along with pregnancy risk factors were taken into account. Induction agent as well as induction to delivery interval with those that underwent Cesarean section was also taken into account. Pregnancy outcome was determined.

In our study 79.2% of patients were in the age group of 21 - 30 years with 62.9% of them being primigravida. Studies done by Cnattingius et al [5] and Ehrenberg et al [6] also showed that there were significantly more patients who were primigravida who underwent induction with risk of Cesarean section. Of these patients 49.4% were in the gestational age of 39 weeks to 40 weeks 6 days.

When no clear indication for induction is identified, the selection of women undergoing induction of labor should be based on favorability of cervix [7, 8]; and the use of cervical ripening agents should be considered when cervix is not favorable [7]. As a determinant of successful induction, the Bishop's score has been commonly used to evaluate cervical status before induction; but there is a wide variation across settings regarding the cut-off point of this score to define a favorable cervix [9]. Different proportions of women undergoing induction with lower values for this score will determine the different Cesarean rates. In the current study, Bishop's score prior to induction was < 6. This had a significant association with Cesarean delivery. This was similar to a study done by Johnson et al [10] which showed significant association between low preinduction Bishop's score and risk of Cesarean section.

The most common indication for induction of the patients is post-dated pregnancy followed by preeclampsia. A study by Zhang et al [11] showed that more than half of women with preeclampsia and eclampsia had Cesarean delivery. Our study did not show a significant association between hypertensive disorders of pregnancy and Cesarean delivery.

In our study, pregnancies with premature rupture of membranes (PROM) and induction of labor are not significantly associated with Cesarean deliveries. Induction of labor in such cases reduces risk of maternal infections. Systematic review by Dare et al [12] concluded the same results.

Primigravida had a risk of 4.4 times for Cesarean after induction and presence of oligohydramnios was associated with more chances of Cesarean section with odds ratio of 0.2.

Higher labor induction rates have been associated with increased Cesarean section rates [13], most likely reflecting no appropriate selection criteria. This situation is particularly important in cases which there are no indication for prompt delivery. On the contrary a study done by Darney et al [14] concluded that elective induction done at term was associated with decreased odds of Cesarean section when compared to expectant management. Teixeria et al [15] concluded that Cesarean section after induced labor varied significantly across hospitals where similar outcomes were expected. The effect was more evident when the induction was not based on the unequivocal presence of commonly accepted indications.

Despite these unfavorable factors for successful induction, the Cesarean section rate in our study was 24.1% compared to that in vaginal delivery, which was 75.9%. The most common risk associated with induction for taking these patients for Cesarean section was fetal distress (61.5%) in the form of non-reassuring CTG, with 38.5% of the neonates taken to NICU. According to Mhaske et al [16] who studied risk factors for Cesarean section at term found that it is better to take women with multiple risk factors for elective Cesarean section than inducing them at term.

Several prospective studies have shown that induction of women at gestational age of 41 weeks or more decreases the risk of Cesarean delivery; and there is promising evidence that labor induction, when used discriminately by protocol, may reduce the odds of a Cesarean delivery.

Although a smaller sample was studied the success rate of induced vaginal delivery was more. The limitation of this study was that it was a smaller sample size.

Conclusions

Hence we can conclude that induction of labor at term has reduced the number of Cesarean sections in our study with a single risk factor. Primigravida with isolated oligohydramnios was a single risk factor in our study. Other risk factors were not associated with a particular mode of delivery. Induction of labor is only to be performed when there is a clear medical indication and other conditions where it outweighs the potential harms. Induction of labor should be performed with caution since the procedure carries the risk of uterine hyperstimulation and fetal distress [17].

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Conflict of Interest

All authors have declared no conflict of interest in respect to this study.

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