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Study of the risk factors for cesarean delivery in induced labor at term

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Abstract
Introduction: Induction of labor has become one of the most common intervention in obstetrics. Induction of labor is a common and essential element of the contemporary obstetric practice and now account for approximately 20% of all deliveries (NICE 2008). Induction of labor (IOL) is often the principal medical intervention utilized to decrease both maternal and neonatal morbidity and mortality.
Aim: To identify those factors which influence the risk of emergency cesarean delivery in induced labor at term.
Materials and Methods: A total of 100 admitted women with a live singleton live fetus in cephalic presentation and induced at term (≥37 weeks) in labor room of MCSG, SMS Medical College, Jaipur. Cases were women who delivered by emergency cesarean section and controls were women with a vaginal delivery among the cohort.
Observations: The study shows that pregnant women with advanced maternal age (age>35yrs, p value=0.0008), BMI>35kg/m3 (p value=0.0001), poor preinduction BISHOP SCORE (p value=0.0001) and nulliparity (p value=0.0001) was significantly associated with failed induction.
Conclusion: There are several clinical elements that need to be considered to estimate the success of induction and minimize the risk of emergency c/s. factors increasing the likelihood of failed induction were advanced maternal age≥35years, maternal BMI ≥30kg/m^2, nulliparity, poor preinduction bishop score<5.
So if induction fails, an emergency caesarean delivery has to be performed, and maternal and fetal morbidity are greater in emergency C/S than those in elective C/S.

Keywords: induction of labor (IOL), caesarean section(c/s), age, body mass index (BMI), parity

1. Introduction
Induction of labor has become one of the most common intervention in obstetrics. Induction of labor is a common and essential element of the contemporary obstetric practice and now account for approximately 20% of all deliveries (NICE 2008). The World Health Organization (WHO) recommends induction to be performed with a clear medical indication and when expected benefits outweigh potential harms. In addition to the rise in the rate of indicated induction of labor, it seems that there has also been an increase in the rate of induction of labor that is not indicated for a medical reason.
There are a number of complications of pregnancy that confer significant ongoing risk to the mother or fetus (e.g., preeclampsia; preterm premature rupture of the membranes (PPROM); intrauterine growth restriction (IUGR); and post term pregnancy). For these conditions, induction of labor (IOL) is often the principal medical intervention utilized to decrease both maternal and neonatal morbidity and mortality. Failed induction is defined as the inability to achieve active phase of labour (cervical dilatation≥4cm within 12 hours of initiating oxytocin) or within 24 hours of induction [1]. In Emergency cesarean section there is lack of facility to m*eet al*l the criteria of surgery, so the procedure has to be done in deficient circumstances. Both maternal and fetal complications are understandably more common in emergency cases [2-4].

2. Aim
To identify those factors which influence the risk of emergency cesarean delivery in induced labor at term.

3. Materials and Method

This hospital based study conducted in labor room of MCSG, SMS Medical college, Jaipur. A total of 100 admitted women with a live singleton fetus in cephalic presentation and induced at term (≥ 37 weeks) in labor room were recruited. Cases were women who delivered by emergency cesarean section and controls were women with a vaginal delivery among the cohort.

3.1 Inclusion criteria - Pregnant women with- a) Term live singleton fetus in cephalic presentation and no contraindication to vaginal delivery admitted for induction of labor. b) Reassuring fetal heart rate (110 to 160 bpm).

3.2 Exclusion criteria - Pregnant women with a) Previous caesarean section, b) Previous uterine rupture, c) Uterine scar (like-myomectomy), d) Multifetal gestation, e) Placenta previa, f) Abnormal fetal lie and presentation.

3.3 Statistical analysis: Mean and standard deviation was calculated for continuous variables like age, BMI, bishop score. The qualitative data were analysed by using chi square test and chi-suare with yates corrections. The quantitative data were analysed by z-test. Multiple risk factors were analysed by using logistic regression analysis. Level of significance in term of p-value was considered as significant if p value ≤ 0.05.

4. Results and Observations

The present study was carried out at Jaipur. A total of 100 women admitted at term for induction of labor were taken into the study over a period of 12 months from jan 2018 - dec 2018 after fulfilling the eligibility criteria. Their data was collected from the antenatal card and case sheet and the outcome was studied in terms of vaginal delivery or caesarean section. Cases included all women who were delivered by emergency cesarean section due to failed induction and controls included all women who were delivered vaginally.

Table 1: Age wise distribution of study subjects

Age group	No.	%
20-24	17	17.00
25-29	58	58.00
30-34	12	12.00
≥35	13	13.00
Total	100	100

In our study out of 100 women, 17 (17%) women were among 20-24 yrs age group, 58(58%) belongs to 25-29 yrs age group, 12(12%) women belongs to 30-34 yrs age group and remaining 13% were in ≥35 yr age group.

Table 2: Distribution according to age & mode of delivery of study subjects

Age group (yrs)	Mode of delivery		Total
	LSCS	NVD	
<35	31	56	87
≥35	11	2	13
Total	43	58	100

In our study out of 100 women, 87(87%) women were among <35 yrs age group in whom 31 women (35.63%) underwent C/S and 56 women (64.36%) delivered by vaginally. 13(13%) women were among ≥35yrs age group in whom 11 (84.61%) underwent C/S and 2 (15.38%) delivered vaginally. In statistical analysis p value is 0.000845 that is highly significant. Emilio *et al* (2014) also found similar association. Maternal age was one independent significant variable ($p = 0.01$, OR 1.08) determining the risk of cesarean delivery [5].

Table 3: Distribution according to BMI & mode of delivery of study subjects

BMI	Mode of delivery		Total
	LSCS	NVD	
<30	30	55	85
≥30	12	3	15
Total	42	58	100

Out of 100 women, 85 (85%) had BMI <30kg/m^2 in whom 30(35.29%) underwent C/S and 55(64.70%) delivered vaginally. 15 (15%) had BMI ≥30Kg/m^2 in whom 12(80%) underwent C/S and 3(20%) delivered vaginally. In statistical analysis p value is 0.000122 that showed highly significant association. Poobalan *et al* (2009) did a systematic review on the effect of BMI in nulliparous women on mode of delivery. They also concluded that cesarean delivery risk is increased by 50% in overweight women (BMI 25–30 kg/m^2), and is more than double for obese women (BMI 30–35 kg/m^2) compared with women with normal BMI (20–25 kg/m^2) [6]

Table 4: Distribution according to Parity & mode of delivery of study subjects

Parity	Mode of delivery		Total
	LSCS	NVD	
Nullipara	36	21	57
Multipara	6	37	43
Total	42	58	100

Out of 57 nullipara women, 36 women (63.15%) had C/S and 21 women (36.84%) delivered vaginally and in 43 multipara, 6(13.95%) had C/S and 37(86.04%) delivered vaginally. Statistical analysis showing a highly significant results (p value 0.001). Cnattingius *et al* (2005) also showed that the risk of cesarean delivery was increased among nulliparous. (Adjusted OR =4.92, 95 % CI = 2.81-8.61), short (adjusted OR = 2.20, 95% CI = 1.06-4.59), and obese women (adjusted OR = 2.03, 95% CI = 1.07-3.84) [7].

Table 5: Distribution according to BS & mode of delivery of study subjects

Bishop score (out of 13)	Mode of delivery		Total
	LSCS	NVD	
<5	40	35	75
≥5	2	23	25
Total	42	58	100

In our study women with BS <5 at the initiation of induction of labor were 75(75%) and with BS ≥5 were 25(25%). women with BS<5 who underwent C/S were 40(53.33%) and 35(46.66%) were delivered vaginally and women with BS≥5 who underwent C/S were 2(8%) and 23(92%) were delivered vaginally. statistical analysis showed p value is 0.0001 showing that this result is highly significant. Vahration *et al* (2005) also found increase C/S rate in unfavourable cervix [8]. Son GH *et al* (2013) did a retrospective cohort study and also found that the patients who underwent C/S had less cervical dilatation and a lower BS on admission than those patients who delivered vaginally (0.76 ± 0.47 vs. 0.92 ± 0.58 cm, p = 0.03 and 1.16 ± 1.25 vs. 1.51 ± 1.34, p = 0.04, respectively) [9].

5. Conclusion

There are several clinical elements that need to be considered to estimate the success of induction and minimize the risk of emergency c/s. In this study we conclude that, Factors increasing the likelihood of failed induction were advanced maternal age ≥35years, maternal BMI ≥30kg/m^2, nulliparity, poor preinduction bishop score<5. It was found that as the number of risk factors increase the chances of emergency cesarean sections increase. So if induction fails, an emergency cesarean delivery has to be performed, and maternal and fetal morbidity are greater in emergency C/ S than those in elective C/S.

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