Factors affecting outcome of Induction of labor-A retrospective analysis.

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Abstract

Introduction: Labour induction offers the potential to avoid caesarean delivery and to achieve vaginal delivery when continuation of pregnancy is no longer in the best interest of the mother or fetus. Induction of labour has a major health impact on the woman and her baby, so the decision to undertake induction of labour needs to be clear and clinically justified. This is an observational   retrospective study planned to review the induction of labour done in the department of Obstetrics and Gynaecology, Jawaharlal Institute of Post Graduate Medical Education and Research Hospital, Puducherry, India.

Aim and objectives: To study the obstetric outcome and to compare the various maternal and fetal factors between successful and unsuccessful induction of labour.

Material and method: All the pregnant women of gestational age of 28 weeks and above with live fetus that underwent induction of labour. Induction was considered successful if the patient delivers vaginally and a failure if the patient delivers through caesarean section. Complication of induction of labour both maternal and fetal was retrieved. The data were analyzed statistically at 5% level of significance and p value <0.05 were considered as significant.

Result: Higher BMI was associated with failure of IOL (p value=0.027). Pre induction Bishop Score was found to be highly affecting the outcome of induction of labour (p value =0.001). The maximum number of successful induction was in the women in whom dinoprostone gel (90%) was used. Among the 403 women who underwent induction of labour, 337 (83.62%) women delivered vaginally and 66 women (16.37%) underwent caesarean section. In the patients who delivered by vaginal route, 85 (21.1%) women had instrumental delivery. The maternal complication rate in induced labour was 24.1%.The neonatal morbidity (14.8%) and mortality (1.74%) in all the cases having induction of labour. sepsis and post partum haemorrhage were more in failed IOL compared to successful IOL, this was found to be statistically significant (p=0.001).More cases of Neonatal intensive care unit admission were observed in case of failed induction of labour compared to successful induction cases (p=0.001).

Conclusion: BMI, pre-induction bishop score, type of cervical ripening agent modify successful outcome.

Requirement of prolonged oxytocin infusion indicate requirement of higher rate of cesarean section. Highest maternal morbidity and NICU admission is associated with instrumental delivery post induction.

Keywords: NICU, IOL, BMI.

Introduction

Induction of labour (IOL) is very frequently encountered as an obstetric intervention. Labour induction helps in avoiding caesarean section and achieving vaginal delivery .It is an intervention designed to artificially initiate uterine contractions leading to progressive effacement and dilation of cervix and birth of baby(1)

The labour induction may be complicated by uterine tachysystole, fetal distress, prolonged labour, prolonged rupture of membrane, chorioamnionitis. Since the uterus and cervix are often not prepared for labour, it may be associated with significantly increased risk of caesarean delivery when compared to women entering labour spontaneously**. (2)**

The rate of induction of labour has doubled in the past decade from 10% to 20%. Some of the increase in rate of induction of labour relates to rise in the number of medically and obstetrically indicated inductions. However, it appears that marginally indicated and elective inductions account for a large proportion of induction of labour. (3)

Induction of labour has a major health impact on the woman and her baby so the decision to undertake induction of labour needs to be clear and clinically justified. This study is planned to review the induction of labour done the department of obstetrics and gynaecology, Jawaharlal Institute of Post graduate Medical Education and Research Hospital, Puducherry, India.

Aims and Objectives

1. To study the obstetric out come in induced labour.

2. To compare the various maternal and fetal factors between successful and unsuccessful induction of labour.

Material and Method

This study was conducted in the department of obstetrics and gynaecology, JIPMER, Puducherry from 1st of august 2013 to 30th September 2013. Ethics clearance (IEC/SC/2012/4/147) was obtained from institute ethic committee (Human studies) on 15/11/2012.This is an observational study. The study population included all the nulliparus and multiparus women of gestational age of 28 weeks and above with live fetus that underwent induction of labour. Spontaneous onset of labour, multiple pregnancies, and scarred uterus was excluded from the study. The data were collected from the parturition register and inpatient records maintained in the hospital. Detailed data regarding the demography of the study group ,body mass index, gestational age, indication of induction,pre ripening Bishop score ,method used for ripening, method of induction were noted. Induction was considered successful if the patient delivers vaginally and a failure if the patient delivers through caesarean section. Complication of induction of labour both maternal and fetal was retrieved. The data were analyzed statistically at 5% level of significance and p value <0.05 were considered as significant.

Results

Table 1: Comparison of demography between successful and failed IOL groups

Total no of cases=403

Characteristic	Successful IOL(n=337)	Failed IOL(66)	P value
Mean age in years(range18-38)	24.18±4.28	25.29±4.27	0.054
Mean BMI(where information was available)	26.73±4.15	30.28±6.2	0.027
Parity in percentage	Nulliparous-223(81%) Multiparous-114(88%)	Nulliparous-51(18.6%) Multiparous-15(11.6%)	0.075
Mean gestational age in weeks	39.04±1.8	39.32±1.7	0.24

Table -1 compares the demographic characteristics of the women having successful IOL with the women with failed IOL. Mean age of the women in successful IOL was comparable to that of failed IOL (24.18±4.28 years vs. 25.29±4.27years, p=0.054).majority of women belongs to the age group of 18-29 in both the groups. Maternal age did not influence the outcome of labour. While higher BMI was associated with failure of IOL (p value=0.027).multiparus women had more successful induction of labour (88%), but this was not statistically significant (p=0.075).So parity did not affect the induction of labour. The mean gestational age of successful IOL was comparable with failed IOL (39.04±1.8 vs. 39.32±1.7, p=0.24).This implies gestational age did not affect the outcome of induction in our study.

Table 2: Indication of induction of labour and outcome

Indication of IOL	Number (n=403)	Percentage (%)
Pastdates	97	23.9
Oligohydramnious	86	21.4
Premature rupture of membrane	83	20.6
Pregnancy induced hypertension	71	17.7
Rh incompatibility	18	4.5
Gestational diabetes mellitus	12	3
Intra uterine growth retardation	10	2.5
Preterm premature rupture of membrane	6	1.5
Pregestational diabetes	4	1.0%
Others*	16	3.7%

*Included? High rupture of membrane, Decreased fetal movement, Gestational hypertension, Small for gestational age, APLA positive, Big baby, Abruption, Decreased MCA resistance.

Table -2 shows the distribution of women according to the indication for induction of labour. Common indication of induction of labour was pastdates, oligohydramnious, premature rupture of membrane, and pregnancy induced hypertension. There was only one case in which induction of labour was done electively without an indication**.**

Table 3: Bishop Score and outcome)

Bishop score	Successful IOL(n=337)	Failed IOL(n=66)	P value
<5(n=370)	304(82.2%)	66(17.83%)	0.001
≥5(n=33)	33(100%)	0(0%)	

Table-3 shows when the initial Bishop score was 5 or more induction of labour was 100% successful .on the other hand, induction of labour failed in 17.8% of women who had an initial Bishop score of less than 5. Pre induction Bishop Score was found to be highly affecting the outcome of induction of labour.

Table 4: Method of cervical ripening

Methods of ripening	Successful IOL(n=337)	Failed IOL(n=66)
Foley(n=174)	145(82%)	29(17.8%)
Foley-PGE2 (n=82)	68(83%)	14(16.8%)
PGE2(n=99)	89(90%)	10(10%)
PGE1(n=20)	15(75%)	5(25%)
Extra Amniotic saline infusion(n=6)	5(83%)	1(16.6%)
Oxytocin(n=5)	4(80%)	1(20%)
Others*	11(64.7%)	6(35.29%)

*3 or more ripening methods used.

Table -4 shows that the maximum number of successful induction was in the women in whom dinoprostone gel (90%) was used. But the difference is not statistically different between the successful and failed IOL groups. Method of cervical ripening did not influence outcome of induction. When Bishop Score was very poor (≤1), the women needed multiple attempts at cervical ripening. This group had highest number of failed induction (35.3%).

Table 5: Methods of induction and outcome

Method of labour Induction	Number	Percentage	Total
Oxytocin	188	65.73%	n=286
Amniotomy	98	34.26%	

Table-5 shows that one hundred and seventeen women (29.03%) went into spontaneous labour with measures taken for cervical ripening. Above table shows the methods used for induction of labour in remaining 286 patients. Oxytocin (65.73%) and amniotomy (34.26%) were the most commonly used methods of induction of labour. Mean oxytocin infusion duration was more in the failed IOL group (10.31±7.2hrs) compared to successful IOL group (6.01±3.5hrs) and this was found to be statistically signifant (p=0.001).

Table 6: Mode of delivery

Mode of delivery	Number(n=403)	Percentage
Vaginal delivery	252	62.43%
Instrumental delivery	85	21.1%
Caesarean section	66	16.37%

Table 6 shows among the 403 women who underwent induction of labour, 337 (83.62%) women delivered vagially and 66women (16.37%) underwent caesarean section. In the patients who delivered by vaginal route, 85 (21.1%) women had instrumental delivery. The caesarean section rate among the group of women who had IOL was similar that of overall caesarean section rate in the department (16-18%).however the rate of instrumental delivery was more than double the overall instrumental delivery rate in the department (8-10%)

Table 7: Maternal complication associated with induction of labour.)

Maternal complication	Number(n=97)	Percentage
PROM	9	9.27%
Maternal	5	5.15%

exhaustion		
Maternal trauma	20	20.61%
PPH	22	22.68%
Sepsis	33	34.02%
Others*	8	8.24%

*APH, convulsion in previously non hypertensive patient, Retained placenta, Wound dehiscence requiring secondary suturing.

Table -7 shows various maternal complications. The maternal complication rate in induced labour was 24.1%. Maternal trauma, which included cervical tear, vaginal laceration, various degree of perineal tear, post partum hemorrhage(PPH) and sepsis were the most common complications associated with IOL. The rate of PPH was twice higher than overall PPH rate in the department. Rest was similar to the overall occurrence.

Table 8 : Neonatal outcome

Reason for NICU admission	Number(N=60)	Percentage
Respiratory distress	31	51.6%
Me conium aspiration	14	23.3%
Low birth weight	4	6.6%
Prematurity	5	8.3%
Others*	6	10%
Mortality	7	11.6%

*seizure, anomaly, septic screening

Out of 403 induced labour cases, the neonatal morbidity (14.8%) and mortality (1.74%) rates were not higher than the overall figures. Respiratory distress and me conium aspiration were the most common reasons for Neonatal Intensive Care Unit admission.

Table 9 : maternal complication and outcome of IOL

Complication	Successful IOL(n=337)	Failed IOL(n=66)	P value
PPH	16(4.8%)	17(25.8%)	0.001
Sepsis	8(2.4%)	10(25.8%)	

Table 9 shows sepsis and post partum haemorrhage were more in failed IOL compared to successful IOL,this was found to be statistically significant (p=0.001).

Table 10: Neonatal complication and outcome

Admission to NICU	Successful IOL	Failed IOL	p value
Yes	34(10%)	26(39.4%)	0.001
No	303(89.9%)	40(60.6%)	

Table 10 implies Neonatal Intensive Care Unit admission was seen more in case of failed IOL compared to successful IOL, this was found t be statistically significant(p=0.001)

Discussion

Prediction of a successful labour induction requires identification of the factors associated with successful labour induction. Coming to the age of the mother, Panagopoulo et al in 2006, found failed IOL rate higher with increased maternal age (<35y-23.53%, ≥35y-46.46%)(4).In our study among the women who underwent IOL, only 8(1.98%) patients were>35 yrs old, among whom 5(41.2%) had failed induction of labour, but this was found statistically insignificant. It was observed that elderly gravidas were considered as precious pregnancy and decision for caesarean section was taken much earlier than other cases. The rate of failed IOL was significantly high in patients with BMI ≥30±6.2(p=0.027) in our study and this result was similar to study done by Rayamajhi et al(5).In a meta analysis by Ellis JA shows obese women usually land up in caesarean birth following induction.(6) Failed

IOL was seen more in naulliparous patients (18.6%) compared to multiparus patients (11.6%) in present study but this was not statistically significant(p=0.075).In study of Rattigan et al (7) more failure was seen in naulliparous patients compared to multiparous patients which was statistically significant. Many studies agree Parity to be a major predictor of IOL success. (8-10)

Present study shows no significant association between gestational age and failed IOL. Study by Feghali M et al shows success of IOL in late preterm (34–36 ^{6} weeks) and of term pregnancies is almost equal. (11)

Most common indication for IOL were pastdates (23.9%) and second was oligohydramnious (AFI<5) (21.4%).Rayamajhi et al (5) found most common indication to be the pastdate pregnancy. Bishop score is one of the well established independent factors determining outcomes of IOL.In present study we found 100% successful outcome with favorable Bishop score(≥5).This outcome was similar to studies done by Vrouenraets et al(12).In contrary, a systematic review by Kolkman et al (13) shows Bishop score to be a poor predictor of successful IOL.

Methods of induction of labour:

Method of ripening and induction of labour differed according to institute protocol. In this present study in majority of patients Foleys catheter and Dinoprostone gel were used for pre-induction cervical ripening followed by oxytocin or amniotomy for induction .Pennell et al (14) found similar outcome of induction of labour in both Foleys catheter group (18.7%) and PGE2 group (17.4%).Choudhury et al (15) in a study reported that PGE1 is more effective than intracervical PGE2 in bringing successful IOL. In contrary in our study the maximum number of successful induction

was associated with dinoprostone gel (90%) and with Foleys catheter it was 82%.This may be due to the departmental policy of routine use of Foley catheter if Bishop Score is less than 3 and use of direct PGE2 gel if Bishop score between 3 and 7.

The rate of failed induction of our study is 16.37% which is less compared to other studies done by Khan et al (18.1%) and Rayamajhi et al 19.7% (**3**, **5**) .The most common indication of caesarian section was fetal distress (56.66%) and non progress of labour (23.33%).The percentage of instrumental delivery in the induced labour group is 21.4% and this finding was similar to the studies Khan et al (35%) (**3**) And Rayamajhi et al (**5**) (27%).This high rate of instrumental delivery may be because usually second stage is cut short in many of the women undergoing induction of labour for some indication. Common complication associated with induction of labour was maternal trauma, post partum haemorrhage (5.6%) and sepsis (8.2%) which was similar to the study done by Ehrenthal et al (16).Neonatal morbidity rate was 12.5% in the study conducted by Simon et al (17) .In our study neonatal morbidity is 16.11% and mortality (1.74%) and mortality was seen more with babies admitted for meconium aspiration syndrome.

Conclusion

Induction of labor should be at best of maternal and fetal interest. Achieving safe vaginal delivery with lowest possible maternal and peri-natal complications should be our goal. Careful selection of cases considering the BMI, pre-induction bishop score, type of cervical ripening agent can improve successful outcome. Strict vigilance requirement of prolonged oxytocin infusion may indicate requirement of cesarean section according to this study. Decision of cesarean section verses instrumental delivery should be carefully

decided in all induced labors as increased maternal morbidity and NICU admissions are associated with this group.

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