ORIGINAL RESEARCH PAPER

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MATERNAL AND FOETAL OUTCOMES IN SPONTANEOUS VERSUS INDUCED LABOUR- A CROSS SECTIONAL STUDY

KEY WORDS: Induction of labour, Spontaneous labour, Maternal outcome, Foetal outcome

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ABSTRACT

Introduction: Induction of labour is the artificial initiation of labour before its spontaneous onset for the purpose of delivery of the foetoplacental unit. The purpose of this study was to determine whether the current practice of elective labour induction was associated with differences in mode of delivery, demand for pain relief and foetal outcomes when compared with labour of spontaneous onset.

Methods And Materials: This cross-sectional study carried out on 100 pregnant women with singleton pregnancy between 37 and 41 weeks of gestation with cephalic presentation delivering in labour room. This study included two groups: Electively induced (50) and spontaneous group (50).

Results: In electively induced group 44% had normal vaginal delivery and 6% had instrumental delivery. With spontaneous labour, 78% had normal vaginal delivery and 4% had instrumental delivery. Postpartum hemorrhage (PPH) was 20% in electively induced group and 6% in the spontaneous group (p-0.038). Apgar scores, mean birth weights were comparable. Analgesia demand was 22% in the electively induced group when compared to 6% in the spontaneous group.

Conclusion: The present study emphasizes that elective induction of labour in nulliparous women with a single cephalic presentation is associated with increased risk of caesarean section, which is predominantly related to an unfavorable cervix. Hence, elective induction is safe and efficacious. Caesarean delivery rate was more due to nulliparity or unfavorable cervix not due to elective induction itself.

INTRODUCTION:

Induction of labour is the artificial initiation of labour before its spontaneous onset for the purpose of delivery of the foetoplacental unit. It is one of the most common procedures in obstetrics. Over the past 10 years, it has become one of the most frequent procedures performed in the labour room. Worldwide, the prevalence of labour induction varies greatly between countries and even between different regions of the same country. In general, it is at least 20% higher in developed countries than in developing countries.[1-3] Induction of labour is on the rise in the U.S, increasing from 9.5 percent in 1990 to 22.1 percent in 2004, according to the National Center for Health Statistics.[4,5] It is well accepted therapy when initiated for a medical or obstetric indication. When induction of labour is done for convenience or psychosocial reasons, it is termed as elective induction. The increase in inductions is thought to be due to several factors, including an increase in elective inductions either due to patient preference, physician practice style or the practice of defensive medicine.[6,7] It could also be due to pregnant women's wish to end their pregnancy because of physical discomfort; concern that rapidly progressing labour would preclude timely arrival at the hospital or epidural placement; scheduling issues; or ongoing concerns for maternal, foetal, or neonatal complications. Clinicians caring for pregnant women may have similar nonmedical reasons for recommending elective induction of labour for their patients.[8] They, too, may wish to end the ongoing risk for complications in the pregnancy, limit their patient's discomfort, or reduce the risks imposed by geographic barriers.[9]The rate of labour induction varies by location and institution. Induction should be considered when it is felt that the benefits of delivery outweigh the potential maternal and foetal risks. Risks of induction include increased rates of operative vaginal delivery, caesarean delivery, excessive uterine activity with abnormal foetal heart rate patterns, and delivery of preterm infant due to incorrect estimation of gestational age.[10,11]According to the American College of Obstetricians and Gynaecologists, Induction of labour is undertaken when, in opinion of the physician, the risks of delivery to the mother or foetus or both are less than the risk of continuing the pregnancy.[12] Several studies have also shown that compared with spontaneous onset of labour, medical and elective induction of labour in nulliparous women at term with a single foetus in cephalic presentation is associated with an increased risk of caesarean delivery, predominantly related to an unfavorable Bishop score at admission.[13]Regardless of the indications for doing induction, induction of labour is associated with significantly reduced spontaneous delivery rates overall and an increased caesarean section rate in nulliparous women. The purpose of this study was to determine whether the current practice of elective labour induction was associated with differences in mode of delivery, demand for pain relief and foetal outcomes when compared with labour of spontaneous onset.

MATERIAL AND METHODS:

This study was conducted in the Department of Obstetrics and Gynaecology at Sir Ganga Ram Hospital from May 2010 to April 2012.This was a cross sectional study carried out on 100 pregnant women with singleton pregnancy between 37 and 41 weeks of gestation with cephalic presentation delivering in labour room. This study included two groups, electively induced (n=50) and spontaneous group (n=50). Both groups were matched for age (± 4 years), parity and gestational age (± 1 week). The study compared the labour, delivery, maternal and foetal outcomes in both the groups. Inclusion criteria comprised of pregnant women with singleton pregnancy with cephalic presentation of gestational age between 37 and 41 weeks without any medical or obstetric conditions necessitating induction. Exclusion criteria included multiple pregnancy, breech or other foetal malpresentation, placenta praevia, prior classical caesarean delivery or myomectomy, multiple uterine incisions, previous uterine rupture, active

maternal herpes infection, cord prolapse, contracted pelvis, spontaneous rupture of membranes, not in labour, postdated pregnancy, oligohydramnios, polyhydramnios, abnormal antepartum testing, pregnancy induced hypertension and preeclampsia, gestational diabetes, chronic hypertension, any serious illness or medical problem (e.g., epilepsy, cardiac diseases). Labour was monitored using partograph.

Drugs used for the induction of labour were: Misoprostol (Prostaglandin E1 analogue) – 25g ($1/4^{th}$ of 100g tablet) was given vaginally, Dinoprostone (Prostaglandin E2 analogue) a 2.5 ml syringe containing gel (0.5 mg of Dinoprostone) given intracervically, Oxytocin- intravenous infusion. Maternal outcome was studied in terms of duration of the labour, The need for the pain relief / epidural anaesthesia, mode of delivery (normal vaginal/ instrumental vaginal/ caesarean), incidence of postpartum haemorrhage (PPH). Foetal outcome was studied in terms of foetal distress, passage of meconium, Apgar score at birth, neonatal intensive unit (NICU) stay.

For the purpose of this study, induction was defined as the initiation of labour with intact membranes and no regular uterine contractions. Spontaneous labour was defined as the onset of regular uterine contractions 5 minutes apart with or without rupture of membranes. All results were compiled and subjected to statistical analysis. Comparative analysis of maternal and foetal outcome was done in spontaneous and induced group. Results were statistically analyzed with SPSS version 17.0 software. Continuous variables were presented as mean ± standard deviation (SD). Categorical variables were expressed as frequencies and percentages. Differences between groups were assessed with the Chi-square test for categorical variables. Proportion test between the groups was also done. p-value < 0.05 was considered as statistically significant.

OBSERVATION AND RESULTS:

During the period May 2010 to April 2012, hundred pregnant women were included in the study. Out of these hundred pregnant women, fifty had spontaneous onset of labour while fifty had elective induction of labour. Comparative analysis of maternal and foetal outcome was done in spontaneous and electively induced group and is depicted in table 1 and 2.

Mode of delivery with favorable bishop's score in the present study, women with favorable Bishop's score, normal vaginal delivery rate was 78.57% in the electively induced group and 88.46% in the spontaneous group. This difference was statistically not significant (p value 0.404). Maximum number of women (41.86%) delivered with single instillation of Tab Misoprostol. When Misoprostol instillation was more than 4, all had caesarean section. With unfavorable cervix and induction with tab Misoprostol, caesarean section rate was 63.3%.

In the elective group, 44% had normal vaginal delivery and 6% had instrumental delivery. Out of these, maximum number of women (40%) had first stage of labour within 5-10 hours. Duration of the first stage of labour was within 10-15 hours in all women with instrumental vaginal delivery. Mean duration of the first stage of labour was 11hours ± 6.3 hours. Most of the women (60%) had second stage of labour between 20-30 minutes. Mean duration of the second stage of labour was 22 minutes ± 7 minutes.

In spontaneous group, maximum number of women (56.9%) had duration of the first stage of labour within 5-10 hours. Mean duration of the first stage of labour was 11.3 hours± 5.5 hours. Most of the women (63.41%) had duration of second stage of labour between 20-30 minutes. Mean duration of the second stage of labour was30 minutes ± 16 minutes.50% of the women had caesarean section in the electively induced group as compared to the 18% of the women in the spontaneous group. This difference was statistically significant (p= 0.0016). Normal vaginal delivery rate was 78% in the spontaneous group as compared to 44% in the electively induced group. This difference was statistically significant (p value = 0.0005).

Caesarean section rate in induced group versus spontaneous group was 50% and 18% respectively which was statistically significant (p value = 0.0008). In both the groups, indication of caesarean section was foetal distress with non-reassuring foetal heart rate (FHR) pattern which 64% in the induced group and 88.89% in the spontaneous group which was statistically not significant (p value 0.160).

One minute Apgar score was 9 in 78% of the babies in the electively induced group and 76% of the babies in the spontaneous group. Five-minute Apgar score was 9 in 46% of the babies in the electively induced group and 68% in the spontaneous group. 8% of babies were shifted to neonatal intensive care unit (NICU) in the induced group as compared to 4% in the spontaneous group which was statistically not significant (p value 0.399). In both the groups, birth weight of the neonates was comparable.

PPH occurred in 20% of the women in the electively induced group as compared to 6% of the women in the spontaneous group. None of them needed blood transfusion or surgical intervention. This difference was statistically significant (p value 0.038). Women in the electively induced group (22%) required more analgesia (injection Promethazine) or anaesthesia (epidural) for pain relief as compared to 6% in the spontaneous group. This difference was statistically significant (p value 0.021).

DISCUSSION:

From the results of the present study, we observed that elective induction of labour in nulliparous women with a single cephalic presentation is associated with increased risk of caesarean section, which is predominantly related to an unfavorable cervix. Caesarean delivery rate was more due to nulliparity or unfavorable cervix not due to elective induction itself.

Macer et al [14] studied the complications and outcome of elective versus spontaneous labour and concluded that nulliparous patients in theinduced group with an estimated Bishop's score of less than or equal to 5 had a 50% caesarean section rate. Study by Vrouenraets et al [11] found that a Bishop score of 5 or less was a predominant risk factor for a caesarean delivery in all three groups (spontaneous, elective induction and medical induction) (adjusted Odd's ratio: 2.32; 95% CI 1.66-3.25).

The methodology of our study is similar to the study of Maslow et al [15]which compared elective induction with spontaneous labour as mentioned in 25 women (50%) who had augmentation of labour with amniotomy and oxytocin infusion. Drugs and mode of delivery in the present study, maximum number of women (41.86%) delivered with single instillation of Tab Misoprostol. When Misoprostol instillation was more than 4, all had caesarean section. With unfavorable cervix and induction with Tab Misoprostol, caesarean section rate was 63.3%. When dinoprostone was used it was 83.33%. The present study has been compared with the study of Wing et al [16] which showed that abdominal delivery rate was 20.3% in the Misoprostol-treated patients and 27.7% in the dinoprostone-treated patients. Study by Shakya et al [17] showed that caesarean section was done among 32.3% and 28.6% respectively in dinoprostone and misoprostol groups. In the present study rate of caesarean section was more as compared to the other studies. Sixty four percent caesarean sections were done for foetal distress.

The present study has been compared with the study of Macer et al [14] which showed that average mean duration of the first

stage of labour was 6. 0 ± 3.1 hours in the induced group and 7.2 ± 5.2 hours in the spontaneous group. Average mean of the second stage of labour was 44 ± 61 minutes in the induced group and 39 ± 44 minutes in the spontaneous group. Mode of delivery in the present study, 50% of the women had caesarean section in the electively induced group as compared to the 18% of the women in the spontaneous group. This difference was statistically significant (p value = 0.0008). Normal vaginal delivery rate was 78% in the spontaneous group as compared to 44% in the electively induced group. This difference was statistically significant (p value = 0.0005). The present study has been compared with the studies of Macer et al,[32] Maslow et al,[15] Cammu et al,[10] and Van Gemund et al.[18]

In most of the studies, elective induction has been compared with the spontaneous onset of labour. In the present study when comparison was done between induced labour and spontaneous onset of labour, caesarean section rate was 50% and 18% respectively which was statistically significant (p value = 0.0008). In both the groups, indication of caesarean section was foetal distress with non-reassuring FHR pattern, 64% in the induced group and 88.89% in the spontaneous group. This was statistically not significant (p value 0.160).This is in contrast to the study by Prysak et al [19] which had most common indication for caesarean delivery dystocia (7.6% in elective induction,3.5% in spontaneous group) followed by non-reassuring fetal heart rate trace (0.9% in elective induction and 1.5% in spontaneous group). Cammu et al [10]showed that the most common indication for caesarean delivery was labour dystocia (first stage) (5.9% in induced group and 3.3% in spontaneous group) followed by fetal distress (2.6% in induced group and 1.8 % in spontaneous group).

One minute Apgar score was 9 in 78% of the babies in the electively induced group and 76% of the babies in the spontaneous group. Five-minute Apgar score was 9 in 46% of the babies in the electively induced group and 68% in the spontaneous group. The present study has been compared with the study of Van Gemund et al and Macer et al showed that no differences were found in neonatal outcomes.[14,18] Prysak et al [19]showed that elective induction did not significantly increase the rate of NICU admissions (4.6% versus control 3.9%).In both the groups, birth weight of the neonates did not have any statistically significant difference.

PPH occurred in 20% of the women in the electively induced group as compared to 6% of the women in the spontaneous group. None of them needed blood transfusion or surgical intervention. This difference was statistically significant (p value 0.038). The present study has been compared with the study of Guerra et al[20] who studied the factors and outcomes associated with induction of labour and found that maternal complications like higher rates of perineal laceration, need for uterotonic agents, hysterectomy, ICU admission, hospital stay more than 7 days and increased need for anaesthetic /analgesic procedures was associated with induced labour than spontaneous labour. This is in contrast to study by Macer et al [14]which showed that no differences existed between the two groups with respect to intrapartum maternal, foetal, or postpartum complications.

Women in the electively induced group (22%) required more analgesia (injection promethazine) or anaesthesia (epidural) for pain relief as compared to 6% in the spontaneous group. This difference was statistically significant (p value 0.021). The present study has been compared with the studies of Macer et al,Prysak et al, Cammu et al,and Van Gemund et al.[10,14,18-19]In our institution epidural analgesia as such is not used routinely, only used on patient's request. Cammu et al[10] found that epidural analgesia (79.8% vs 57.6%) was significantly more common when labour was induced electively. Van Gemund et al[18] showed that pain relief was recorded more frequently in the electively induced labour group.

This study has several limitations. The sample size of the present study was small (50 in each group). Secondly, it was a single-centre study which can have its own drawbacks. Lack of blinding is another limitation which was not followed in this study.

CONCLUSION

The present study emphasizes that elective induction of labour in nulliparous women with a single cephalic presentation is associated with increased risk of caesarean section, which is predominantly related to an unfavorable cervix. Hence, Elective induction is safe and efficacious. Caesarean delivery rate was more due to nulliparity or unfavorable cervix not due to elective induction itself. Elective induction in nulliparous women with unfavorable cervix should be discouraged. Each case where cervical ripening is done it should be closely scrutinized. The impact of induction should be monitored to determine the effect on the perinatal outcome and the third stage complications.

Table 1: Comparison Of Labour Outcomes Among Two Groups

Variable	Induced Group (n=50)	Spontaneous Group (n=50)	p-value
Period of Gestation I) 37-38(wks) II) 39-40(wks)	 15(30%) 35(70%)	 18(36%) 32(64%)	0.523
Bishop score I) Favourable cervix II) Unfavourable Cervix	 14(28%) 36(72%)	 26(52%) 24(48%)	0.014
Mode of delivery in unfavourable bishop score I) NVD II) Instrumental III) LSCS	 11(30.55%) 1(2.77%) 24(66.66%)	 16(66.66%) 0(0%) 8(33.33%)	0.011
Mode of delivery in favourable bishop score I) NVD II) Instrumental III) LSCS	 11(78%) 2(14.28%) 1(7.14%)	 23(88.46%) 2(7.69%) 1(3.84%)	0.404
Mode of delivery I) Normal Vaginal II) Instrumental Vaginal III) LSCS	 10(33.30%) 1(3.33%) 30(63.30%)	 39(78%) 2(4%) 9(18%)	 0.0005 0.647 0.0008
Indication for LSCS I) Failed Induction II) NPOL III) Compound presentation IV)Foetal distress and MSL	 2(8%) 6(24%) 1(4%) 16(64%)	 0(0%) 1(11.10%) 0(0%) 8(88.89%)	0.160
Incidence of PPH	10(20%)	3(6%)	0.038
Analgesia/Anaesthesia for pain relief	11(22%)	3(6%)	0.021
	Mean +/- S/D	Mean+S/D	
Age (yrs)	28.06 +/- 2.82	27.62+3.02	0.453
Duration of first stage of labour	11 +/- 6.3 hrs	11 +/- 5.5 hrs	1.000
Duration of second stage of labour	22 +/- 7 mins	30 +/- 16 mins	0.0016
Mode of delivery I) Normal Vaginal II) Instrumental Vaginal III) LSCS	 10(33.30%) 1(3.33%) 30(63.30%)	 39(78%) 2(4%) 9(18%)	 0.0005 0.647 0.0008

Indication for LSCS I) Failed Induction II) NPOL III) Compound presentation IV)Foetal distress and MSL	 2(8%) 6(24%) 1(4%) 16(64%)	 0(0%) 1(11.10%) 0(0%) 8(88.89%)	0.160
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	Mean +/- S/D	Mean+S/D	
Age (yrs)	28.06 +/- 2.82	27.62+3.02	0.453
Duration of first stage of labour	11 +/- 6.3 hrs	11 +/- 5.5 hrs	1.000
Duration of second stage of labour	22 +/- 7 mins	30 +/- 16 mins	0.0016

Table 2: Comparison Of Fetal Outcomes Among Two Groups

Variable	Induced Group n (%)	Spontaneous Group n (%)	p-value
Apgar score at 1minute 6 7 8 9 10	 0 2(4%) 7(14%) 39(78%) 2(4%)	 0 0 3(6%) 38(76%) 9(18%)	0.812
Apgar score at 5minutes 6 7 8 9 10	 0 0 5(10%) 23(46%) 22(44%)	 0 0 2(4%) 34(68%) 14(28%)	0.265
Number of babies shifted to Nursery	4(8%)	2(4%)	0.399
	Mean +/- S/D	Mean +/- S/D	
Birth weight of neonate	2.89+/- 0.41	2.94 +/- 0.41	0.397

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