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Original Research Article

Impact Of Induction Of Labor At 39 Weeks Vs 40 Weeks On Maternal And Perinatal Outcomes Among A Cohort Of Low-Risk Pregnant Women At A Rural Tertiary Centre: A Retrospective Study

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Abstract

Introduction: The rate of maternal and perinatal complications increases after 39 weeks' gestation.[1] Growing body of evidence supports improved or not worsened birth outcomes with non-medically indicated induction of labor at 39 weeks gestation compared with expectant management. This evidence includes 2 recent randomized control trials.[2-4] This study was conducted to evaluate whether induction of labor at 39 weeks improves perinatal and maternal outcomes in women with low risk pregnancy compared with induction of labor at 40 + weeks.

Materials and Methods: This was a retrospective observational study in a rural teaching hospital in Mandya, Karnataka, India. The study population was 280 low risk women with an uncomplicated singleton pregnancy induced at 39 weeks (Group A, n=141) versus induction at 40 completed weeks of gestation (Group B, n=139). The data was retrieved from medical records department from January 2021 to April 2022. Mode of birth and other maternal and perinatal outcomes were described in each group, for women who underwent induction of labor at 39 weeks, and for women who gave birth from 40 completed weeks onward. The primary outcome included various modes of delivery. Secondary outcomes included maternal outcome and neonatal morbidity.

Results: In the current study, elective induction at 39 weeks gestation versus elective induction at 40 weeks gestation was compared. Induction at 39 weeks was associated with a decreased likelihood of cesarean birth (17.7% versus 23.7%) and a comparable increase in rate of operative vaginal birth (9.2% vs 10.7%)(p value<0.001). Indication for cesarean delivery in the majority of the study participants in Group A 44% was non-reassuring fetal status while in Group B 45.45% was secondary arrest of cervical dilatation (p value<0.001).

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An increased incidence of meconium stained amniotic fluid was noted in 19.4% among Group B participants compared to 14.1% in Group A (p value <0.001). In Group A 95.7% of the babies had an APGAR score of 7 at birth and in Group B 90.6% had an APGAR score of 7 at birth (p value <0.001). There was 1.4% neonatal NICU admission in Group A with 0.7% requiring respiratory support (p value<0.001). There was 5.03% neonatal NICU admission in Group B with 2.8% requiring respiratory support (p value<0.001). Term elective induction was associated with a statistically significant decrease in adverse newborn infant outcomes.
Conclusion: Elective induction of labor at 39 weeks gestation is associated with a decrease in cesarean birth and operative delivery and improved neonatal outcomes.

Keywords: Induction Of Labor, Cesarean section, operative delivery, neonatal outcome

Introduction

Induction of labour (IOL) is a commonly performed obstetric procedure. Rate of Induction of labour has doubled in the past decade from 10 to 20% while in some institutions, the rate of IOL is as high as 40%.[1]. Some of the increase in this rate is related to a 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 IOL.
Population studies have shown that the prevalence of maternal and fetal complications increases with advancing pregnancy beyond 39 weeks' gestation [1]. This pattern appears to be similar for both unselected populations and groups with risk factors, and there is evidence that elective birth from 39 weeks minimizes maternal and fetal risk, except for specific groups like growth-restricted and macrosomic fetuses, morbidly obese women, women older than 44 years, women with cholestasis of pregnancy and women with a multiple pregnancy, who may benefit from even earlier scheduled delivery [2,3].
Thus, induction of labor at 39 weeks has been proposed as a means of ensuring optimal maternal and neonatal outcomes [4-6]. The arguments against such a policy relate to theoretical concerns about logistics, cost and the consequences of failed induction. However, there are both retrospective and prospective data showing that induction at 39 weeks may in fact decrease the rate of complications, including Cesarean section, while no cost-effectiveness analysis of this policy is available to date. An additional factor, which is commonly overlooked, is women's preference and perception about induction of labor.[5, 6].Adverse perinatal outcomes gradually increase after 40 gestational weeks and are substantially increased post-term (≥42 weeks (≥294 days)). The risk of stillbirth has been shown to increase after term. As much as 14% of stillbirths worldwide are associated with prolonged pregnancy. Furthermore, there is an increase in maternal complications with increased duration of pregnancy after 40 weeks.
In this study we evaluated induction of labor at 39 weeks Vs expectant management/induction of labor at ≥40 weeks+ days in terms of decrease rates of cesarean delivery and operative delivery and better maternal and perinatal outcome in healthy women with a low risk pregnancy.

Materials and Methods

This retrospective observational study was conducted on 280 low risk pregnant women with singleton live pregnancy, cephalic presentation between 39 completed weeks (Group A, n=141) to 40 completed weeks (Group B, n= 139) admitted to the labor room in the Department of Obstetrics and Gynecology, Adichunchanagiri Hospital and Research Center, Nagamangala, Karnataka, India.
Inclusion criteria were primi or multigravida, singleton live pregnancy with vertex presentations with normal liquor not in labor with no contraindication to vaginal delivery, cases admitted at >39 weeks of gestation with intact membranes. Exclusion criteria were, patients with polyhydramnios, antepartum hemorrhage, hypertensive disorders of pregnancy,

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GDM, previous CS, complete placenta previa, vasa previa,obvious congenital abnormalities, oligohydramnios, multiple / twin gestation, Fibroids or adnexal mass, Fetal Growth Restriction, IUFD (Intrauterine fetal demise), short stature, ruptured fetal membranes, suspected chorioamnionitis (unexplained fetal tachycardia or maternal temperature >38 ºC), cephalopelvic disproportion active genital herpes infection and previous myomectomy with entry into endometrial cavity.

Details about the patient history and physical examination including per vaginal examination were obtained through case sheets from Medical Records Department. Categorization into two groups was done and 280 antenatal cases were divided according to their gestational age into 2 groups accordingly. Group a patients had 39 completed weeks of gestation to 39 weeks 6 days period of gestation. Group B patients had 40 completed weeks of gestation. Both groups were induced by either foley's with Cerviprime gel or cerviprime gel alone according to their bishop score. Maternal and newborn outcomes were assessed in all the patients divided into two groups and conclusions were drawn. The data was analysed using SPSS software version 22.

Primary outcomes included mode of delivery including: vaginal delivery, assisted vaginal delivery and cesarean section.

Secondary outcomes included: significant (Grade-3/4) perineal laceration, postpartum hemorrhage, maternal infection (including postpartum endometritis), maternal hypertension, maternal thrombotic events, length of maternal hospital stay, need for neonatal respiratory support, neonatal cerebral palsy, length of neonatal stay in NICU.

Results

In our study, 280 low risk antenatal women were divided into Group A (141) with 39 weeks completed period of gestation and Group B (139) with 40 weeks completed period of gestation were studied. The majority of the study participants in group A (50.35%) and Group B (53.9%) belonged to the age group of 21-25 years.

Comparison of age between Group A and Group B

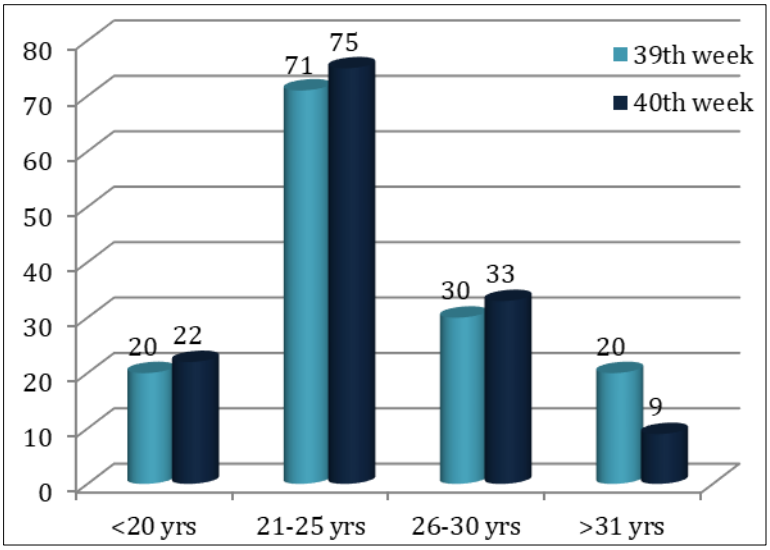

Fig 1: Comparison of age between Group A and Group B

Majority of the cases in our study had a Bishop Score of 6 at induction in Group A (31.1%) and Group B (31.6%) at induction.

Comparison of BISHOP score between study groups

Table 1: Comparison of BISHOP score between study groups

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BISHOP score	Group A	Group B
2	0	0
3	3	3
4	1	20
5	18	41
6	44	44
7	37	18
8	33	0

Induction was done with foley's with cerviprime gel in Group A in 36.7% and Group B in 57.55% of the study subjects (p value<0.001). Induction was done with only cerviprime gel in Group A in 46.8% and in Group B in 42.44% of the study subjects (p value<0.001).

Comparison of induction methods among study participants

Table 2: Comparison of induction methods among study participants

Induction	Group A	Group B	P value
PGE2 Gel	66	59	0.001
Foleys+PGE2 Gel	52	80	0.0001

In the majority of the study subjects in Group A (56%) and Group B (50.35%) gel induction was done twice.

Comparison of number of gels between Group A and Group B

Table 3: Comparison of number of gels between Group A and Group B

Number of gels	Group A	Group B
1	58	69
2	79	70
3	4	0

Rupture of membranes was spontaneous in Group A in 41.1% and in Group B in 40.28% of the study subjects. Artificial rupture of membranes was done in Group A in 60.28% and in Group B in 58.98% of the study subjects.

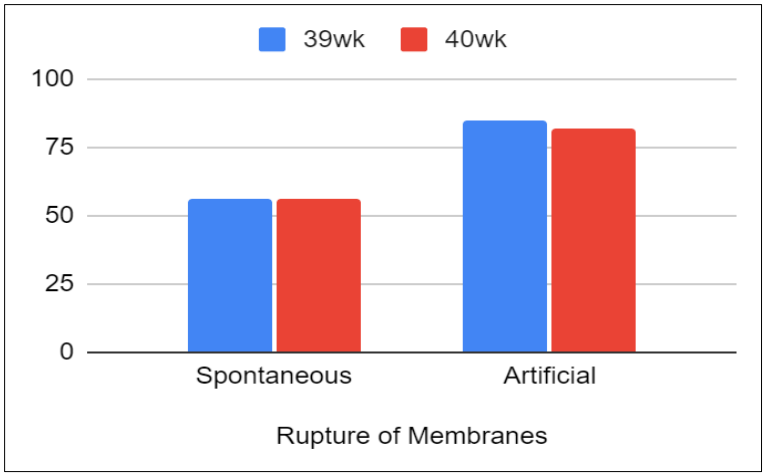

Fig 2

Amniotic fluid (AF) was clear in majority of the study subjects in Group A in 85.8% and in Group B in 80.5%. Rest had Meconium Stained Amniotic Fluid (MSAF).

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Comparison of Amniotic fluid status between the two groups

Table 4: Comparison of Amniotic fluid status between the two groups

AF	Group A	Group B
Clear	121	112
MSAF	20	27

In Group A 75.1% had normal vaginal delivery (NVD), and in Group B 69.78% had NVD. In Group A 17.7% and in Group B 23.7% underwent LSCS (p value <0.001). In Group A 9.2%and in Group B 10.7% underwent vacuum assisted vaginal delivery (VAVD).

Mode of delivery among study participants

Table 5: Mode of delivery among study participants

Type	Group A	Group B	P value
NVD	96	97	1.000
VAVD	13	15	0.01
LSCS	25	33	0.0001

Duration of the first stage of labor in Group A was 10.04 hours and Group B was 10.12 hours. Duration of the second stage of labor in Group A was 24.71 minutes and Group B was 23.94 minutes.

Indications for Cesarean births among study participants

Table 6: Indications for Cesarean births among study participants

Indication	Group A	Group B	P value
Secondary arrest of cervical dilatation	10	15	0.001
Non reassuring fetal status	11	11	1
Failed Induction	3	7	0.02
Cord Prolapse	1	0	1

Indication for cesarean delivery in the majority of the study participants in Group A 44% was non-reassuring fetal status while in Group B 45.45% was secondary arrest of cervical dilatation (p value<0.001).
Maternal Complications were PPH in Group A (2.83%) and Group B (5.7%) (p value <0.001) and Cervical tears in Group B (1.4%).
Average duration of hospital stay was 5.08 days in Group A and 7.04 days in Group B.
In Group A 95.7% of the babies had an APGAR score of 7 at birth and in Group B 90.6% had an APGAR score of 7 at birth (p value <0.001).

Cry at birth	Group A	Group B
Baby cried immediately	135	126
Not cried	6	13

There was 1.4% (two babies) neonatal NICU admission in Group A with 0.7%(one baby) requiring respiratory support. There was 5.03% (seven babies) neonatal NICU admission in Group B (p value <0.001) with 2.8% (four babies)requiring respiratory support.
Average duration of NICU stay in group A was 2.85 days and in Group B was 5.74 days.
There was no maternal or perinatal mortality in this study.

Discussion

Recommendations regarding the timing of delivery are founded balancing the maternal and

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perinatal risks. Randomized controlled trials have compared induction of labor with expectant management in prolonged pregnancies, most with inconclusive results for perinatal mortality and major morbidity [7]. The results from the latest Cochrane review (2018) showed lower rates of cesarean delivery and perinatal death but a higher rate of operative vaginal delivery in the induction group compared with the expectant management group [5-7].

The rationale supporting elective induction of labor at 39 weeks is that the population data demonstrates an increase in the rate of perinatal and maternal complications in both unselected and complicated pregnancies after 38-39 weeks. The major counterarguments against such a policy have been the concerns for failed induction and the concomitant risk for maternal and neonatal complications, mostly arising from retrospective studies.

Our results do not support these concerns. Elective induction at 39 weeks may, in fact, result in a relative reduction in the rate of Cesarean section, from approximately 23.7% with induction of labor at 40 weeks to approximately 17.7% with induction of labor at 39 weeks (NNT = 32) comparable to Souter V *et al*(14.7% vs 23.2%); adjusted odds ratio, 0.61; 95% confidence interval,0.41-0.89) [2-7]. Similar results were obtained by Sinker *et al* in their study in 2018(35.9% versus 13.9%, p<0.001) [2].

A comparable increase in operative delivery was seen in our study group 9.3% in Group A versus 10.7% in Group B comparable to Souter V *et al*(10.8%; adjusted odds ratio, 1.8; 95% CI 1.28-2.54)(p value< 0.001).[4]A possible explanation is that 39 weeks is the optimal time for induction. Women who continue their pregnancy beyond 39 weeks become progressively less likely to have a successful induction. This may reflect increasing rates of failure to progress in labor (as the fetus becomes larger there is a higher risk of cephalopelvic disproportion) and increasing risks of fetal distress due to a simultaneous decrease in placental reserve [5, 7, 8].

Our study found an increased incidence of meconium stained amniotic fluid 14.1% in Group A compared to 19.4% in Group B comparable to Aaron B Caughey *et al* (OR 2.04; 95 percent CI 1.34-3.09) (p value <0.001) [3].

5 minute APGAR <5 was 0.7% in Group A and 2.8% in Group B comparable to Sabrina *et al* (aRR 0.684;0.647-0.723) (p value<0.001) [6].

The need for neonatal respiratory support in Group A was 0.7% and 2.8% in Group B comparable to A Sotiriadis *et al*. (RR 0.73, CI, 0.58-0.95) and Sabrina *et al* (aRR 0.840, 95% CI 0.80-0.83) (p value<0.00\1) [6, 8, 9].

A large trial from the United States, ARRIVE (A Randomized Trial of Induction Versus Expectant Management), compared induction of labor in nulliparous women at 39 weeks+0 days to 39 weeks+4 days with expectant management until 41 weeks+0 days. No significant difference was found in perinatal outcome between groups, whereas the frequency of cesarean delivery was significantly lower in the early induction group [5-7].

William A Grobman *et al* in their randomized trial of low risk nulliparous women suggested a relative risk of 20% decrease in adverse perinatal outcomes. Their data also suggested that 1 cesarean delivery may be avoided for every 28 deliveries among low risk nulliparous women who plan to undergo elective induction of labor at 39 weeks [7].

Although the Society for Maternal and Fetal Medicine issued a response to the ARRIVE study proposing that it is reasonable to offer elective induction of labor to low-risk nulliparous women at or beyond 39 weeks, there are still significant unresolved issues. There is moderate-quality evidence that elective induction of labor in uncomplicated singleton pregnancy at 39 weeks' gestation may be associated with reduced risk of Cesarean section, maternal hypertension and need for respiratory support in the neonate [5-7, 10]. (Unresolved issues, should systematic induction be adopted, involve logistics, cost, the preferences of women and possibly the long-term neurodevelopmental outcome of the offspring [11].

Conclusion

In conclusion, our study demonstrates that in low-risk women induction of labor at 39 weeks gestation is not associated with any adverse effects on maternal or neonatal outcomes, but it is

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significantly associated with both lower frequencies of maternal and neonatal morbidity when compared to expectant management through 40 weeks. Thus avoiding or delaying the induction of labor at or after 39 weeks of gestation may not always be in the best interest of the mother or the neonate. Elective induction at 39 weeks gestation adds to the growing number of optional interventions in pregnancy.

Induction of labor is time intensive and can be costly; however a preliminary estimate of the cost savings appears supportive. We acknowledge that not all women nor their providers desire elective inductions therefore patients preference and shared decision making helps ease out this uncertainty. We recommend that patient should be the final arbiter of the timing and mode of delivery after adequate counseling and informed consent. Further multicentre, prospective studies of a larger sample size in a range of settings and the economic impact are imperative to have a better understanding of the outcomes of induction of labor, before elective induction of labor at 39 weeks becomes offered routinely.

Ethical approval was obtained for this study.

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Conflict of interest: None

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