International Journal of Clinical Obstetrics and Gynaecology

ISSN (P): 2522-6614
ISSN (E): 2522-6622

www.gynaecologyjournal.com
2021; 5(2): 80-82
Received: 17-01-2021
Accepted: 20-02-2021

Dr. Mayekar Shonali
Assistant Professor, Department of Obstetrics and Gynaecology, Subbaiah Institute of Medical Sciences, Shivamogga, Karnataka, India

Dr. Nanda Shankar Rao Shinge
Associate Professor, Department of Obstetrics and Gynaecology, Subbaiah Institute of Medical Sciences, Shivamogga, Karnataka, India

Corresponding Author:
Dr. Nanda Shankar Rao Shinge
Associate Professor, Department of Obstetrics and Gynaecology, Subbaiah Institute of Medical Sciences, Shivamogga, Karnataka, India

Analysis of preterm induction of labour

Dr. Mayekar Shonali and Dr. Nanda Shankar Rao Shinge

DOI: https://doi.org/10.33545/gynae.2021.v5.i2b.870

Abstract
Introduction: Preterm labor is defined as regular uterine contractions occurring at least once every 10 minutes and resulting in cervical dilatation or effacement before 37 weeks' gestation. A preterm infant is any infant delivered before 37 weeks' gestation.
Material and Methods: This is a prospective study conducted at Department of Obstetrics and Gynaecology, Subbaiah Institute of Medical Sciences, over a period of 1 year. All patients admitted in antenatal ward and labour room requiring preterm induction were included in this study. Pregnancies with major fetal anomalies or no intrapartum fetal monitoring were excluded. All patients were monitored in labour room with auscultation and non-stress test (NST). Mifepristone was given orally and Prostaglandin E2 (PGE2) gel was inserted in posterior fornix.
Results: There was a total of 70 deliveries during this period. The preterm induction majorly includes 20-34 years as this is the commonest reproductive age group seen in our hospital. Multigravida requires induction more as compared to primigravida. More number of patients were induced between 32-36 weeks, reason being Preterm premature rupture of the membranes (PPROM), severe preeclampsia, intrauterine device (IUD) and severe Fetal growth restriction (FGR). 33% of the cases being induced due to PPROM, Fetal demise being the second cause of induction in our analysis. It is also interesting to note that HCC also contributes to be one of the causes of induction. 62.8% were induced via PGE2 gel. Out of 70 patients 87.1% of them delivered vaginally, 9 underwent lower segment Caesarean section (LSCS) i/v/o fetal distress and another one i/v/o Prolonged PROM.
Conclusion: Our findings suggest that vaginal delivery is likely following preterm induction of labor (IOL) irrespective of gestational age. Parity and cervical favorability are the first and second strongest predictors of a successful vaginal delivery, respectively. Labor curves accelerate with each category of GA, ultimately approximating those observed following term IOL.

Keywords: Preterm, mifepristone, multigravida, primigravida

Introduction

Preterm labor is defined as regular uterine contractions occurring at least once every 10 minutes and resulting in cervical dilatation or effacement before 37 weeks' gestation. A preterm infant is any infant delivered before 37 weeks' gestation. Any infant weighing less than 2.5 kg or 1.5 kg at birth is a low-birth-weight or very-low-birth-weight infant, respectively, regardless of gestational age. At 29 weeks' gestation, more than 90% of fetuses weigh less than 1.5 kg [1].

Preterm birth is the leading cause of neonatal mortality and morbidity, contributing to over 35% of total infant health care spending, well over 5 billion dollars per year [2]. Spontaneous labor precedes approximately 50% of preterm deliveries, the remainder are guided by medical necessity due to either maternal or fetal indications [3]. Cervical favorability, as assessed by Bishop scoring, cervical length, and maternal parity predicted vaginal delivery following induction of labor (IOL) at term [4]. However, data regarding predictors of vaginal delivery and labor curves in pregnancies undergoing preterm IOL are limited [5].

Active labor occurred most commonly after 6 cm of dilation, and cervical dilation progressed more slowly than previously thought, especially between 4 and 6 cm. These results represent a departure from the Friedman curve and now inform our clinical knowledge of median labor progression in modern obstetric practice [6]. Additionally, inherent differences in the progress of labor have been attributed to specific patient characteristics or clinical conditions. Maternal obesity, gestational age beyond 37 weeks and even fetal sex have been shown to influence labor progression [6]. In our study, we examined a contemporary labor database to identify labor curves and predictors of vaginal delivery in pregnant women undergoing medically indicated preterm IOL.

Material and Methods

This is a prospective study conducted at Department of Obstetrics and Gynaecology, Subbaiah Institute of Medical Sciences, over a period of 1 year.

All patients admitted in antenatal ward and labour room requiring preterm induction were included in this study. Pregnancies with major fetal anomalies or no intrapartum fetal monitoring were excluded. A detailed proforma was made and details filled out. All patients were monitored in labour room with auscultation and NST. Mifepristone was given orally and PGE2 gel was inserted in posterior fornix.

Results

There was a total of 70 deliveries during this period. The preterm induction majorly includes 20-34 years as this is the commonest reproductive age group seen in our hospital. Multigravida requires induction more as compared to primigravida. More number of patients were induced between 32-36 weeks, reason being PPROM, severe preeclampsia, IUD and severe FGR.

Table 1: Maternal Demographics profile

AGE (years)	n=70 (Percentage)
<19	9 (12.8)
20-34	59 (84.2)
>34	2 (2.8)
Gravida	**n=70 (Percentage)**
Primigravida	37 (52.8)
Multigravida	28 (40)
Grandmultipara	5 (7.1)
Gestational Age	**n=70 (Percentage)**
<27 weeks	11 (15.7)
27-32 weeks	23 (32.8)
32-36 weeks	36 (51.4)

Table 2: Indications for induction

Indications	n=70 (Percentage)
Pprom	23 (32.8)
Fetal demise	15 (21.4)
Severe pre-eclampsia	9 (12.8)
Severe preeclampsia+FGR	9 (12.8)
Oligohydramnios +FGR	6 (8.5)
severe FGR with Doppler changes	2 (2.8)
Imminent eclampsia	3 (4.2)
Prolonged latent phase of labour	2 (2.8)
HCC	1(1.4)

Table 2 shows that 33% of the cases being induced due to PPROM, Fetal demise being the second cause of induction in our analysis. It is also interesting to note that HCC also contributes to be one of the causes of induction.

Table 3: Method of Induction

Method	n=70 (Percentage)
PGE2 Gel	44 (62.8)
Intracervical Foley's with gel	17 (24.2)
Mifepristone-Misoprostol	9 (12.8)

In table 3 shows 62.8% were induced via PGE2 gel.

Table 4: Mode of delivery

Outcome	n=70 (Percentage)
Vaginal	61 (87.1)
LSCS	9 (12.8)

In table 4, Out of 70 patients 87.1% of them delivered vaginally, 9 underwent LSCS i/v/o fetal distress and another one i/v/o Prolonged PROM.

Table 5: Neonatal Outcome

Baby Weight	n=70 (Percentage)
550g-1.5 kg	37 (52.8)
1.6kg-2.5kg	27 (38.5)
>2.5kg	9 (12.8)
Baby Status	**n=70 (Percentage)**
With mother	19 (27.1)
NICU	23 (32.8)
IUD	21 (30)
Fresh still birth	7 (10)

In table 5 shows that 52.8 % of baby weight were between 550g-1.5kg and 38.5 % of them were in neonatal intensive care unit (NICU), reason being Low birth weight (LBW) and prematurity being the commonest.

Table 6: Complications of PPH

Complications	n=70 (Percentage)
Yes	Atonic PPH – 2 (2.8)
	Traumatic PPH – 1(1.4)
No	67 (95.1)

Table 6 shows 95.1% did not have any complication while 4.2% of them had postpartum haemorrhage (PPH).

Discussion

This study describes maternal and obstetric characteristics of preterm induction of labor in a large, modern cohort of pregnant women across the city. Vaginal delivery rates increased with gestational age. Hypertensive disease, maternal conditions including diabetes mellitus, and fetal conditions were the most common indications for induction. Parity significantly increased the likelihood of a successful vaginal delivery. While indications for induction differed by gestational age, labor curves were similar overall, with minimal differences comparing the active phases across gestational ages.

In our study, vaginal delivery occurred in 87.1% of women undergoing preterm IOL, increasing with gestational age. The increase in vaginal delivery rates with increasing gestational age was comparable to, but greater than, that of Nassar and colleagues, who reported a success rate of 31.6% at ≤28 weeks, and 62.5% at >32 weeks in their series of 145 patients undergoing IOL for severe preeclampsia remote from term [7]. The higher vaginal delivery rates we observed may be related to heterogeneity in the indications for IOL in our cohort, including conditions with less threatening maternal and fetal risks than severe preeclampsia.

Published strategies to predict the likelihood of vaginal delivery at the time of induction have had low predictive value [8]. Our analysis confirmed a highly significant effect of parity in predicting vaginal delivery in women undergoing preterm IOL. In seeking to assess cervix favorability and the likelihood of a successful vaginal delivery, limitations in our database required us to rely on a simplified Bishop score, evaluating cervical dilatation, station, and effacement. However, this simplified Bishop Score has been shown previously to predict vaginal delivery comparably to the original Bishop score [9]. Our study demonstrated that, as in term pregnancies, cervical favorability predicted a higher likelihood of vaginal delivery. By contrast, obesity was a negative predictor of vaginal delivery. This

observation is in accordance with a significant association between BMI the risk for cesarean delivery in laboring women at term [10]. Furthermore, obesity has been linked to a slower labor progression, mainly due to a prolonged latent phase [11].

Overall, our findings are comparable to recent data on labor progression. In a previous report from the CSL, Patel RR reported that spontaneous labor in singleton gestations at term progressed rapidly following 6 cm dilation, differing from Farrell PM classic observation that the active phase starts at 4 cm dilation [12, 13]. A recent analysis of IOL cases in the CSL cohort noted that most cesarean deliveries occurred during the latent phase at <6 cm dilation for fetal indications or in the settings of preeclampsia or diabetes mellitus [14]. Allen R *et al*. reported that 88.2% of cesarean delivery due to "failure to progress," occurred in the latent phase in women with a diagnosis of severe preeclampsia remote from term. Labor progress to complete cervical dilation was slower in women undergoing induction compared to those laboring spontaneously, primarily due to a longer latent phase [15]. Taken together, these data suggest that both maternal and obstetric characteristics should be considered in clinical assessment of labor progression.

Limitation of the study: Missing data on the clinical indications for induction. We inferred missing clinical indications by using patient-level information available on other medical, obstetrical or fetal conditions. However, it is possible that those precursor conditions may not have been the actual clinical indications for delivery and that the true incidence of indicated precursors was less than we reported. The majority of cases with unknown indications for IOL occurred in patients at term, most likely reflecting elective inductions. By contrast, some of the preterm cases with no recorded indication may be due to underreporting of maternal or fetal conditions.

Conclusion

Our findings suggest that vaginal delivery is likely following preterm IOL irrespective of gestational age. Parity and cervical favorability are the first and second strongest predictors of a successful vaginal delivery, respectively. Labor curves accelerate with each category of GA, ultimately approximating those observed following term IOL. In the absence of fetal or maternal contraindications, IOL should be considered in women requiring preterm delivery and considerations should be made for gestational age in assessing labor progress.

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