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An overview on preterm induction of labour

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Abstract
Introduction: Although the definition of preterm birth is birth before 37 completed weeks, the major transition in terms of needing special care occurs between 34 and 37 weeks.
Material and Methods: A prospective observational study was conducted among 60 patients admitted in the Department of OBGY, NC Medical College and Hospital, Panipat from August 2018 to June 2020.
Results: There was a total of 60 deliveries during this period. The preterm induction majorly includes 20-34 years as this is the commonest reproductive age group seen in our hospital. More number of Hindus underwent induction. 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.
Conclusion: Induction of labour remains relevant obstetrics procedure and its outcome will depend on proper choice of patients and close intrapartum monitoring.

Keywords: Preterm, Prematurity, Induction of labour

Introduction
The definition of spontaneous preterm labour is labour resulting in birth before 37 completed weeks (259 days) of gestational age. This definition, promulgated by the World Health Organization (WHO) and the International Federation of Gynecology and Obstetrics (FIGO), originated from a statistical analysis of the distribution of gestational age at birth, based on the first day of the last menstrual period. [1] It had no specific functional basis and should be clearly distinguished from the concept of 'prematurity', which represents the lack of development of various organ systems (and in particular, the lungs, leading to the respiratory distress syndrome) at the time of birth. Numerous studies based on early sonar fetal biometry have shown that uncertainty of recall and variations in the length of the menstrual cycle result in an inaccurate assessment of the true gestational age at birth. [2]
Furthermore, the concept of 'completed weeks' is still widely misunderstood. According to the WHO/FIGO definition, weeks and days should be truncated to whole weeks (e.g. 36 weeks and six days of gestational age is recorded as 36 completed weeks of gestation, and so the baby is defined as preterm). Unfortunately, many clinicians and midwives do not follow this recommendation, incorrectly using 'rounding', in which the weeks of gestation are rounded up or down to the nearest whole week of actual gestational age. Using this approach, 36 weeks and six days of gestational age becomes recorded as 37 weeks, which is erroneously recorded as 'term'. In a recent study of 17 hospitals in London, Balchin *et al*. found that 'rounding' was still commonly used, resulting in up to 10.1% of preterm babies being misclassified. [3]
Although the dichotomisation of gestational length into 'term' and 'preterm' tends to polarise one's view, it is important to appreciate the 'haziness' of the transition between babies who need supportive care in special care baby units, and those that can stay with their mothers. In the North-West Thames database consisting of 517,381 births (1988 –2000 inclusive), the proportion of babies transferred to a special care baby unit was more than 90% for those born before 33 completed weeks of gestation, but this number fell steadily to below 5% by 39 weeks (83% at 34 completed weeks, 58% at 35 weeks, 31% at 36 weeks, 14% at 37 weeks and 7% at 38 weeks). Over 40% of babies at 35 weeks of gestation will show signs of maturity, yet even at 38 weeks of gestation, some babies will need ventilation due to inadequate lung development. [4]

Aim and Objectives

- To analyse method and outcome of preterm induction of labour
- To make early diagnosis and offering prompt treatment to reduce maternal and neonatal morbidity and mortality for preterm delivery in indicated patients

Materials and Methods

This is Prospective observational study conducted between August 2018 to June 2020 in Department of OBGY, NC Medical College and Hospital.

All patients admitted in antenatal ward and labour room requiring preterm induction were included in this study. 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 60 deliveries during this period. The preterm induction majorly includes 20-34 years as this is the commonest reproductive age group seen in our hospital. More number of Hindus underwent induction. 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 = 60 (Percentage)**
<19	7 (11)
20-34	50 (83)
>34	3 (5)
Religion	**n = 60 (Percentage)**
Hindu	42 (70)
Muslim	18 (30)
Occupation	**n = 60 (Percentage)**
Working	15 (25)
Non-working	45 (75)
Literacy	**n = 60 (Percentage)**
Literate	50 (83)
Illiterate	10 (17)
GRAVIDA	**n = 60 (Percentage)**
Primigravida	32 (53)
Multigravida	24 (40)
Grandmultipara	4 (7)
Gestational Age	**n = 60 (Percentage)**
<27 weeks	9 (15)
27-32 weeks	18 (30)
32-36 weeks	33 (55)

Table 2: Indications for induction

Indications	**n = 60 (Percentage)**
PPROM	20 (33)
Fetal demise	12 (20)
Severe pre-eclampsia	7 (12)
Severe preeclampsia+FGR	7 (12)
Oligohydramnios +FGR	5 (8)
severe FGR with Doppler changes	3 (5)
Imminent eclampsia	2 (3)
Prolonged latent phase of labour	3 (5)
HCC	1 (2)

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 = 60 (Percentage)**
PGE2 Gel	40 (66.6)
Intracervical Foley's with gel	12 (20)
Mifepristone-Misoprostol	8 (13)

In table 3 shows 66.6% were induced via PGE2 gel.

Table 4: Mode of delivery

Outcome	**n = 60 (Percentage)**
Vaginal	52 (87)
LSCS	8 (13)

In table 4, Out of 60 patients 87% of them delivered vaginally, 8 underwent LSCS i/v/o fetal distress and another one i/v/o Prolonged PROM.

Table 5: Neonatal Outcome

Baby Weight	**n = 60 (Percentage)**
550g -1.5 kg	31 (52)
1.6kg - 2.5kg	22 (37)
>2.5kg	7 (11)
Baby Status	**n = 60 (Percentage)**
With mother	16 (27)
NICU	20 (33)
IUD	18 (30)
Fresh still birth	6 (10)

In table 5 shows that 52% of baby weight were between 550g-1.5kg and 33% of them were in NICU, reason being LBW and prematurity being the commonest.

Table 6: Complications of PPH

Complications	**n = 60 (Percentage)**
Yes	Atonic PPH - 2 (3.33)
	Traumatic PPH - 02 (3.33)
No	55 (94)

Table 6 shows 94% did not have any complication while 6% of them had PPH

Discussion

This manuscript provides information on clinical factors associated with preterm delivery in a tertiary care center. The study benefits from its relatively homogeneous ethnic population and its setting in a maternity hospital with unified management guidelines in the central delivery suite. Moreover, it highlights the main risk factors that remain associated with preterm birth, and emphasizes the need to promote research into the basic mechanisms of parturition as the best way to develop effective management for spontaneous preterm labour

In our predominantly Indian population, teenage pregnancies were not significantly associated with preterm birth; however, our data confirm that older mothers have an increased risk of preterm delivery. [5] A low BMI is associated with increased risk of spontaneous preterm birth [6] and this was reflected in our population. Previous preterm delivery is a strong risk factor for subsequent preterm birth, with a fivefold higher rate of previous preterm delivery in the preterm compared to the control group; this indicates that maternal factors are important, however the mechanism remains unclear. A history of preterm delivery has long been recognised as a strong risk factor for subsequent preterm birth [3] and is the basis for most risk scoring systems. [4] Moreover, our data confirm that hypertension and fetal growth restriction are major predisposing factors for elective preterm delivery. [7]

Episodes of threatened preterm labour were strongly associated with spontaneous preterm deliveries. Thus, spontaneous preterm labour is characterised by remarkable uterine hyperactivity. The mechanism requires further investigation but it probably results from increased sensitivity of the uterus to stimulatory agonists such as oxytocin, prostaglandins or other endogenous mediators. [8] as well as a premature loss of inhibitory pathways involving myometrial ion channels. [9] We have recently shown that spontaneous preterm labour is associated with increased GTP bound RHO proteins in myometrial tissue, a pathway for enhanced uterine contractility through 'calcium sensitization'. [10] Uterine contractions are the most common presenting sign of preterm labour but in a high percentage of women the contractions stop without the need for Tocolytic treatment. Separating imminent spontaneous preterm labour from recurrent but transient episodes of uterine contractions remains a major clinical challenge.

Bleeding in pregnancy was strongly associated with both spontaneous and elective preterm deliveries. Women with vaginal bleeding have an increased risk of induction of labour and caesarean section and the condition is associated with other pregnancy complications such as PPROM, oligohydramnios and fetal growth restriction. [11] The mechanism by which intrauterine bleeding may lead to spontaneous preterm labour is not known, but it has been proposed that thrombin activation in the decidua leads to uterine contractions. [12, 13] Moreover thrombin increases matrix metalloproteinase activity in the fetal membranes providing a link between intrauterine bleeding and rupture of the membranes. [14, 15]

Anaemia is one of the most common nutritional problems in pregnant women throughout the world and is the most important preventable risk factor for preterm birth. Our data show that even moderate anaemia (< 10.5 g/dl) in pregnancy is associated with preterm birth and this agrees with observations in other tertiary referral hospitals. [16] Ascending intrauterine infection is often quoted as a pathogenic mechanism for preterm labour, [17] however in our survey the proportion of women with bacterial pathogens in high vaginal swabs was similar in the control and preterm groups.

Preterm babies continue to die in the perinatal period or have severe neonatal complications which predispose to a high incidence of neurodevelopmental impairments and sensory deficits. The early administration of glucocorticoids to the mother and impressive advances in neonatal care have steadily improved neonatal survival rates over the past three decades; however, it is unrealistic to expect that improvements in neonatal intensive care will decrease neonatal mortality and the sequelae of prematurity much further. [18] The onus is now on understanding the causes and mechanisms of parturition, so that spontaneous preterm labour can be prevented and preterm birth is only allowed to happen electively for the benefit of the mother and her baby. [19] The proportion of elective preterm deliveries in our survey is considerably higher than in similar UK and European hospital populations in the 1970s and 1980s. [20] This reflects a growing confidence among young obstetricians that justified intervention in preterm pregnancies results in good obstetric and neonatal outcome, but significant morbidity should not be forgotten.

This study has limitations because it has surveyed a population of several hundred women in a single tertiary hospital. The factors associated with preterm birth would be better addressed through prospective study of a very large geographical cohort. Furthermore, we believe that over the next decade epidemiological data will be supplemented by advances in uterine physiology and maternofetal endocrinology which will improve our understanding of human parturition and help devise successful strategies to prevent preterm labour.

Conclusion

The data from this study show that more than 50% of preterm births follow spontaneous preterm labour and further research to clarify the mechanism by which risk factors such as increased uterine contractility, premature rupture of the membranes and uterine bleeding result in preterm labour will be clearly beneficial. Moreover, it is important to address the major causes of elective preterm delivery, namely hypertensive disorders and intrauterine growth restriction. This may be achieved through the discovery of the aetiology of pre-eclampsia and a better understanding of the control of *et al.* growth and placental function. The reduction of spontaneous preterm labour is a realistic aim; however, our lack of knowledge of the process of labour is a major handicap in devising effective strategies. It is essential to promote research into the physiological and pathophysiological pathways that increase uterine activity during pregnancy. The combination of laboratory and clinical research will provide the necessary breakthroughs to improve the prevention of preterm birth.

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