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Study the Mode of Delivery and Induction to Delivery Time in the Subject of Prelabour Rupture of Membrane

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ABSTRACT

Background: Premature rupture of membranes (PROM) is a significant obstetric complication associated with increased maternal and neonatal risks. It often leads to preterm labor, chorioamnionitis, and neonatal sepsis. Risk factors include infections, previous PROM, and inadequate prenatal care. The management of PROM depends on gestational age and maternal-fetal conditions, with induction of labor being a key intervention. This study aimed to evaluate the bishop score, mode of induction, and induction-to-delivery time in pregnancies complicated by PROM.

Methods: A prospective observational study was conducted on 130 antenatal subjects with PROM admitted to the Department of Obstetrics and Gynaecology, NSCB Medical College over 18 months. Detailed history-taking and examinations were performed. Induction of labor was considered based on clinical assessment, using PGE1/PGE2. Delivery outcomes, including vaginal delivery and lower segment cesarean section (LSCS), were recorded. The induction-to-delivery time was documented.

Results: The incidence of PROM was 6.39%. Induction was required in 57.7% of cases, with PGE1 used in 20.8% and PGE2 in 36.9%. Among induced cases, 64% had a vaginal delivery, while 36% underwent LSCS. A significantly higher proportion of subjects who were not induced delivered via LSCS (72.7%, $p<0.05$). The mean induction-to-delivery time was 11±3.42 hours (range: 0–14 hours).

Conclusion: PROM increases the need for labor induction and is associated with a higher rate of operative deliveries. A history of PROM further elevates future risk. Early intervention and appropriate management can improve maternal and neonatal outcomes.

Key-words: Premature rupture of membranes, induction, LSCS, NVD, Induction to delivery time

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INTRODUCTION

Premature rupture of membranes, also known as pre-labour rupture of membranes, is a common obstetric complication that can lead to preterm labour, low birth weight, and increased risks for both the baby and the mother [1–3]. Several factors contribute to PROM, including inadequate prenatal care, low socioeconomic status, infections during early pregnancy, and sexually transmitted infections [4,5]. Among these, vaginal infections are one of the most significant causes [6]. Early

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diagnosis and treatment of these infections may help lower the risk of PROM, ultimately reducing complications for both mother and baby [7,8].

Diagnosis of PROM is usually clinical, based on a history of sudden fluid leakage, followed by persistent wetness [9]. The color, consistency, and smell of the fluid should be assessed. Chorioamnionitis usually presents with fever, foul-smelling discharge, and abdominal pain [10]. A sterile speculum exam is essential to check for liquor pooling. If fluid is not visible, the Valsalva manoeuvre or coughing may help [11].

Management of subjects with PROM depends on various factors. Antibiotic prophylaxis should be given to treat GBS if positive [12]. Digital pelvic examination should be minimized to avoid the risk of infection [13]. Administration of prophylactic antibiotics is controversial [14]. At 37 weeks of gestation or beyond, delivery should be expedited, antibiotics may be required, and induction of labour via IV oxytocin seems to be superior to other options [15].

If Caesarean delivery is indicated, vaginal irrigation with povidone-iodine 1% is recommended to reduce the risk of endometritis and wound complications [16]. We here aim to study the bishop score of subjects with pregnancy complicated by PROM, mode of induction, and induction to delivery time in subjects with PROM.

MATERIALS AND METHODS

Place of study- A prospective observational study was conducted on 130 antenatal subjects admitted to the Department of Obstetrics and Gynaecology, NSCB Medical College and Hospital. The study included women with gestational age ≥37 weeks experiencing PROM over 18 months (August 1, 2022 – January 31, 2024).

Inclusion Criteria- Antenatal subjects admitted with PROM at or beyond 37 weeks at NSCB Medical College and Hospital, Jabalpur.

Exclusion Criteria- Women with gestational age <37 weeks, those in active labor, and non-consenting subjects.

Methodology- After ethical clearance and informed consent, detailed history, clinical examination, and fetal assessment (Doppler, CTG) were performed. Delivery was conducted vaginally or via LSCS. Induction agents (PGE1/PGE2) were randomly assigned, and labor progress, mode of delivery, and maternal-fetal outcomes were recorded.

Statistical Analysis- Data was analyzed using IBM SPSS v20. Categorical variables were expressed as frequency/proportion, continuous variables as mean ± standard deviation. The chi-square test was used for the mode of delivery analysis, with $p<0.05$ considered statistically significant.

Ethical approval- Ethical approval was obtained from the Institutional Ethics Committee of NSCB Medical College. Written informed consent was taken from all participants before enrollment.

RESULTS

During the study period, a total of 2033 deliveries took place in our study area, of them, 130 cases presented with premature rupture of membranes. The incidence of PROM in our study was found to be 6.39%. The mean age of patients presenting with PROM was 26.01±3.193 years. Out of 130 cases with PROM in the present pregnancy, a history of PROM was present in 42.3% of cases in the previous pregnancy (Table 1).

Table 1: History of PROM in previous pregnancy

History of PROM in previous pregnancy	Frequency (n=130)	Percentage
Absent	75	57.7
Present	55	42.3

Bishop score was 4 or less in 40% cases whereas it ranged between 5 to and in 30% of cases. Bishop's score was 9 or more in only 30% of cases (Fig. 1).

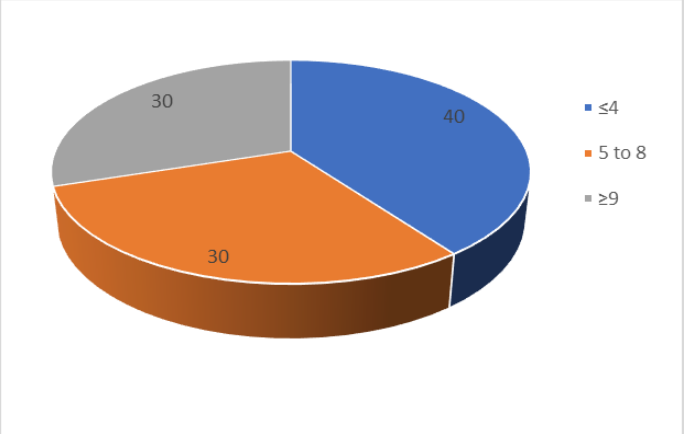

Fig. 1: Bishop score in patients with PROM

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Induction was done in more than half of the cases (57.7%) cases, of them, induction was done with PGE1 in 20.8% of cases and PGE-2 in 36.9% of cases. Out of 27 cases induced with PGE-1, 15 (11.5%) cases received a single dose and 12 (9.2% cases were induced with 2 doses of PGE-1. Similarly, out of 38 cases induced with PGE2, 1,2 and 3 doses were required for induction in 16.2%, 16.2% and 4.6% cases respectively (Table 2).

Table 2: Distribution of cases according to need for induction

Induction		Frequency (n=130)	Percentage
Not done		55	42.3
With PGE-1	Total Single dose 2 doses	27 15 12	20.8 11.5 9.2
With PGE-2	Total Single dose 2 doses 3 doses	48 21 21 6	36.9 16.2 16.2 4.6

Induction was done in more than half of the subjects i.e. 75 (57.7%) subjects, of them, 64% of deliveries were conducted via vaginal route whereas 36% of subjects underwent LSCS. However, significantly higher proportions of subjects in whom induction was not considered due to absolute or relative contraindication to induction delivered via LSCS (72.7%); ($p<0.05$) (Table 3).

Table 3: Distribution of subjects according to the need for induction and mode of delivery

Mode of delivery	Induction considered		Induction not considered		Total	
	n	%	n	%	n	%
Vaginal	48	64	15	27.3	63	48.5
LSCS	27	36	40	72.7	67	51.5
Total	75	100	55	100	130	100

$\chi 2= 17.14$; p-value= .001

Table 4 presents the induction to delivery time in patients with PROM. The mean time from induction to delivery was 11 hours, with a standard deviation (SD) of 3.42 hours, indicating variability in the duration. The recorded range was between 0 to 14 hours, showing that some patients delivered almost immediately after induction (Table 4).

Table 4: Induction to delivery time in patients with PROM

Time from induction to delivery (hours)	
Mean	11
SD	3.42
Range	0-14

DISCUSSION

According to recent literature, induction of labour in subjects with PROM as compared to expectant management reduces the risk of chorioamnionitis without increasing the rate of caesarean section.[17] Labour was induced in more than half of the subjects presenting with PROM in our study (57.7%). The mean induction to delivery time was 11±3.42 hours in subjects with PROM.

Out of 75 subjects in whom induction was considered, the mode of delivery was vaginal in (48) 64% of subjects and (27) 36% delivered via LSCS. Whereas out of 55 subjects in whom induction was not considered due to absolute or relative contraindication to induction, the majority i.e. (40) 72.7% underwent LSCS ($p<0.05$). Overall, total LSCS was the mode of delivery in 51.5% of subjects of PROM and the most common indication of LSCS was previous LSCS (19.2%), followed by fetal distress (11.5%). Other indications of LSCS were failed induction (6.9%), malpresentation (4.6%), NPOL (4.6%) and chorioamnionitis (4.6%).

Our study findings were supported by the findings of Nagaria *et al*. in which labour was induced in 86% of subjects and the mean induction to delivery time was 10.6 hours.[17] Induction of delivery was done in all the subjects in a study by Patil *et al.* and the time from induction to delivery was 12 to 24 hours in the majority of subjects (61%).[18] About 55.2% of subjects in a study by Poondru *et al.* required induction, and of them 48% of subjects delivered via the vaginal route.[19] Meena *et al.* reported that 88% of subjects with PROM required

induction and of them, 84.5% of subjects were induced with cerviprime-gel.[20]

Our study findings were concordant with the findings of Poondru *et al.* where the authors documented LSCS delivery as a mode of delivery in 55.2% of subjects of PROM and fetal distress was the most common indication of LSCS (43.9%), followed by severe oligohydramnios (25.2%).[19] Mode of delivery was LSCS in 32% of subjects with PROM and the rate of LSCS in subjects of PROM was found to be significantly higher as compared to age and sex-matched controls (32% vs 13.4%; p<0.05) in a study of Nagaria *et al.* [17] Similarly, the mode of delivery was LSCS in 30% of subjects in a study by Vasava *et al*. and 10% of the deliveries were assisted. About 60% of deliveries were conducted via normal vaginal route.[21] About 30% of the deliveries were conducted via LSCS in a study by Patil et al and the most common indication of LSCS was a failure to progress (15%), followed by fetal distress (11%), deep transverse arrest (2%) and intrapartum sepsis (2%).[18]

Similar findings were documented by Pandey *et al*. in which significantly higher proportions of subjects with PROM delivered via LSCS as compared to controls (31% vs 12%; p<0.05) and the common indications of LSCS in subjects with PROM were Foetal distress (45.16%) and failed induction (16.12%).[22] Mode of delivery was via LSCS in 32.7% of subjects in a study by Singh *et al.* and the most common indication of LSCS was failure to progress (38.58%), followed by fetal distress (34.54%).[23]

CONCLUSIONS

Premature rupture of membranes is a frequent obstetric complication associated with increased maternal and neonatal risks. A history of PROM in previous pregnancies significantly raises the likelihood of recurrence. PROM often necessitates medical intervention, with a substantial proportion of cases requiring labor induction. In our study, more than half of the subjects underwent induction, primarily using PGE1 and PGE2, leading to a mean induction-to-delivery time of 11±3.42 hours. While vaginal delivery remained the preferred mode, the rate of operative deliveries was notably higher in cases where induction was not performed. The timely and appropriate management of PROM is crucial to minimizing complications, reducing infection risks, and optimizing perinatal outcomes. Early diagnosis, careful monitoring, and judicious use of induction methods can improve maternal and fetal prognosis. Further studies are needed to establish standardized protocols for managing PROM to enhance both maternal and neonatal health outcomes.

CONTRIBUTION OF AUTHORS

Research concept- Ranu Jain, Shuchi Sehgal
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Materials- Ranu Jain, Shuchi Sehgal
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Article editing- Shraddha Mehta, Ranu Jain
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