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Outcomes of Induction of Labor versus Expectant Management in Women with Premature Rupture of Membrane

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Abstract
Objective: To assess outcomes of induction of labor versus expectant management in pregnant women suffering from preterm rupture of membrane. **Study Design:** Randomized controlled trial. **Place and duration:** It was held in Gynecology Department Bahawal Victoria Hospital, Bahwalpur from 12 December 2017 to 25 May 2018. **Methodology:** 80 women were enrolled in this clinical trial and they were categorized into two groups IOL and EM randomly. Women with single or twice pregnancy having PROM at > 37 weeks gestation, they were eligible for this study. PROM was clinically examined and confirmed with Ferning and positive litmus tests. Digital vaginal examination was avoided. Women with abnormal cardiotocogram, major fetal anomalies, severe preeclampsia, sign of intrauterine infection, monochorionic multiple pregnancies, meconium stained amniotic fluid and HELLP syndrome was excluded from this clinical study. All the pregnant women who met these criteria of this study were randomly assigned to EM group and IOL group with lottery method.Computer software SPSS version 23 was used for entering and analyzing data. Frequencies and percentage was calculated for maternal and neonatal variables like mode of delivery, Chorioamnionitis, maternal and neonatal sepsis, Pneumonia, HELLP syndrome, Apgar score, Meningitis, Convulsion, Neonatal temperature, Neonatal ICU admission and RDS. Standard deviation and mean were used to describe the maternal length of hospital stay (days), Neonatal birth weight (g) and neonatal length of ICU stay (days). Student t test and Chi square test were used to find frequency, percentage, SD and mean respectively. P value < 0.05 was considered to be significant.**Result:** Rates of neonatal and maternal infection were insignificant in both study groups. The neonatal infection rate was 7.5 % for both IOL and EM group, while maternal infection rate was 7.5 % in IOL group, 10 percent for the EM group, and 2.7 % in the EM (prostaglandin) group. The rates of C-section were insignificant. Rates of clinical chorioamnionitis were significant in both study groups. Clinical chorioamnionitis was less likely to be developed in the women of the IOL group than in women of EM group (7.5 % vs. 12.5 %, P_0.04), as was pneumonia (zero vs. 10 %, P-0.040). Length of hospital stay was significant in IOL and EM group (7.57±1.15 vs. 6.85±1.13, P- 0.004), as neonatal ICU admission was (12.5 % vs. 7.5 %, P- 0.04). Similarly, meningitis was (zero vs. 5 % and P- 0.030), as was convulsion (zero in IOL vs. 1.5 % in EM, P-0.040).**Conclusion:** It has been concluded that management of induction of labor (IOL) is very suitable for all pregnant women suffering from preterm rupture of membrane (PROM) than expectant management (EM) because it decreases maternal as well as fetal complications**.**
Keywords: Expectant management (EM), Induction of labor (IOL), premature rupture of membrane (PROM).

Introduction

Premature or preterm rupture of membrane (PROM) is very common condition that occurs during 20-30 percent of all preterm pregnancies, in which amniotic sac is ruptured before the onset of labor[1]. In PROM, pregnant women experience a painless leakage of amniotic fluid through vagina in very slow and steady manner. It gives an easy way for bacteria to enter the womb and creates high risk of life threatening infection for both mother and fetus[2]. PROM produces greater risk of complication in 2-8% pregnancies by causing stillbirth, chorioamnionitis and mental retardation in fetus. It increases the fetal and maternal mortality and morbidity rate[3, 4].

Despite of this frequent condition occurring during pregnancy, there is still no consensus and great uncertainty is present about the appropriate management of women with PROM[5]. The pendulum of this decision has been swinging between expectant management and induction of labor for more than 10 years[6]. Very few studies are present show which of the two options is suitable for women with PROM. Moreover the available studies leave many questions unanswered because they give limited information only about C- section and infectious morbidity. Royal College of Obstetricians and Gynecologists guideline suggest that the best option should be delivery for PROM at or beyond 34 weeks of gestation and expectant management at or above 34 weeks can increase risk of maternal chorioamnionitis but it can decrease risk of C-section, neonatal admission in ICU and neonatal RDS[7]. According to The American Congress of Obstetricians and Gynecologists guidelines, IOL should be preferred for PROM at or beyond 34 week of gestation[8]. The Dutch Society for Obstetrics and Gynecology guidelines suggest EM for 36 week but they advocate induction of labor in 37 week of gestation[9].The study surveys in Canada and Australia are unable to identify any consensus regarding how to

manage pregnant women suffering from PROM between 34 to 36 weeks of gestation[10, 11].

A recent and updated Cochrane review about management of women suffering from PROM was published in 2017, it concluded that there was no consensus regarding the best management of PROM to reduce or avoid maternal and fetal outcomes[12]. There is no local study present regarding PROM, so this clinical randomized trial was designed to compare perinatal Outcomes of IOL versus EM in women with Premature Rupture of Membrane (PROM).

Methodology

We conducted this randomized controlled trial in Gynecology Department Bahawal Victoria Hospital, Bahwalpur from 12 December 2017 to 25 May 2018. In which 80 women were enrolled. Ethical approval was granted from Ethics Committee of hospital. The trial was started after taking informed consent from all participants of trial. Women with single or twice pregnancy having PROM at > 37 weeks gestation, they were eligible for this study. PROM was clinically examined and confirmed with Ferning and positive litmus tests. Digital vaginal examination was avoided. Women with abnormal cardiotocogram, major fetal anomalies, severe preeclampsia, sign of intrauterine infection, monochorionic multiple pregnancies, meconium stained amniotic fluid and HELLP syndrome was excluded from this clinical study. All the pregnant women who met these criteria of this clinical study were randomly assigned to EM and (IOL) group with lottery method.

All the pregnant women assigned in IOL (induction of labor) were induced within 24 hours of randomization. The induction was done according to international guidelines. After vaginal examination, all the patients were induced with oxytocin. After induction of labor, planned C-section was done immediately. All women in EM group were hospitalized for 24 hours. They were monitored according to hospital protocol. Their temperature, leukocyte count, color of amniotic fluid was monitored twice a day. They were given permission to walk around as they could do. If there was no labor resulted within 24 hours, they were induced with intravenous oxytocin. The initial dose of IV oxytocin was 2.5 mU / min after every half an hour until adequate contractility achieved.

Computer software SPSS version 23 was used for entering and analyzing data. Standard deviation and mean was calculated for baseline variables like maternal age (years), gestational age (weeks) and Interval from membrane rupture to delivery. Frequency and percentage was calculated for baseline variables like parity, vaginal examination with speculum, digital vaginal examination, method of confirming rupture of membrane and group B streptococcus on vaginal culture. Frequencies and percentage was calculated for maternal and neonatal outcome variables like mode of delivery, Chorioamnionitis, maternal and neonatal sepsis, Pneumonia, HELLP syndrome, Apgar score, Meningitis, Convulsion, Neonatal temperature, Neonatal ICU admission and RDS. Standard deviation and mean were used to describe the maternal length of hospital stay (days), Neonatal birth weight (g) and neonatal length of ICU stay (days). Student t test and Chi square test were used to find frequency, percentage, SD and mean respectively. P value was < 0.05 was considered to be significant.

Results

Eighty patients were enrolled and they were categorized randomly into two groups i.e. EM group and IOL group. 40 women (50%) were assigned to IOL (oxytocin) group and 40 women (50%) to EM group. The baseline characteristics in both groups were similar and the differences were statistically insignificant. All these baseline characteristics described in (Table I).

Table. I
Baseline characteristics among the groups

Variables	IOL (n=40)	EM (n=40)	p-value
Maternal age (years)	29.30±2.32	29.22±1.67	0.869
Gestational age (weeks)	39.40±1.42	39.12±1.41	0.390
Interval from membrane rupture to delivery hours	5.45±1.27	5.03±1.65	0.205
Parity			
0	n=16 (40%)	n=21 (52.5%)	0.262
>1	n=24 (60%)	n=19 (47.5%)	
Method of confirming rupture of membranes			
Litmus test alone	n=28 (70%)	n=29 (72.5%)	0.361
Ferning test alone	n=4 (10%)	n=1 (2.5%)	
Litmus and Ferning tests	n=8 (20%)	n=10 (25%)	
Vaginal examination with a speculum			
None	n=13 (32.5%)	n=12 (30%)	0.761
Cervix unripe	n=19 (47.5%)	n=22 (55%)	
Cervix ripe	n=8 (20%)	n=6 (15%)	
Digital vaginal examination			
None	n=24 (60%)	n=27 (67.5%)	0.388
Cervix unripe	n=12 (30%)	n=7 (17.5%)	
Cervix ripe	n=4 (10%)	n=6 (15%)	
Group B streptococcus on vaginal culture			
Present	n=5 (12.5%)	n=10 (25%)	0.245
Absent	n=32 (80%)	n=29 (72.5%)	
Unknown	n=3 (7.5%)	n=1 (2.5%)	

Table 2 explained the data about mode of delivery and maternal outcomes in both groups. Of the 40 women assigned to the IOL group, 35 (87.5%) went into labor spontaneously, but 3 (7.5%) women had C-section, and remaining 2 (5%) women had assisted vaginal delivery. Of the 40 women enrolled in the EM group, spontaneous labor was induced in 28 (70%) women, 6(15%) women had planned C-section, and remaining 6 (15%) women underwent assisted vaginal delivery. The mean length of hospital stay of patients in IOL group and EM group was 7.57±1.15 and 6.85±1.13 days respectively. It was statistically significant with (p = 0.004).

All the data recorded regarding histological chorioamnionitis, pneumonia, clinical chorioamnionitis, HELLP syndrome and maternal sepsis in IOL was as n=9 (22.5%), n=0 (0%), n=3 (7.5%), n=0 (0%) and n=3 (7.5%). But in EM group data about pneumonia, Histological chorioamnionitis, clinical chorioamnionitis, maternal sepsis and HELLP syndrome was as n=4 (10%), n=8 (20%), n=5 (12.5%), n=4 (10%) and n=3 (7.5%) respectively. The differences were statistically significant of Clinical chorioamnionitis (p=0.040), pneumonia (p=0.040), HELLP syndrome (p=0.040), other complications (p=0.030).

Table. II
Distribution of maternal outcomes among the groups

Variables	IOL (n=40)	EM (n=40)	p-value
Mode of delivery			
Vaginal spontaneous	n=35 (87.5%)	n=28 (70%)	0.151
Vaginal assisted	n=2 (5%)	n=6 (15%)	
Cesarean section	n=3 (7.5%)	n=6 (15%)	
Histological chorioamnionitis	n=9 (22.5%)	n=8 (20%)	0.785
Clinical chorioamnionitis	n=3 (7.5%)	n=5 (12.5%)	0.040
Maternal sepsis	n=3 (7.5%)	n=4 (10%)	0.692
Pneumonia	n=0 (0%)	n=4 (10%)	0.040
HELLP syndrome	n=0 (0%)	n=3 (7.5%)	0.040
Length of hospital stay (days)	7.57±1.15	6.85±1.13	0.004

Table 3 explained the neonatal outcomes in two groups IOL and EM respectively. The mean birth weight and length of ICU stay of neonates in IOL group was 437.86± 2.17 grams and 4.40±1.72 days. While, the mean

birth weight and length of ICU stay of neonates in EM group were 413.55±3.01 grams and 8.07±1.97days respectively.

In IOL group data regarding neonatal sepsis, Apgar score at 5 min, neonatal temperature >38 C^0, respiratory distress syndrome, meningitis, convulsion, neonatal death, neonatal ICU admission was observed as n=3 (7.5%), n=1 (1.5%), n=5 (12.5%), n=3 (7.5%), n=0 (0%), n=0 (0%), n=0 (0%) and n=5 (12.5%) respectively. respectively. Similarly in EM group data about neonatal sepsis, Apgar score at 5 min, neonatal temperature >38 C^0, respiratory distress syndrome, meningitis, convulsion, neonatal death, neonatal ICU admission was recorded as n=3 (7.5%), n=2 (5%), n=3 (7.5%), n=5 (12.5%), n=2 (5%), n=1 (1.5%), n=0 (0%) and n=3 (7.5%) respectively. The statistical differences observed in both groups were as; birth weight (p=0.000), length of ICU stay (p=0.000), meningitis (p=0.030), convulsion (p=0.040) and neonatal ICU admission (p=0.040).

Table. III

Distribution of Neonatal outcomes among the groups

Variables	IOL (n=40)	EM (n=40)	p-value
Neonatal sepsis	n=3 (7.5%)	n=3 (7.5%)	1.000
Apgar score at 5 min <7	n=1 (1.5%)	n=2 (5%)	0.556
neonatal temperature >38 C^0	n=5 (12.5%)	n=3 (7.5%)	0.456
Birth weight g	437.86± 2.17	413.55±3.01	0.000
Respiratory Distress Syndrome	n=3 (7.5%)	n=5 (12.5%)	0.456
Meningitis	n=0 (0%)	n=2 (5%)	0.030
Convulsion	n=0 (0%)	n=1 (1.5%)	0.040
Neonatal ICU* admission	n=5 (12.5%)	n=3 (7.5%)	0.040
Length of ICU stay (days)	4.40±1.72	8.07±1.97	0.000

***intensive care unit (ICU)**

Discussion:

During premature rupture of membrane (PROM), major complications are maternal and fetal morbidity as well as mortality rate. It increases rate of infection in both mother and baby[13]. There are many studies to evaluate the better management for PROM[14]. In this study eighty babies were born to women and all the babies of both IOL and EM groups had neonatal sepsis rate of 7.5 percent. The neonatal mortality rate with this infection was zero percent. The frequency of neonatal infection was very low when management of PROM was done with practice of induction of labor (IOL) than expectant management (EM). However the rate of maternal infections like chorioamnionitis, pneumonia and HELLP syndrome have low frequency when they were treated with IOL than the practice of expectant management. These results are similar to randomized controlled trial by Wagner MV, Chin VP et al[15]. Another clinical trial by H.Rydhstrom and Ingemarsson, 369 women were included in this study to compare maternal and fetal outcomes of EM and IOL. The results had shown that fetal infectious morbidity was higher in expectant management than spontaneous induction of labor but the rate of obstetric intervention was not significant in IOL and EM[16].

This clinical study shows that rate of obstetric interventions (C- section, vaginal delivery) is same in IOL and EM. This result of obstetric intervention is similar to clinical trial of H.Rydhstrom and Ingemarsson. These results differ from those of clinical study by Hauth.JC, Cunningham.FG et al; that has indicated lower cesarean section rate in spontaneous IOL than EM[17]. However, many past studies have not tried to decrease or avoid bias in the evaluation of better management for PROM to minimize the maternal and fetal infectious morbidity. Our clinical trial was specially planned to avoid such bias[3, 18].

A study was published in The New England JOM by Mary E. Hannah, Arne Ohlsson et al; according to this clinical study both practices of IOL and EM are suitable options for management of mothers and babies with PROM. It also shows that their rates of obstetric interventions and fetal infection are similar. This study indicates that practice of IOL has very low risks of maternal infection than EM. Pregnant women who are suffering from PROM prefer IOL than EM[19].

There are many studies that are in favor of expectant management, clinical trial by Grant JM, Serle E, Mahmood T, et al; in this study 444 women were included, it shows that rate of C-sections and vaginal examination was less in EM than IOL[20]. Another randomized clinical trial compared oxytocin IOL with EM by H. Pauline Ottervanger, Marc J.N.C, Wilma Smit, et al; it shows rate of operative delivery (C-section, instrumental vaginal delivery) and comfortable labor is lower in EM than oxytocin IOL. There is insignificant difference of maternal and fetal infection in both groups[21]. These results are significantly different from our study.

A clinical trial designed in 2012 by David P Vander, Sylvia M.C, et al; the result indicated that maternal

and fetal outcomes in PROM complication were neither improved by IOL nor EM [15]. This study is contrast to our results. In our study, the results of length of hospital stay show significant difference and the patients who were managed with spontaneous IOL; their hospital stay was longer than those who were managed by practice of EM. But there is study by Brian M.M, Lisa G. Crocker, Nina .M, et al; it shows that IOL reduces the hospital stay and fetal as well as maternal infection for women with PROM[22]. Its results are different from our study in hospital stay but similar regarding maternal and fetal infectious morbidity.

Conclusion

It has been concluded that management of induction of labor (IOL) is very suitable for women with premature rupture of membrane (PROM) than expectant management (EM) because it decreases maternal as well as fetal complications**.**

Limitation:

This study had been designed on local level with small number of women suffering from PROM. It has been recommended to organize more studies with larger sample size to get better results.

Finding Source:
Nil

Conflict of Interest:

Nil

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