Original Article

Comparison of Intravenous Oxytocin with Vaginal Prostaglandin E2 for Labour Induction in Prelabour Rupture of Membranes at Term

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Abstract

Objective: To compare intravenous oxytocin with vaginal prostaglandin E2 for labor induction in term prelabour rupture of membranes based on mean induction-delivery interval and risk of chorioamnionitis.

Methodology: This randomized controlled trial was conducted in Obstetrics and Gynecology department of POF Hospital Wah Cantt from 9th February 2018 to 8th August 2018. One hundred and sixty patients fulfilling the inclusion and exclusion criteria were included in the study and were divided into two equal groups. Group A; consisted of 80 patients subjected to oxytocin induction and Group B; included 80 patients subjected to prostaglandin E2 induction.

Results: The results of our study showed a significant difference between both groups for induction-active labour interval being 5.51±1.24 hours in oxytocin induction group and 6.46+/-1.47 hours in prostaglandin E2 induction group. Induction-delivery interval between both groups also showed a significant difference being 13.24±2.96 hours in oxytocin induction group and 14.76±3.45 hours in the prostaglandin induction group. Clinical chorioamnionitis was seen in 3.7% of patients who were induced with Prostaglandin E2 whereas none of the patients in oxytocin-induced group developed any clinical sign of chorioamnionitis. Statistically, no significant difference was found in both groups regarding maternal age, parity and gestation at presentation.

Conclusion: Immediate active management of term PROM using intravenous oxytocin decreases induction to delivery interval and reduces the risk of chorioamnionitis compared with vaginal prostaglandin E2.

Keywords: Term PROM, Oxytocin, Prostaglandin E2, Induction-delivery interval, Chorioamnionitis.

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Introduction

PROM is defined as the rupture of membranes before the onset of regular uterine contractions at term gestation (≥37+0 weeks gestation). It affects about 8% of term pregnancies. Spontaneous labor follows term pre-labor rupture of membranes (term PROM) at 24, 48 and 96 hours in 70%, 85% and 95% of women respectively.[1] The “latent period” is the interval between membrane rupture and the onset of active labor. Due to

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this variable latency period, it is strongly associated with perinatal morbidity and mortality due to ascending infection.

Resulting in lower genital tract infections especially bacterial vaginosis and abnormal mid-trimester flora.[2]Sequel of PROM includes sub-clinical chorioamnionitis, increased incidence of caesarean section, postpartum endometritis and neonatal sepsis. Fetal hypoxia may occur due to cord prolapse, cord compression and abruptio-placentae.[3]

Prolonged PROM resulting in perinatal morbidity and mortality as it results in latency period from membrane rupture till delivery which increases the likelihood of ascending infection.[4,5]Many management strategies of PROM at term have been devised but none has proven to be the standard strategy to manage such patients. One school of thought insists that labour can be induced if it does not immediately start after membrane rupture while some say that waiting for labor to begin spontaneously itself is better if there is no feto-maternal compromise.[6]In patients with PROM at term patients who underwent induction with intravenous syntocinon resulted in lower risk of maternal and neonatal infection[7].

A research study results showed that induction to active labor time was significantly shortened in oxytocin induced group compared with PGE_2 induced group(4.9+/-4.1 vs. 8.5+/- 3.6 hrs, P=0.02) as was the induction-delivery interval (3.4+/-1.5 vs. 9.6+/-4.7 hrs; P=0.02) but caesarean delivery rates and neonatal outcome were statistically comparable in both groups.[8]Another multicenter trial of term PROM found that the duration of active labour is strongly associated with risk of chorioamnionitis being 2% in labour lasting less than 3 hrs. and rising up to 12% once this duration exceeds 12 hrs[9]. Another study showed that immediate induction with intravenous oxytocin is associated with reduced risk of maternal infections (odds ratio for chorioamnionitis of 0.63, 95% confidence interval 0.51 to 0.78, endometritis 0.72,95%confidence interval 0.52 to 0.99) compared with expectant management.[10]

A survey done in Australia on the management of term PROM showed oxytocin being preferred by physicians as first line agent for induction compared with vaginal prostaglandins (96.2% vs 15.3%) due to increased incidence of chorioamnionitis and neonatal infection with vaginal prostaglandins.[11] The rationale of this study is to compare the efficacy and safety of intravenous oxytocin with vaginal PGE_2 with idea to review current practices of labour induction in term PROM and to determine safe and effective induction agent to be used in these patients so that the risks of maternal and neonatal morbidity and mortality are reduced.

Methodology

This Randomized Controlled Trial was carried out at the Department of Obstetrics/ Gynecology of POF hospital Wah Cantt affiliated with Wah Medical College. After obtaining institutional ethical committee approval, the study was carried out from Feb 2018 to August 2018. A total of 160 patients were included in the study which fulfilled inclusion and exclusion criteria. Patients were divided into two equal groups. In Group A; 80 patients were induced with intravenous oxytocin and in Group B; 80 patients were given induced with vaginal prostaglandin E2. Non-probability consecutive sampling was done and patients were allocated group through the lottery method. Patients with spontaneous term PROM for < 24 hrs., para 4 or less and with singleton pregnancy and fixed cephalic presentation, with Bishop score 5 or less, not in active labour were included in the study. Patients with malpresentation, chorioamnionitis, cord prolapsed, previous uterine surgery, presence of absolute indication for caesarean section, and known hypersensitivity to prostaglandins or oxytocin were excluded from the study group.

Data was collected by a structured questionnaire. A detailed history was taken and obstetrical examination and ultrasound was performed at the time of admission. PROM was confirmed by a sterile speculum examination. A vaginal examination was carried out to assess the Bishop's score. Any signs of feto-maternal compromise were kept in check like maternal pyrexia, maternal or fetal tachycardia, uterine tenderness and a TLC count of >11, 000/mm^3. Fetal wellbeing was assessed by observing the color of liquor, fetal heart sound record and CTG. Routine investigations included a blood complete picture, blood group, and urine examination which were done by a laboratory technician.

The patients in group A were immediately induced with intravenous oxytocin, an initial dose of 2mU/min was started and increased at 20 mins interval by 2mU/min to a maximum of 36mU/min or until four contractions in 10 mins are achieved and patients in group B; were induced immediately with single PGE_2 vaginal tablet that were repeated, if required, after a period of 6 hrs up to a maximum of three tablets. Patients in both groups were put on a 4-hourly temperature, blood

pressure, pulse charting, and 1 hourly fetal heart rate record. They were provided with sterile pads with close monitoring of colour and smell of liquor. Per vaginal examination were done 4 hourly. The latent period was recorded, a partogram was maintained in active labour. The success of induction was declared when effective uterine contractions started with improvement in bishop score. Where the induction failed or signs of impending feto-maternal compromise developed caesarean section was performed. Newborns were assessed by a pediatrician at the time of delivery and their APGAR score was noted at 1 and 5 mins.

All data was entered and analyzed using SPSS version 20. Descriptive statistics were calculated for both quantitative and qualitative variables. For quantitative variables like Induction-initiation of active labour interval and induction-delivery interval mean and SD was calculated. For qualitative variables like signs of chorioamnionitis frequencies and percentages were measured. For comparison of quantitative variables by both procedures independent sample t- test were used. For comparison of qualitative variables chi square test was used. P-value$\leq$ 0.05 was considered as significant.

Results

The age distribution between the two groups was found to be no different. In oxytocin induction group (Group A) mean age was 27.4 years comparable to prostaglandin induction group (Group B) which was 28.02 years as shown in Table I. Mean parity between both groups also showed no significant difference as shown in Table 1. Mean gestational age between both groups was also comparable being 38.68 +/- 1.11 in oxytocin induction group and 38.57 +/- 1.10 in prostaglandin induction group as shown in Table I.

Table I: Comparison of age distribution, parity and gestational age between both groups. (n=80)

GROUPS	Age of patients (Mean $\pm$ SD)	Parity of Patients	Gestational Age
Oxytocin Group (Group A)	27.40 $\pm$ 4.85	1.42 $\pm$ 0.96	38.68 $\pm$ 1.11
Prostaglandin E2 group (Group B)	28.02 $\pm$ 4.40	1.47 $\pm$ 1.06	38.57 $\pm$ 1.10

Induction-active labor interval showed a significant difference between both groups being 5.51$\pm$1.24 hours in oxytocin induction group and 6.46$\pm$1.47 hours in prostaglandin induction group as shown in following Table 2. Most patients went into active labour between 5 to 10 hours of induction with either drug. Induction-delivery interval between both groups also showed significant difference between both groups being 13.24+/-2.96 hours in oxytocin induction group and 14.76+/-3.45 hours in prostaglandin induction group as shown in Table II.

Table II: Comparison of induction-active labor interval and induction-delivery interval. (n=80)

	Mean duration (hrs) Of induction-active labour interval $\pm$ std. Deviation	Mean duration (hrs) Of induction-delivery $\pm$ std. Deviation
Oxytocin induction group (Group A)	5.51 $\pm$ 1.24	13.24 $\pm$ 2.96
Prostaglandin E_2 induction group (Group B)	6.46 $\pm$ 1.47	14.76 $\pm$ 3.45

Finally, the incidence of chorioamnionitis between two groups showed that none of the patients in oxytocin induction group developed signs of chorioamnionitis;03 patients in prostaglandin group developed chorioamnionitis out of 80 i.e. 0% vs. 3.7%. (Table III)

Table III: Comparison for signs of chorioamnionitis between two groups. (n=80)

Both groups for chorioamnionitis	Yes	No
Oxytocin induction group (Group A)	0	80
Prostaglandin E_2 induction group (Group B)	3	77

Discussion

Obstetricians from the very ancient days believed that premature rupture of membranes can cause maternal complications, increased operative procedures, and neonatal morbidity and mortality. Increasing to the obstetrician's trouble is the fact that much of the literature available pertains to the studies in developed countries where better maternal and neonatal care, strict asepsis protocol is followed and appropriate antibiotics are used when necessary.

In developing countries like Pakistan incidence of maternal and neonatal morbidity is still higher especially in resource-poor settings. This study was done in an attempt to revise current practices for management of term PROM. The recommended management strategy for women with the PROM at term has changed considerably during the last decade partly because of improvement in the facilities for

identification and treatment of maternal and neonatal complications.[12]

More and more institutions worldwide now accept the early induction in cases of PROM to improve perinatal outcome.[13,14] Immediate induction of labour in the women with PROM at term will result in a decrease in the time interval between rupture of membranes and delivery. In this study intravenous oxytocin was compared with vaginal prostaglandin E_2 for labour induction in women with PROM at term in relation to induction-delivery interval and risk of chorioamnionitis. Historically intravenous oxytocin has been utilized as the initial labour induction agent in women with PROM at term. This drug is inexpensive and safe when used judiciously in carefully monitored patients. A recent review recommended intravenous oxytocin as the gold standard for labour induction in PROM at term.[15] Prostaglandin E_2 are effective agents of cervical ripening and induction of labour for an unfavorable cervix.[16]

There was no statistically significant difference between both groups in terms of maternal age, parity and gestational age at presentation in our study. Mean maternal age of oxytocin induction group was 27.4 yrs and that of prostaglandin E_2 induction group was 28.02 yrs. Mean gestational age between two groups was also comparable being 38.68$\pm$1.11 in oxytocin induction group and 38.57$\pm$1.10 in prostaglandin induction group.

In Australia most obstetricians prefer oxytocin being drug of choice for labour induction in term PROM as also supported by TERM PROM trial in terms of shorter induction-delivery interval and reduced risk of feto-maternal infection when compared with vaginal Prostaglandin E2.[17] Our study also supported these previous findings with mean induction-active labour interval showing a significant difference between both groups being 5.51$\pm$1.24 hours in oxytocin induction group and 6.46$\pm$1.47 hours in prostaglandin induction group.

However NICE recommends women with prelabour rupture of membranes at term (at or over 37wks) should be offered a choice of induction of labour with vaginal prostaglandinE2 or expectant management.[18] Induction-delivery interval between both groups also showed significant difference being 13.24$\pm$2.96 hours in oxytocin induction group and 14.76$\pm$3.45 hours in prostaglandin induction group also favoring intravenous oxytocin being drug of choice for induction in term PROM.

These findings were also supported by another study which showed that induction to active labour interval was significantly shortened in oxytocin induction group compared with vaginal prostaglandin E2 (4.9+/- 4.1 vs. 8.5+/-3.6hours; p=0.02) as was the induction-delivery interval (3.4+/-1.5 vs. 9.6+/-4.7hrs).[8]Another important variable of my study was to compare incidence of chorioamnionitis between two groups which is the most feared maternal complication of PROM. The risk was 3.7% in group where vaginal Prostaglandin E2 was used as induction agent compared with 0% in oxytocin induction group.

So, prostaglandins increase the risk of maternal infection(chorioamnionitis), maternal interventions (vaginal examinations) and possibly neonatal infection compared to induction with oxytocin. Few other studies also support the idea that induction of labour with vaginal prostaglandin E2 appears to be relatively inefficient method of inducing labour in term pregnancies with PROM and unfavorable cervices as it is associated with an increased risk of chorioamnionitis and neonatal infection in comparison with oxytocin induction.[19] So the main reasons of preferring oxytocin over prostaglandin E2 was decreased incidence of perinatal infections and more efficacy in terms of induction-delivery interval.

The other school of thought supports Prostaglandin E2 to be effective agent for induction in term PROM. The most common responses being that the women can ambulate more, will have more natural labour with less requirement for electronic fetal heart rate monitoring and there is reduced caesarean section rates and significant improvement in rates of normal vaginal delivery. [20]

This study proved our initially formulated hypothesis suggesting intravenous oxytocin to be an effective induction agent in patients with PROM at term as it significantly reduces induction-active labour interval, induction-delivery interval and risk of developing chorioamnionitis as compared to vaginal prostaglandins, as already proven by various previously done trials.

Conclusion

Immediate active management/induction of term PROM patients with intravenous oxytocin results in the shorter induction-delivery interval and reduced risk of maternal

infection in the form of chorioamnionitis when compared with vaginal prostaglandin E_2. In the local setup induction of such patients with intravenous oxytocin will be of great help especially in our under-resourced labour wards, as this drug is very cheap compared to prostaglandin E_2, also by reducing the induction-delivery interval and the risk of perinatal infections thus minimizing the need for antibiotic therapy.

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