Comparative Analysis of Oxytocin Versus Vaginal Prostaglandin in Induction of Labour in Pre Labour Rupture of Membrane

Sana Danish,[1] Wafa Najeeb,[2] Amna Javed,[3] Rabia Shahid,[4] Sadia Sharif,[5] Maryam Matloob[6]

Abstract

Objective: To determine the mean time from induction to delivery after spontaneous pre-labour rupture of membrane using I/V oxytocin versus vaginal prostaglandin E2.

Method: The study was randomized clinical trial carried out in gynae unit IV Sheikh Zayyed Hospital Lahore. Over a period of six months from July 2019 to Dec 2019. A total of 100 pregnant ladies with age range 18 years to 40 years and having gestational age > 37 weeks were included. Pregnant women with twin pregnancy, and with placenta previa or abruptio placenta and females with any known fetal or maternal risk assessed on clinical examination and those who have congenital abnormality at the time of presentation were also excluded from study. Later on patients were divided randomly into two groups using random number table. Group A (50 patients) patients was given intravenous oxytocin 1 m unit/min in infusion while group B (50 patients) patients was given 3mg prostaglandin E2 vaginaly. Effect modifier like BMI, hypertension and pregnancy induced hypertension will also be recorded. Patients were observed for the time of induction of delivery as per operational definition. Data was entered on computer software SPSS version 21 Independent t-test was applied to compare the mean time between both groups.

Results: There was significant difference between two groups for mean duration of labor as mean duration of induction of labor was 3.92±1.74 in the oxytocin group while 9.38±3.71 in prostaglandin group with a p-value of 0.001.

Conclusion: Oxytocin is effective in terms of reduction in time of induction of labor to delivery as compared to prostaglandin E2.

Keywords: oxytocin, prostaglandin, pre-rupture of membrane

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Introduction

Labour is defined as regular painful uterine contractions with progressive cervical effacement & dilatation accompanied by descent of presenting part resulting in expulsion of fetus from the uterus.[1] Premature rupture of membranes (PROM), is rupture of the membranes before start of labour, It affects 5-10% among all pregnancies, and 60% of the time it happens before the baby is born.[2] Labour begins spontaneously within 24 hours of membranes ruptures. With hoping conservative management, about 60.0-80.0% of PROM patients will go into spontaneous labour within 24 hours of the rupture of membranes, and approximately 95% within 72 hours. But 4% of such patients will not experience spontaneous labour till seven days even. In spite of many studies available in the literature, the clinical management is surprisingly still controversial.[3] If the time between leakage and birth is longer than 18 hours, the risk of infant infection and hospitalization increases.

1-3,4,6: Department of Gynacology, Sheikh Zayed Hospital Lahore
3. Department of Gynacology, Sheikh Zayed Hospital Lahore
5. Department of pathology Amna Inayat Medical College-Lahore

Correspondence:
Dr. Sadia Sharif, *MHPE (UHS), Associate Professor Amna Inayat Medical College-Lahore*
saadia.shaarif@gmail.com

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Reported incidence of neonatal sepsis is 2.0-4.0%.[3] Fetal hypoxia can occur due to cord prolapse, cord compression and abruption of placentae. Other risks include, sub-clinical chorioamnionitis, increased likelihood of operative delivery, increased incidence of marginal cord insertion which itself is associated with retained placenta & both primary and secondary postpartum hemorrhage. Management of PROM involves a balance between expectant management and intervention.[4]

However, induction of labour compared with expectant management only, reduces the risk of maternal and neonatal complications. Various mediators that stimulate uterine contractions & cervical ripening have been introduced, but only a few have been evaluated scientifically. For inducing labour, intravenous Oxytocin and other prostaglandin formulations have been utilised, but their success varies.[5] If rupture of membranes occurs at term between 37 and 41 weeks of gestation at this time it is referred as pre-labor rupture of membranes.[6]

Although the approach of expectant management may appear to be warranted at first, postnatal problems have been found in 17% of expectantly managed patients. Infections are among the neonatal risks of expectant treatment (2.8 percent), admission to ICU (8.0%) and placental abruption, fetal pain (2.0%), deformities caused by foetal restriction. The most commonly used pharmaceutical drug is oxytocin.[7]

Induction is specify when there is a risk of pregnancy continuing, for the sake of the mother or fetus, exceeds the associated risk with induced labour & delivery. The sign has to be convincing, compelling and well documented. In order to acquire clear permission, the cause for induction and the techniques should also be discussed between the medical provider and the lady. When induction is offered simply for the convenience of the medical provider or the patient, these requirements are not met.[8] While in another study the time for induction of labor to birth was >5.0hrs smaller in the amniotomy group (24.7 / 30.0 hrs; average difference, 5.12 h; 95% CI, –2.50 to –7.79). Less women in the amniotomy group remained undelivered after 24 hours (47.2% / 67.6%; P < .01).9 The rationale of the study is to reach on a consensus regarding the effectiveness of oxytocin and prostagaldin for time of induction to delivery in women who have rupture of membrane before labour. This need arises due to controversy among the literature published internationally.[6,10] Moreover in an another study[8] it has not mentioned the standard deviation with mean time so the results are not clear. The results of this study will help us to measure the actual time of delivery from induction.

Material and Methods

This randomized Clinical Trial was conducted from July 2019 to December2019 in the Gynaecology department of Ethical approval was taken from Institutional Board of the hospital. Written consent was obtained from patients. The sample size 100 cases were calculated with 95% confidence level, 80% power of study taking an expected mean time between induction to delivery in the oxytocin group as 3.4±1.5 and in prostaglandin group as 9.6±4.7 hours.10 Patients of age 18-40 years having singleton pregnancy on ultrasonography with gestational age >37weeks. Females also presenting with PROM was expectantly managed for first 6 hours from the onset of ROM were also included from the study. Females with any known fetal or maternal risk assessed on clinical examination and those who have congenital abnormality at the time of presentation. Pregnant ladies with twin and triplet pregnancy. Those with gestational age less than 37 weeks. With placenta pravia and abruption placenta. Patients were interviewed for their demographics variables like age, gestational age, name and contact details. Later on patients were divided randomly into two groups using random number table. Group A (50 patients) patients was given intravenous oxytocin 1 munit/min intravenous (infusion diluted in normal saline) while group B (50 patients) patients was given 3mg prostaglandin vaginally once and labor was monitored with electronic fetal heart monitoring via CTG machine along with tocometer for assessing uterine contractions and cervical dilatation monitored using bishop scoring. Effect modifier like BMI, hypertension and pregnancy induced hypertension were recorded. Patients were observed for the time of induction of delivery as per operational definition. All data was collected through predesigned proforma attached. Data was entered in SPSS-21. Quantitative variables like age, BMI, gestational age and mean time from induction to delivery in both groups was presented as mean ± SD. Independent t-test was applied to compare the mean time between both groups. Data was stratified for the variables i.e. age, gestational age, hypertension, PIH and BMI. Post-stratification independent t-test was applied to check the significance with P value ≤ 0.05 as significant.

Results

In this study, total 100 patients were included the mean age of the women was 33.28±7.61 years. Majority of the female were having a parity of 4 with frequency of 30 (30%)(Table-2). Mean gestational age of the patients was 38.87±1.14 weeks. Mean duration of induction of labor was 6.65±3.97 hours. Number of Parity as shown in (Table-1). Pregnancy induced hypertension was fond in 27 cases (27%) as 73(73%) were free from this condition. (Table-2) There was significant difference for mean duration of labor as mean duration of induction of labor was 3.92±1.74 in the oxytocin group while 9.38±3.71 in prostaglandin group with a p-value of 0.001 (Table-3). When data was stratified, it was note that there was significant difference with respect other factors. Mean duration of induction of labor was 3.31± 1.88 in oxytocin and 10.61±3.89 in prostaglandin who were in age group of 18-30 years and this was significant difference. Similarly, there was significant difference for the gestational age, hypertension and pregnancy induced hypertension in the both treatment groups with a less than p-value 0.05 as considered in (Table-4).

Table 1: *Distribution of Age and Gender*

Age	Mean ±SD
Mean	33.82± 7.61
Gestational Age	38.87± 1.14
Mean duration from induction to labor	6.65 ±3.97
Parity	
1	9(9.0%)
2	21(21%)
3	11(11.0%)
4	30(30%)
5	17(17%)
6	12(12%)

Table 2: *Distribution of Hypertension*

		Frequency (%)
Hypertension	Yes	30(30%)
	No	70(70%)
Pregnancy induced hypertension	Yes	27(27%)
	No	73(73%)

Table 3: *Comparison of Mean Time of Induction of Labor in both Treatment Groups*

Duration of induction of labour	Mean ± SD	P value
Oxytocin	3.92±1.72	**0.001**
Prostaglandin	9.38±3.71	

Table 4: *Stratification with respect to Age, Gestational age for the mean duration of induction labor.*

		Oxytocin Mean± SD	Prostagladin Mean± SD
Age Group	18-30 years	3.31± 1.88	10.61± 3.89
	>30 years	4.20± 1.59	8.48± 3/36
	P value	**0.001**	**0.02**
Gestational Age	37-39 weeks	4.03± 1.66	9.82± 3.70
	>39weeks	3.70± 1.86	8.43± 3.66
	P value	**0.001**	**0.00**
Hypertension	Yes	3.66±1.67	10.33±4.41
	No	4.02±1.75	8.97±3.35
		0.000	0.000
PIH	Yes	4.00±1.41	9.62±3.77
	No	3.89±1.81	9.26±3.73
	P value	0.001	0.0001

Discussion

All pregnancies would be carried to term in such an ideal world, and labour would commence spontaneously. In fact, it's generally preferable to deliver the baby before natural labour starts. When deciding whether to conduct a caesarean section or induce labour for a vaginal delivery, the physician considers the mother's & fetus medical stability.[11] The stimulation of uterine contractions to achieve delivery before the commencement of natural labour is known as labour induction. Since the 1950s, when oxytocin (Pitocin) was synthesized, this method has been widely used; In the United States, approximately 13% of live births are currently induced. The majority of labour inductions are performed for postdate pregnancies, which account for around 10% of all live deliveries.12By 32 weeks of pregnancy, oxytocin receptor in the uterus have increased 100-fold, and by parturition, they have increased 300-fold. Although significant for the actual labour process, higher oxytocin sensitivity only predicts the duration of labour to a little extent, as parity and cervical state at the time of labour are more important factors. In the United States, oxytocin is one of the most regularly utilized medications. While individual patients differ in oxytocin sensitivity and reaction, the pathophysiology of oxytocin-stimulated labour is comparable to that of spontaneous labour. According to synthetic oxytocin pharmacokinetic studies, uterine response occurs after 3–5 minutes of infusion, and a stable level of oxytocin in plasma is reached after 40 minutes.[13] Uterine response to oxytocin is determined by the length of pregnancy.

From 20 to 30 weeks of pregnancy, there is a progressive increase in response, From 34 weeks of pregnancy until term, there is a plateau, after which sensitivity increases. Lower BMI, higher cervical dilatation, parity, or gestational age are all predictors of a good oxytocin induction response.[14] In a study The oxytocin/PGE2 group consisted of 112 patients who experienced PGE2 cervical instillation 6.0 h already continuous oxytocin infusion. Induction to the active phase of labour was successful in 96 women (85.69%) in the misoprostol group versus 86.0 women (76.8%) in the oxytocin/PGE2 group, however the misoprostol group (9.2+2.4 h) had a considerably shorter medication initiation delivery interval than the oxytocin/PGE2 group (15.2+3.2 h, P value :0.001)[15] which was similar as the results noted in this study but the time of induction in prostaglandin group was different in our study.

Conclusion

Intravenous Oxytocin is more effective in induction of labour in Pre Labour Rupture of Membrane as compared to vaginal prostaglandins.

Conflict of Interest None

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Authors Contribution

SD: Conceptualization of Project
WN: Data Collection
AJ : Literature Search
RS: Statistical Analysis
RS: Drafting, Revision
MM: Writing of Manuscript