INDUCTION OF LABOUR IN TERM PREGNANCIES WITH PRELABOUR RUPTURE OF MEMBRANES -COMPARATIVE STUDY OF INTRACERVICAL PROSTAGLANDIN E2 GEL WITH INTRAVENOUS OXYTOCIN INFUSION

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CERTIFICATE

This is to certify that this dissertation titled " INDUCTION OF LABOUR IN TERM PREGNANCIES WITH PRELABOUR RUPTURE OF MEMBRANES - COMPARATIVE STUDY OF INTRACERVICAL PROSTAGLANDIN E2 GEL WITH INTRAVENOUS OXYTOCIN INFUSION**"** is a bonafide record of work done by **Dr. M.NIRMALA DEVI** during the period of her postgraduate study from May 2006 to March 2009 under guidance and supervision in the **Department of obstetrics and gynaecology**, **RAJA SIR SAVALAI RAMASAMY MUDALIYAR HOSPITAL, STANLEY MEDICAL COLLEGE AND HOSPITAL CHENNAI 600013,** in partial fulfilment of the requirement for **M.D. (Branch – II) Obstetrics and Gynaecology, e**xamination of the Tamil Nadu Dr.M.G.R. Medical University to be held in March 2009.

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Prelabour rupture of membranes(PROM) is defined as spontaneous rupture of chorioamnion before the onset of uterine contractions. In PROM there are serious concerns regarding obstetric complications as well as perinatal morbidity and mortality.

Induction of labour is indicated when pregnancy presents a threat to well being of mother or child in cases of PROM. Among the various methods of induction of labour prostaglandin(PG) and oxytocin are the two major pharmacological agents that are widely used. Now a days there is increasing evidence that prostaglandins can be more effective than oxytocin which is the most commonly used drug. Hence this study assumes significance to know about the effectiveness, side effects and complications of prostaglandin as compared to oxytocin in PROM patients.

1. To compare the efficacy of endocervical prostaglandin E_2 gel and intravenous oxytocin in the induction of labour in term pregnancies with prelabour rupture of membranes.

2. To compare the induction - delivery interval and the mode of delivery in each group.

3. To compare the fetal outcome and the occurrence of fetal complications in both groups.

4.To study the maternal complication in both groups

Fetal Membranes Embryology:

Chorion is developed from parietal extra embryonic mesoderm (on the inside) and the overlying trophoblast (on the outside).

Amnion is constituted by amniogenic cells forming the wall of the amniotic cavity. These cells are derived from the trophoblast. [1]

Anatomy

The human fetal membranes is composed of inner amnion and outer chorion.[2]

Amnion

It is the innermost fetal membrane. Amnion is a vascular structure. It provides almost all of the tensile strength.[2]

Amnion Structure [2]

Inner to Outer

1. Single layer of cuboidal epithelial cells.
2. Basement membrane.

3. Acellular compact layer which is composed of interstitial collagens I, IIIandV.

4. Row of fibroblast like mesenchymal cells.

5. Acellular Zona Spongiosa

As a site of Prostaglandin production, the amniotic epithelium participates in the final common pathway of initiation of labour.

Chorion is a thick opaque friable avascular structure of thickness varying from 0.02 - 0.2 mm.

Amniotic Fluid - Origin

In early pregnancy, amniotic fluid is an ultra filtrate of maternal plasma.By the beginning of the second trimester, it consists largely of extra cellular fluid that diffuses through the fetal skin.After 20 weeks, amniotic fluid is composed largely of fetal urine. Pulmonary fluid contributes a small proportion.

Functions of Amniotic Fluid [3]

1. Cushioning effect to the fetus.

2. During labour it forms hydrostatic wedge, which helps in dilatation of the cervix.

3. When amniotic membrane is intact, it prevents interference of placental circulation during uterine contractions.

4. It prevents ascending infection to the uterine cavity at the end of the first stage of labour by flushing and bactericidal action.

PROM (Prelabour rupture of membranes)

Prelabour rupture of membranes (PROM) is defined as spontaneous rupture of the chorioamnion before the onset of uterine contractions and irrespective of whether this rupture occurs before term, at term or postterm[4]. If PROM occurs before 37 completed weeks of pregnancy it is referred to as a preterm prelabour rupture of membranes (PPROM).

In these cases there is serious concern regarding the obstetric complications including perinatal morbidity and mortality.

Incidence

PROM occurs in 4 - 18% of pregnancies - majority occurring after 37 completed weeks.[4] In another study incidence is 2.7 - 17% of all pregnancies and in most cases happens spontaneously and without apparent cause. [5]

PPROM which occurs in 2% of all pregnancies is responsible for nearly 50% of the preterm deliveries and consequent

10% of perinatal mortality. [4]The incidence of PROM varies from 2.6 - 14%.

Pathology of PROM

There is thinning of the epithelium at the site of rupture and decrease in its tensile strength. Collagen sheets and fibril bundles are dissolved and replaced by amorphous material signifying disorientation of the extra cellular matrix .[6]

A loss in membrane integrity is associated with a reduction in type III collagen which is brought about by enzymatic proteases.

Decidual prolactin may induce osmolarity changes in the amniotic fluid. These may affect the viscous component of the membranes.

Associated Factors [6]

1. Recurrent genitourinary infections.
2. Malnutrition.
3. Over distension (Multiple gestation, hydraminos).
4. Over exertion.
5. Poor hygiene.

6. Stress.

7. High Parity.

8. Anemia.

9. Incompetent os.

10. Coitus.

11. Diet and habits (low levels of Ascorbic acid, Copper, Zinc).

12. Smoking.

13. Iatrogenic trauma (Amniocentesis, fetoscopy).

14. Genetic disorders (Ehlers - Danlos syndrome).

15. History of PROM / Preterm delivery in previous pregnancy.

16. Low Socioeconomic status.

Diagnosis [6]

1. Besides the history of leak or sudden gush of fluid from the vagina,speculum examination may reveal the presence of liquor in the vagina.

2. Nitrazine Test :

Accurate in 90 - 98% of cases. It detects the alkaline pH of the amniotic fluid (7 - 7.5) as compared to vaginal or cervical secretions (4.5 - 5.5)

3. Fern Test :

Accurate in 85 - 98% of cases. The fluid is dried on a slide and observed under microscope. It produces fern pattern due to crystallization of Nacl in amniotic fluid.

4. Nile blue sulphate test :

The presence of desquamated cells from the fetal skin which stains orange indicates ruptured membranes.

5. Amnioscopy : May reveal absence of membranes.

6. Diamine oxidase test :

The decidual cells which enter aminotic fluid can be detected by paper strips.

7. Intra amniotic dye instillation :

Instillation of indigo carmine, evansblue, sodium fluroscein is followed by examination of the vaginal fluid on the pad for the presence of the dye after few hours.

8. Heat / Evaporation test :

Endo cervical material is heated on a glass slide and color of the residue is noted. A white residue indicates the presence of amniotic fluid and a brown one, its absence.

9. Single measurement of AFP in vaginal secretion - recent one.

10. Detection of fetal fibronectin in vaginal fluid.

11. The presence of insulin like growth factor binding protein - 1 in vaginal secretions.

12. Ultra sound examination for quantity of liquor.

Maternal and fetal complications [5]

1. Chorio amnionitis (4.2% - 10.5%)
2. Abruptio Placenta(6%)
3. Hyaline membrane disease.
4. Pulmonary hypoplasia
5. Fetal Distress
6. Postural deformities
7. Neonatal infections

- Septicemia

- Meningitis

- Pneumonia

- Pyoderma

- Umbilical Sepsis

- Conjuctivitis.

Management :

Spontaneous rupture of membranes occurs relatively frequently. It should also be kept in mind that unlimited conservation is associated with increased maternal and neonatal morbidity [6]

Some centres advocate immediate induction of labour because of reported association of increased maternal and fetal infections with increased latent period.

Rise in perinatal morbidity with increase in latent period makes early decision mandatory . There should be no delay in immediate induction if fetus is judged to have good chance of extra uterine survival.

Problems in term PROM with unfavourable cervix are

1) Risk of infection when induction is postponed.

2) Failed induction resulting in increased caesarean section rates.

Management of Term PROM [4]

↓

Confirm diagnosis and obtain high vaginal swab for culture

↓

Sterile speculum examination only, digital examination to assess cervix if thought to be labouring

↓

Assess maternal and fetal well being (Assess colour / nature of liquor, presentation, CTG, Maternal observation

↓ ↓ ↓ ↓

MSAF Malpresentation Maternal Pyrexia All normal

+/- Abnomal CTG ↓ ↓

↓

Expedite Discuss most Investigations

delivery appropriate antibiotics

mode of delivery Expedite delivery

All normal

↓

Favourable cervix unfavourable cervix

↓ ↓ ↓

Induction and deliver Immediate Expectant

induction management

Patients delivered 24 hrs after PROM had significant risk of infection. Infection related to PROM depends on number of per vaginal examinations and time taken between first per vaginal examinations and delivery.

Unless the mother is grossly neglected mortality due to PROM should not occur. Even morbidity is almost negligible. But still development of Chorioamnionits or overt infection is associated to higher maternal morbidity and rarely death.

In the presence of infection abnormal labour pattern is common and the chances of operative delivery are increased.

Expected Problems in induction.

1. Failure of induction
2. Unforeseen disproportion
3. Prematurity
4. Sepsis
5. Cord Compression
6. Accidental haemorrhage.

Cervical Scoring System [4]

Bishop's score (Bishop 1964)

	0	1	2	3
Dilatation (cm)	0	1 - 2	3 - 4	>4
Effacement (%)	0 - 30	40 - 60	60 - 70	80+
Station (cm)	- 3	- 2	- 1 / 0	+1 / +2
Consistency	Firm	Medium	Soft	
Position	Posterior	Mid - Position	anterior	

Modified Bishop's Score (Calder 1974)

	0	1	2	3
Dilatation (cm)	< 1	1 - 2	2 - 4	> 4
Effacement (cm)	> 4	2 - 4	1 - 2	< 1
Station (cm)	- 3	- 2	- 1 / 0	+1 / +2
Consistency	Firm	Average	Soft	-
Position	Posterior	Mid - Anterior	-	-

Chemistry [6]

Prostaglandins are family of polyunsaturated 20 Carbon fatty acids containing a cyclopentane ring and two aliphatic side chains. Chemically they are derivatives of the Prostanoic acid. Prostaglandins are divided into groups A - I according to the difference in the structure of the five membered cyclopentane ring.

On its release from membrane phospholipids, arachidonic acid is metabolized by two types of enzymes. The enzyme

cyclo-oxygenase converts it to an unstable prostaglandins endoperoxide PGG2. This is converted immediately to the PG endoperoxide PGH2. The PGH2 is enzymatically converted into stable substances PGE2, PGF2, PGD2.

The prostaglandin used in the present study is a natural prostaglandin which induces cervical ripening when applied endocervically. There is little or no evidence of storage in cervical tissue. They are rapidly metabolized in the cervical tissue via 15 hydroxy prostaglandin dehydrogenase and 13 reductase enzymes.

PGE2 causes cervical ripening and relaxes cervical muscle while PGF_{2a}contracts uterine smooth muscle. Hence PGE2 is used in the present study.

Oxytocin

Oxytocin is an octapeptide synthesized in the neurons of the paraventricular and supraoptic nuclei of the hypothalamus and transported and stored in the neuro hypophysis. It has a half life of 3 - 10 minutes.

In myometrial cells, oxytocin increases the activity of phosphodiesterases, bringing about a decrease in cyclic AMP concentration that in turn causes release of calcium from the endoplasmic reticulum.. The increased concentration of free intra

cellular calcium causes contraction of myometrial cells and oxytocin also promotes the formation of gap junctions necessary for the orderly propagation and synchronization of uterine contractions.

Oxytocin should always be given by continuous intravenous infusion using a pump capable of precisely delivering small amounts of medication.

The main problems associated with oxytocin administration are hyper stimulation and neonatal hyperbilirubinemia.

Many studies have been done on safety and efficacy of prostaglandin E2. It has been used as oral tablets, pessaries as well as intracervical gel in various studies

In a study by Egarter et al PGE2 containing gel was tested with relation to its safety and efficacy. Fifty seven percent of the nulliparas and 71% of the multiparas with a modified Bishop-score of smaller than or equal to 5 could be delivered within 12 hours of the first gel-application. The rate of operative deliveries in this group of low risk patients was low (4.1% in nulliparas and 1.9% in multiparas)[7].

The efficacy of prostaglandin gel was studied by Bredow et al in 30 gravida at or near term with an unripe score of the cervix. In 11 cases labour had started with intracervical prostaglandin gel, the Bishop-score of the other gravida was improved in the mean from 2.5 +/- 1.1 to 5.5 +/- 1.7. When the induction was carried out with

PGE2, the rate of success rose to 5 of 9, compared to infusion of oxytocin in 6 of 10 cases.[8].

In a study done by Ekman et al which included fifty-four women, 37 of them (70%) who received prostaglandin gel had cervix ripened within 5 hours and seven of them were in labour at that time.[9]

In a study by Gonen et al intracervical prostaglandin E2 (PGE2) gel is compared with conservative management for induction of labour in patients with premature rupture of the membranes (PROM) at term and with an unripe cervix. Of the patients receiving PGE2, 93% began labour after a single application, and the mean interval between prostaglandin application and delivery was 6.6 hours. In the conservative group, only 57% began labour within 24 hours, and more than half of them required augmentation with oxytocin[10]

Many studies have compared prostaglandin E2 with a placebo. One hundred fifty-five nulliparas at term with poor cervical scores (modified Bishop score below 6 of 10) and premature rupture of membranes (PROM) were recruited in a double-blind, placebo-controlled randomized trial. Women receiving a PG pessary were significantly less likely to require stimulation of labour at the end of 12 hours than were those given a placebo pessary (37 versus 58%, P =0 .002). The mean time between admission to study and delivery

was significantly shorter in the PG group compared with the placebo group[11]

A randomized double-blind, placebo-controlled study done by Bernstein et al included 107 women . Compared to controls receiving placebo gel only, the group receiving prostaglandin E2 gel had significant increase in their cervical Bishop scores, shorter induction-to-delivery intervals, shorter time requiring use of oxytocin, and more successful labour induction without oxytocin.[12]

Oral prostaglandin was compared with intravenous oxytocin in different studies.In a randomized prospective study, the use of intravenous oxytocin with oral PGE2 tablets for stimulation of labour in cases of premature rupture of membranes (PROM) before term were compared by El-Qarmalawi et al. Labour induction was successful in 96% of patients in the PGE2 group compared with 84% in the oxytocin group[13].

A clinical trial involving 60 patients was conducted to assess the relative efficacy of intravenous oxytocin and oral prostaglandin E2 in ripening the unfavourable cervix, when given as a priming dose on the day before induction of labour. There was significant improvement in the Bishop score, and the subsequent induction-delivery interval following priming with prostaglandin. This improvement appeared to be dose-related.[14]

In a study by Lange et al Prostaglandin E2-tablets were compared to intravenous oxytocin for the stimulation of labour in 201 patients at or near term, with premature spontaneous rupture of the membranes without labour activity for 6 hours after the escape of fluid. A significant difference was found in the stimulation-delivery time, in favor of intravenous oxytocin.[15]

Twenty nulliparous term pregnant women with premature rupture of the membranes and unfavorable cervical states were randomly given either oxytocin intravenously or 4 mg prostaglandin E2 in gel intravaginally. One of ten women receiving oxytocin had a favorable cervical state within five hours and vaginal delivery within 24 hours after the start of the infusion compared with six of ten women after prostaglandin E2 gel application. This difference was found to be statistically significant (P less than 0.01). The number of instrumental deliveries was nine (four caesarean sections and five vacuum extractions) in the oxytocin-treated patients compared with only two vacuum extractions in women who received prostaglandin E2 gel. This difference is also statistically significant (P less than 0.01).[16]

In a study which included one hundred nulliparas at term were randomly given oxytocin intravenously or prostaglandin E2 (PGE2) gel (0.5 mg PGE2) intracervically when the cervix was unfavorable, 53% of the patients could be delivered with PGE2 gel,

compared with 31% when oxytocin was given. In patients with a highly unfavorable cervix this difference was significant (P less than 0.02).[17].

A multicentric trial conducted in the United States and Canada, included 538 women; 277 treated with PGE2 gel and 261 controls with oxytocin, with initial Bishop scores of < or = 4. Compared to controls, PGE2 recipients had significant improvement in cervical Bishop scores (P < 0.01) and a high rate of labour (47.4% vs. 9.6%, P < .001) during the 12-hour ripening period[18]

A prospective randomized trial was performed on one hundred primigravid women by Ashrafunnessa et al between 37 and 42 weeks of gestation. The Modified Bishop Score (MBS), interval between IOL and onset of labour and the duration of labour after insertion of PGE2 gel was significantly different from those of oxytocin infusion group. The proportion of emergency Caesarean Section (CS) was high in the oxytocin infusion group than that of in the prostaglandin group. There was also no significant difference regarding the acceptability of both the induction methods.[19]

In another study which included 49 patients in each series the over-all success rate with PGE2 gel is 82 per cent; with oxytocin, 65 per cent but there was no difference in the duration of labour in successful inductions with PGE2 or oxytocin.[20]

Papageorgiou et al studied labour characteristics after intracervical application of 0.5 mg prostaglandinE2 gel (n = 83) versus

intravenous administration of oxytocin (n = 82). The induction to delivery time as well as the total oxytocin dose were significantly reduced in the PGE2 group ($p < 0.001$). Caesarean sections, instrumental deliveries and fetal distress had the same frequency, but the failures of trial were significantly higher in the oxytocin group than in the PGE2 group (20.7 vs. 6%, $p < 0.01$).[21]

Rayburn et al compared prostaglandin E2 (PGE2) gel and oxytocin for the initiation of labour in term pregnancies with a moderately favorable cervix (Bishop score 5-8). Compared with a matched group, 48 cases treated with PGE2 gel (2.5 mg intravaginally) required significantly less or no oxytocin, had shorter first stages of active labour, and had no increased risk of uterine hyperstimulation or caesarean section.[22].

Goeschen studied the influence of endocervical application of 0.4 mg prostaglandin E2 (PGE2) gel on the clinical outcome of pregnancies of at least 36 weeks' duration complicated with premature rupture of the membranes (PROM) and unripe cervix, (modified Bishop score of 7 or less). There were 579 women in the study. The clinical outcome was significantly better in the PGE2-treated patients than oxytocin-infused patients. PROM to delivery interval and the incidence of operative deliveries were significantly reduced.[23]

A prospective study was undertaken by Herabutya et al to evaluate the safety and efficacy of a 3 mg prostaglandin E2 (PGE2) gel

applied intracervically. The 3 mg PGE2 gel was found to be an effective method of cervical ripening in primigravida and multigravida with a success rate of 76 and 86.8 per cent after the first application to 96.4 and 97.4 per cent after third application respectively.[24]

In a study by Vrtacnik-Bokal et al comparing prostaglandin E2 and oxytocin infusions for induction of labour in primiparas at term with an unripe cervix and premature rupture of fetal membranes Each group contained 17 nulliparas. In the first group the labour was induced with the prostaglandin E2 (PGE2) infusion, in the second group the oxytocin infusion was used. The results of both groups were compared. PGE2 was found to be effective in labour induction; the rate of caesarean sections was 18.75% in the first group and 29.41% in the second group. The PGE2 drug was found to be safe for the fetus and also well tolerated by pregnant women.[25]

In a study by Ray et al one hundred and forty patients were randomized to one of three study groups: prostaglandin E2, placebo, or oxytocin. Patients receiving prostaglandin E2 were found to be more likely to be in labour after one suppository and delivered without the addition of oxytocin when compared with placebo.[26]

A double-blind clinical trial consisting of 200 patients done by Pollnow et al Two intravaginal, 4 mg prostaglandin E2 gel applications administered 4 hours apart were compared with 10 hours of low-dose oxytocin (2 mU/min). There were no difference in parity,

initial Bishop scores, estimated gestational ages, indications for induction, or birth weights. Prostaglandin E2 gel was significantly better ($p < 0.0001$) at achieving a change in the Bishop score of 3 or more. The number of successful inductions was significantly greater ($p < 0.0003$) and the mean time to active labour was significantly shorter ($p < 0.0002$) in the prostaglandin E2 group than in the oxytocin group.[27]

In a study by Zehradnik et al comparing prostaglandin E2 gel with oxytocin, 100 gravida were included. In 46 of 50 women (92%) treated with prostaglandin E2 gel there was an increase in the Bishop score of at least three points. The frequency of caesarean sections was 10% (n = 5) in the PGE2 gel group and 12% (n = 6) in the oxytocin group.[28]

In a study by Atad et al thirty subjects were included in the PGE2 gel group, 30 in the oxytocin group and 35 in the Atad Ripener Device group. The postpartum course was comparable in all. The change in Bishop score and induction-to-delivery interval in the PGE2 and Atad Ripener Device groups was significantly better than in the oxytocin group.[29]

Forty five term pregnant patients with premature rupture of membranes were randomized into two groups PGE2 gel(20) and oxytocin (20). Caesarean section rates were 24% in the oxytocin group and 5% in the other ($p < 0.05$). The mean rupture to delivery

time was 12.6 +/- 4.4 hours in the oxytocin group and 16.5 +/- 4.5 hours in the prostaglandin group ($p < 0.01$).[30]

Cabrol et al studied intracervical PGE2 gel application, as compared to placebo, for priming of the cervix in 208 patients at term The cervical ripening success rate is significantly higher in the treated group (58.6%) than in the control group (27.8%; $p = 0.0001$):[31]

Granstrom et al studied sixty-one term pregnant women, 29 nulliparous (Group A) and 32 multiparous (Group B) with unfavorable cervix and premature rupture of the membranes (PROM) were given 3 mg PGE2 in suppository form for cervical ripening and labour induction. Five hours after starting the treatment, 12 women of the 29 in Group A and 21 of the 31 in Group B had a favorable cervix and established labour.[32]

One study by Kuvacić et al compared oral prostaglandin E2, prostaglandin E2 gel and intravenous oxytocin. Two hundred and one patients at or near term, with premature spontaneous rupture of the membranes were included. One hundred and thirty eight (138) women received PGE2 peroral tablets, 14 intracervical PGE2 gel, and 67 oxytocin intravenously. There were 73.2% vaginal deliveries in the group that received PGE2 per oral, 77.5% in the group that received oxytocin, and 92.9% in the group that was given intracervical gel. The difference were significant.[33]

In one study intravenous oxytocin was compared with intravenous prostaglandin E2 by Steiner et al in the induction of labour. Labour duration was significantly shorter in the PGE2 group (2 hrs., 36 mins.) than among the oxytocin group (3 hrs., 26 mins.). PGE2 patients showed a significantly faster cervical dilatation and a significantly shorter interval between dilatation and delivery (p .05).[34]

Though many studies have reported significant improvement with prostaglandin E2 some studies have not reported any significant improvement compared to intravenous oxytocin . Ninety-four nulliparous women with a poor cervical score (less than 6) who had premature rupture of membranes at term were studied. One group received immediate stimulation of labour with oxytocin infusion. The second group received two prostaglandin E2 (PGE2) 3-mg pessaries 4 hours apart, followed by oxytocin infusion, if necessary. The use of PGE2 3-mg pessaries 4 hours apart, followed by oxytocin infusion if necessary, did not confer any benefit over the use of intravenous oxytocin in obstetric or neonatal outcome[35].

Another study by Herabutya et al included forty-seven nulliparous term pregnant women with PROM and unfavorable cervix, were randomly divided into 23 patients who were observed for four hours then followed by intravenous oxytocin, and 24 patients who were given 3 mg PGE2 gel intravaginally then followed by intravenous oxytocin four hours later. No statistically significant difference was

observed between the two treatment groups with regard to Bishop score four hours after observation, intravenous oxytocin to delivery time, Apgar score at 1 and 5 minutes and maternal puerperal complications in both groups[36].

In another study by Jackson et al which included 158 women were randomized to receive either two intracervical doses of 0.5 mg prostaglandin E2 gel 6 hours apart or 12 hours of intravenous oxytocin up to 4 mlU/min. There was no difference between the prostaglandin E2 and low-dose oxytocin groups in the likelihood of being in labour or having a Bishop score favorable for induction after ripening (64.2% vs 52.0%, p = 0.12) or in the incidence of vaginal delivery (75.9% vs 74.7%).Prostaglandin E2-treated patients were delivered sooner (20.2 +/- 8.1 hours vs 25.0 +/- 10.5 hours, p = 0.002). Among delivered patients the likelihood of vaginal delivery within 24 hours was greater with prostaglandin E2 ripening (63.7% vs 47.2%, p = 0.04), but there was no difference at 36 hours (76.2% vs 75.0%).[37]

In a study by McCaul et al, 96 women with PROM and an unfavorable cervix were randomized into one of three treatment groups: oxytocin induction, vaginal prostaglandin E2 gel followed by oxytocin, or expectant management. Length of labour, caesarean section rate, and maternal/neonatal morbidity were not significantly different.[38].

In another study by Magann et al, ninety-nine women were included. No difference were detected among prostaglandin E2 gel, estrogen, and oxytocin in relation to cervical ripening in patients with an unfavorable cervix at term who require an induction of labour.[39]

In a study by Anderson et al which included 88 patients prostaglandin E2 vaginal tablets were compared with intravenous oxytocin for induction of labour in premature rupture of the membranes and immature cervix. The results did not reveal any significant difference in the numbers of successful inductions regardless of the Bishop score at the commencement of stimulation.[40]

Few studies have reported complications such as polisystoly , chorioamnionitis etc.. for prostaglandin whereas others have not. In a study by Kuvaic et al the outcome of stimulation of labour in 219 primiparous patients with more than 6 hours following a premature rupture of the membranes, and with unripe cervix, without the established labour were studied. Uterine polisystoly was encountered in 10.9% labours after peroral stimulation, in 7.1% in the gel group and in 1.5% in the oxytocin group, and perinatal asphyxia in 16.7%, 7.1% and 13.4%, respectively peroral stimulation predisposes to uterine polisystoly. Intracervical application of PGE2 gel is suggested as the method of choice in primigravid patients with a premature rupture of the membranes and the unripe cervix.[33]

Malik et al, randomized 118 patients to receive either endocervical 0.5 mg of PGE2 gel (study group) or immediate oxytocin induction of labour (control group). The rates of clinical amnionitis were 5.3% in the PGE2 group and 8% in the control group. Endometritis developed in 1.7% of PGE2 patients and 3.2% of controls. These difference in maternal infection rates were not statistically significant.[41]

In a study of one hundred fifty-five nulliparas at term with poor cervical scores (modified Bishop score below 6 of 10) and premature rupture of membranes (PROM), comparing PGE2gel with a placebo the caesarean delivery rates in the two groups were similar, and there were no significant difference in neonatal outcome.[11]

In a study which included 158 women uterine hyperstimulation and fetal distress during ripening occurred only in the prostaglandin E2 group, at a rate of 4.8%[37]. 1,472 births with a medical indication were induced in a multicenter-study. With a Bishopscore < 5 prostaglandin E2 gel intracervical and with a score between 5 and 8 vaginal tablets were used for induction.The APGAR-score one minute post partum was < 8 in 10.8 per cent of all neonates. This part was nearly the same in the gel- and in the tablet group (p > 5%).[42].

A prospective randomized trial was performed on one hundred primigravid women between 37 and 42 weeks of gestation with singleton pregnancy. But the Apgar Score at 1 and 5 min had shown no statistically significant difference. [19]

In a study which studied the effects of oral prostaglandin in 49 patients in each series, nausea and diarrhea are more common with PGE2 but in only one case was this severe enough to warrant discontinuing the medication. One case of uterine hypertonus occurred in each series. No serious harmful effects on mother or fetus were noted with PGE2.[20]

In a study comparing intracervical application of 0.5 mg prostaglandin (PG) E2 gel (n = 83) versus intravenous administration of oxytocin (n = 82), more neonates in the oxytocin group had 5-min Apgar scores < 7 ($p < 0.05$).[21] In the study which included 579 women no adverse effects on the neonates were observed and the incidence of neonatal infection declined.[23]

In a study comparing oral prostaglandin with intravenous oxytocin side effects with prostaglandin E2 were mostly mild gastrointestinal ones. A significantly higher incidence of foetal distress was observed with intravenous oxytocin (15%) as compared to prostaglandin E2 (3.33%)[43]. In a study comparing prostaglandin gel with intravenous oxytocin with 17 nulliparas in each group no incidence of uterine hyperactivity was recorded. All newborns in the first group were in good condition. [25]:.

In another study with one hundred and forty patients the incidence of maternal infection was lowest in patients with labour induced by prostaglandin E2.[26] In a double-blind clinical trial involving

200 patients comparing prostaglandin gel and intravenous oxytocin there were no difference between patient groups in the caesarean section rate, meconium staining, hyperstimulation, and Apgar scores.[27]

In another study involving 100 gravida no severe side effects were observed during and after PGE2 treatment, in either the mothers or the children.[28] In a retrospective review of the efficacy and safety of prostaglandin E2 involving 146 women with PROM the caesarean rate was 12%. Chorioamnionitis developed in 6.8% of the study group and endometritis in 2%. Neonatal complications were limited to two with low Apgar scores (less than 7 at 5 minutes)[44]. In a study of 208 patients at term signs of myometrial hypercontractility were observed in the PGE2 treated group as compared to the control group ($p = 0.01$).[31]

The present study is carried out at Raja Sir Ramasamy Mudaliar hospital, Chennai during the period 2006 - 2008. All pregnant women who satisfy the inclusion and exclusion criteria were included in the study after getting an informed consent from both the patients and their husbands .

INCLUSION CRITERIA

1. All pregnant women who have completed 37 weeks of gestation and less than 42 weeks as assessed by menstrual dates, clinical examination and confirmed by doing an ultrasonagram.

2. Cevical score assessed by Bishop scoring with $\leq$ 4.

3. Prelabour rupture of membranes.

4. Single fetus with Cephalic presentation.

5. Live fetus showing no compromise on admission Cardiotocogram. .

EXCLUSION CRITERIA

1. Bad obstetric history

2. Multiple gestation

3. Women with PROM in labour

4. Suspected chorioamnionitis

5. Previous history of caesarean section or other uterine surgeries.

6. Fetal distress , hydramnios or intrauterine growth restriction.

7. Contraindications for prostaglandins such as bronchial asthma and allergy.

8. Associated medical complications for the mother or gravida $\geq$ 3.

After being included in the study they were randomly allocated to either prostaglandin E_2 group or oxytocin group.

The time of application of intracervical prostaglandin E2 or the time of starting the oxytocin infusion is taken as Zero hour. Patients name, age, parity, and duration of rupture of membranes are noted. General ,abdominal and vaginal examinations are done. Bishop's score is assessed.

All patients are monitored with partogram and amnioinfusion is given to all patients with amniotic fluid index less than six.

Patients in oxytocin group are given 5 milli units / minute diluted in normal saline or ringer lactate. This is increased by six milli units / minute every 20 - 40 minutes until adequate uterine contractions are achieved namely three contractions per ten minutes each lasting 45 seconds to a maximum dose of 40 milli units / minute.

To patients in the prostaglandin E2 group, prostaglandin E2 gel (dose 3 gram) 0.5mg available in a preloaded syringe is placed in the endocervical canal under strict aseptic precautions. A repeat dose of prostaglandin E2 gel is given to patients with no improvement in Bishop's score after 6 hrs. In patients with improvement in Bishop's score labour is augmented with oxtyocin infusion.

Bishops score at 12 hrs and 24 hrs are assessed for all patients. The duration of labour in stage I and stage II are tabulated. The induction delivery interval is calculated, any associated maternal complication is recorded.

The weight and 5 minute apgar of all newborn delivered are tabulated, neonatal complications are also noted.

Patients with non - progress of labour or fetal distress are taken up for lower segment caesarean section or forceps as indicated and labour outcome is recorded.

All parameters are tabulated and statistical analysis is done using graph pad instat - 3 software. P value of < 0.05 is taken as significant.

The study includes a total of 400 patients; 200 each in oxytocin and prostaglandin group

Table 1:Parity Distribution

Parity	Oxytocin	%	Prostaglandin E2	%
Nulliparous	100	50	100	50
Para 1	100	50	100	50

Out of these 50% were nulliparous and 50% were of para 1.

Table 2:Age group distribution

Age In Years	Oxytocin	%	Prostaglandin E2	%
<=20	22	11	38	19
21-25	110	55	114	57
26-30	64	32	44	22
>30	4	2	4	2
Mean	24.02		23.56	

P=0.30

The Age group distribution between the two groups were found to be comparable. There was no statistical difference between the age group of two groups (P=0.30). Majority of patients were in age group 21-25, 55% in oxytocin group and 57% in Prostaglandin E_2 group, followed by 26-30 age group in both the groups.

Table 3: Gestational age distribution

Gestational Age	Oxytocin	%	Prostaglandin E2	%
>=37-38	98	49	96	48
>38-40	102	51	104	52
>40-42	-	-	-	-
Mean	38.16		38.18	

P=0.91

The mean gestational age in oxytocin and prostaglandin groups are 38.16 and 38.18 weeks respectively. The number of patients in 38-40 weeks and 37-38 weeks in each group is almost equal. There is no significant difference in the gestational age of both groups (P=0.91).

Table 4: Bishop score at Induction

Bishop Score	Oxytocin				Prostaglandin E2			
	Nulliparous	%	Para 1	%	Nulliparous	%	Para 1	%
0-2	68	68	62	62	90	90	78	78
3-4	32	32	38	38	10	10	22	22
Mean	1.86		1.94		1.28		1.5	

Nulliparous P=0.0156 Para 1 P=0.10

A significant difference was noted in the Bishops score between both the groups for nulliparous patients (P-0.0156). The mean Bishops score is 1.86 in oxytocin group whereas it is 1.28 in prostaglandin group.

However in patients with Para-1 the Bishops score were not found to be statistically significant between the two groups (P-0.10).

The mean Bishops score in oxytocin group is 1.94 compared to 1.5 in prostaglandin E_2 group.

Table 5:Bishops score at 12 hours after induction

Bishop Score	Oxytocin				Prostaglandin E2			
	Nulliparous	%	Para 1	%	Nulliparous	%	Para 1	%
0-3	40	40	22	22	20	20	10	10
4-6	34	34	24	24	22	22	20	20
7-9	20	20	40	40	38	38	40	40
Mean	4.34		5.46		5.01		6.06	

Nulliparous P=0.008 Para 1 P=0.01

When Bishops score is assessed at 12 hrs after induction of labour a statistically significant difference was found between prostaglandin and oxytocin group in both nulliparous and para-1 patients (P-0.008 and P-0.01 respectively).

The mean Bishops score is 4.34 and 5.46 in oxytocin group for nulliparous and para-1 respectively whereas it is 5.01 and 6.06 in prostaglandin group, which is significantly higher.

Hence prostaglandin was found to significantly improve Bishops score at 12hrs compared to oxytocin.

Table 6: Mode of delivery

	Oxytocin				Prostaglandin E2			
Mode Of Delivery	Nulliparous	%	Para 1	%	Nulliparous	%	Para 1	%
Labour Natural(LN)	62	62	74	74	80	80	86	86
LSCS	32	32	24	24	12	12	12	12
Forceps	6	6	2	2	8	8	2	2

LSCS-Lower Segment Caesarean Section

For LSCS Nulliparous P=0.028 Para 1 P=0.19
For LN Nulliparous P=0.76 Para 1 P=0.19

In oxytocin group 62% of nulliparous women and 74% of para-1 women delivered by spontaneous vaginal delivery, whereas in prostaglandin group 80% of Nulliparous women and 86% of para-1 women delivered by spontaneous vaginal delivery. Though a higher percentage of women in prostaglandin group delivered as spontaneous vaginal delivery it was not found to be statistically significant (Nulliparous P-0.76 para-1 P-0.19).

Thirty two percent of nulliparous women in oxytocin group and 24% of para-1 in oxytocin group required caesarean section whereas only 12% in both nulliparaous and para-1 women in prostaglandin group required caesarean section. The difference in Nulliparous women between the two groups was found to be statistically significant (P-0.028), but in para-1 women though a lesser

percentage of women in prostaglandin group required caesarean section,the difference was not statistically significant (P-0.19)

Table – 7: Induction delivery interval

Induction -Delivery Interval	Oxytocin				Prostaglandin E2			
	Nulliparous	%	Para 1	%	Nulliparous	%	Para 1	%
<12 hrs	6	6	14	14	20	20	34	34
12-24 hrs	28	28	42	42	44	44	48	48
>24 hrs	36	36	18	18	24	24	6	6
Mean	25.95		18.8		19		13.93	
Mean total	22.23				16.44			

Nulliparous P=0.0012 Para 1 P=0.004
Total P=<0.0001

The induction delivery interval was >24hrs in 36% of nulliparous women and 12-24hrs in 42% in oxytocin group whereas in prostaglandin group the majority is in the 12-24hrs in both nulliparous and para-1 women with 44% and 48% respectively.

The mean induction delivery interval is 25.95 hrs and 19hrs in oxytocin and prostaglandin group in nulliparous whereas para-1 women the mean is 18.8hrs and 13.9hrs in both groups respectively. Thus the induction delivery interval is found to be significantly lower for both nulliparous and para-1 women in prostaglandin E2 group (nulliparous P-0.0012 and para-1 P-0.004).

Table-8: Indication for LSCS (Lower Segment Caesarean Section)

Indication For Lscs	Oxytocin				Prostaglandin E2			
	Nulliparous	%	Para 1	%	Nulliparous	%	Para 1	%
Fetal Distress	18	18	8	8	6	6	8	8
Failed Induction	14	14	16	16	6	6	4	4

Nulliparous P-0.0298 Para 1 P-0.1931

In nulliparous group there is a statistically significant reduction in the need for caesarean section from 32% in oxytocin group to 12% in prostaglandin group. In para-1 group though there is a 50% reduction in the incidence of caesarean section from 24% to 12% the difference is not statistically significant.

Table 9: Birth Weight Distribution

Birth Weight In Kilograms	Oxytocin	Prostaglandin E2
2-2.5	64	52
2.5-3	88	96
>3	48	52
Mean	2.74	2.81

P=0.21

The mean birth weight in oxytocin and prostaglandin E_2 group were 2.74 and 2.81kilograms respectively. There is no significant difference between 2 groups (P-0.21) .

Table 10:Neonatal Outcome

Neonatal Outcome	Oxytocin	Prostaglandin E2
Apgar At 5minutes <=5	2	4
Pathological Jaundice	-	-

In oxytocin group only 2 newborn had apgar ≤5 whereas in prostaglandin E_2 group 4 babies had apgar ≤5. None of the babies had pathological jaundice in both the groups.

Table 11: Maternal Complications

Maternal Complications	Oxytocin	Prostaglandin E2
Atonic PPH	2	-
Hypertonus	-	2

PPH-Postpartum Haemorrhage

Two patient in oxytocin group had atonic PPH (Post partum Haemorrhage) whereas two had hypertonus in prostaglandin E_2 group. No other maternal complications occurred.

In the present study the age group distribution was even between both the groups. The mean age in oxytocin group is 24.02 yrs whereas in prostaglandin group it is 23.56 yrs. This is similar to other studies where similar age group patients were included in both the groups.

In the present study 200 (50%) nulliparous and 200 (50%) para-1 patients were chosen with prelabour rupture of membranes at term and were equally randomised into either oxytocin or prostaglandin group.

Studies done by malik et al[41] included 118 patients and that done by Trofatter et al[18] included 538 patients, Jackson et al [37] included 158 women and that by McCaul et al[38] included 96 women. These studies included both nulliparous and para-1 patients similar to the present study whereas some studies were done exclusively on nulliparous women for example a study by chua et al [35] included 94 nulliparous women and study by Ekman-Ordenberg et al[16] included only 20 nulliparous women and study by Herabutya et al [36]included 47 nulliparous women and study by ulmsten et al[17] included 100 nulliparous women .

The mean gestational age in the oxytocin group is 38.16 weeks whereas it is 38.18 weeks in the prostaglandin group which is comparable. Studies done by chua et al [35], Ekman et al [16], Herabutya

et al [36] and ulmsten et al [17] all included term pregnant women comparable to the present study.

However study done by Goeschen [23] and Bernstein et al [12] included women with more than or equal to 36 weeks of gestation.

In the present study women with bishop score less than or equal to 4 were included. In a study including 538 women by Trofatter[18] similar to the present study bishop score with < or = 4 were included. Also studies done by Herabutya et al [24] and Bernstein et al [12] included women with Bishops score < or = 4. However in study by Egarter et al [7] , Bredow et al [42] and Ashrafunnessa et al [19] included women with Bishops score < or = 5. Also study by Chua et al[11] included women with bishop score with < or = 6 and study by Goeschen [23] included women with bishop score < or = 7.

In the present study there is a significant improvement in Bishops score in both nulliparous and para-1 group at 12 hours after induction of labour in the prostaglandin group compared to oxytocin group. The Bishops score improved from mean of 1.28 in nulliparous group to 5.01 at 12hrs and from 1.5 to 6.06 in para-1 group for prostaglandin gel. In oxytocin group the bishop score improved from 1.86 to 4.34 for nuliparous and from 1.94 to 5.46 in para-1 group.

In a study by ulmsten et al [17] similar improvements in Bishop score from 2.9 to 6.3 was observed for prostaglandin gel application. Similarly in a study by Trofatter et al [18] significant improvement in

Bishops score was reported at 12 hours after induction. Study by Ashrafunnessa et al [19] also reported a significant improvement in bishop score with prostaglandin gel as compared to oxytocin . In a study by Bredow et al [8] the bishop score improved from 2.5 to 5.5 in prostaglandin group . Similar improvement in Bishops score was also reported by Bernstein et al [12]. In a study by pollnow et al [27] prostaglandin E2 gel was significantly better at achieving a change in Bishops score of 3 or more .

However studies by Herabutya et al[36] and Jackson et al[37] reported no significant improvement in Bishop score for prostaglandin gel as compared to oxytocin.

In the present study the mean induction delivery interval for nulliparous oxytocin women is 25.95 hrs compared to 19hrs in nulliparous prostaglandin women. In para-1 women the mean induction delivery for oxytocin group is 18.8 hrs compared to 13.93 hrs in prostaglandin group. The difference were significantly different. Hence prostaglandin is more efficacious in induction of labour.

In study by ulmsten et al [17] in women with unfavourable cervix 53% delivered with PGE2 compared to 31% with oxytocin. In another study by Trofatter et al [18] prostaglandin significantly reduced the induction delivery interval .

In study by Jackson et al [37] prostaglandin E_2 gel treated patients were delivered sooner 20.2hrs compared to 25hrs in oxytocin

group. Study by Ashrafunnessa et al [19] also reported a significant reduction in induction delivery – interval with prostaglandin E_2 gel. Papageorgiou et al [21] also reported a similar outcome. Atad et al [29] also has reported similar outcome.

However studies by Chua et al [35], Herabutya et al [36] and Mc Caul et al [38] reported no significant difference in the induction delivery interval between the oxytocin and prostaglandin E_2 gel.

In the present study 80% of nulliparous women in prostaglandin group delivered by labour natural compared to 62% in the oxytocin group. In para-1 it is 86% and 74% in prostaglandin and oxytocin group respectively. Though there is a trend of increased number of labour natural in prostaglandin E2 group, the results are not statistically significant. For caesarean section, in nullipara the incidence of caesarean section is 12% in prostaglandin group compared to 32% in oxytocin group which is statistically significant. In para-1 group though there is a reduction in caesarean section in prostaglandin group it is not statistically significant.

In study by Trofatter [18] the incidence of caesarean section was found to be lower in prostaglandin group 28.5% vs 32.9% in control group but was not statistically significant. In a study by Ashrafunnessa et al [19] the proportion of caesarean section was high in oxytocin group compared to prostaglandin group.

In a study by Vrtacnik–Bokal et al [25], the rate of caesarean section were 18.75% in the prostaglandin group compared to 29.41% in the oxytocin group.

In a study by Bilgin et al [30] the incidence of caesarean section in the oxytocin group is 24% compared to 5% in the prostaglandin group.

In studies done by Chua et al [35], Mc Caul et al [38], Herabutya et al [24]and Pollnow et al [27] no significant difference were observed in the rate of caesarean section between the prostaglandin and oxytocin group. Also in the study by Magann et al [39]the incidence of caesarean deliveries were found to be similar between oxytocin and prostaglandin group, with approximately 59% of pregnancies delivered abdominally.

In the present study only 2 women in the prostaglandin group had hypertonus and 2 woman in the oxytocin group had postpartum haemorrhage. No other maternal complications were encountered.

In study by ulmsten et al [17], no adverse maternal complication were noted during study period in both oxytocin and prostaglandin group.

In study by Jackson et al [37], uterine hyperstimulation was reported in the prostaglandin group at a rate of 4.8% and Cabrol et al[31] reported signs of uterine hypercontractility in PGE2 group.

Studies done by Gonen et al [10], Goeschen [23], Bredow et al [8], Vrtacnik-Bokal et al [25], Pollnow et al [27] reported no significant difference in the incidence of maternal complications between the prostaglandin and oxytocin group.

In a study by Malik et al [41] amnionitis developed in 5.3% of prostaglandin E_2 group compared to 8% in oxytocin group. Endometritis developed in 1.7% of PGE_2 group compared to 3.2% in oxytocin group though the results were not statistically significant.

The mean birth weight in oxytocin and prostaglandin E_2 group in the present study were 2.74kg and 2.81kg respectively. Also the 5 minute apgar was < or = 5 in 2 newborn in the oxytocin group and 4 newborn in the prostaglandin group. No other neonatal complications were encountered.

Study by Chua et al [35] reported similar incidence of low apgar in oxytocin and prostaglandin group. Malik et al also reported no significant difference in the birth weight and 1 and 5 minute apgar score between oxytocin and prostaglandin group.

Also studies done by Ulmsten et al [17], Trofatter et al [18], Ashrafunnessa et al [19], Goeschen [23], Bredow et al [8] and Bilgin et al [30] reported no significant difference in the neonatal outcome between the oxytocin and prostaglandin group.

One study by Papageorgiou et al [21] reported increased incidence of 5 min apgar < 7 in oxytocin group compared to prostaglandin E_2 gel group ($P < 0.05$).

Study by Meikle et al [44]also reported no significant difference in infections between two groups. Study by Goeschen [23] reported a decreased incidence of neonatal infection in the prostaglandin E_2 gel group.

- Majority of patients included in the study were in 21-25 age group.
- The mean gestational age is 38.16 weeks in oxytocin group and 38.18 weeks in the prostaglandin group.
- Prostaglandin E_2 gel causes a significant improvement in Bishops score compared to oxytocin in both Nulliparous and Para-1 group (P-0.008 and P-0.01 respectively).
- There is a non significant trend towards increased incidence of labour natural in prostaglandin group.
- Prostaglandin E_2 gel significantly reduces the incidence of caesarean section in nulliparous wowen from 32% in oxytocin group to 12% in prostaglandin E_2 group.
- There is a non significant trend in the reduction of caesarean sections in para-1 women from 24% in oxytocin group to 12% in prostaglandin E_2 group.
- Prostaglandin E_2 gel causes a significant reduction in mean Induction delivery interval compared to oxytocin. For nulliparous women the mean induction delivery interval is 25.95hrs in oxytocin group compared to 19hrs in prostaglandin group. In para-1 women the mean induction delivery interval in oxytocin group is 18.8hrs compared to 13.93hrs in prostaglandin group.
- There is low incidence of maternal complications in both oxytocin and prostaglandin group.

- The birth weight and Apgar score at 5 for neonates was comparable between both the groups, and the incidence of neonatal complication is extremely low.

In the present study comparing prostaglandin E_2 gel and oxytocin for induction of labour in prelabour rupture of membranes at term, prostaglandin E_2 gel is found to significantly improve Bishops's score at 12hrs compared to oxytocin in both nulliparous and para-1 women. Prostaglandin also significantly reduces the induction delivery interval compared to oxytocin in both nulliparous and para-1 women. Prostaglandin gel causes reduction in the requirement of caesarean section especially in nulliparous women as compared to oxytocin. Also it is found that prostaglandin is safe and is not associated with any significant adverse effects for both the mother and the neonate.

(1) Inderbir Singh. Formation of Germ Cell Layers.In:Human Embryology,Editor. Inderbir Singh. 6 ed.New Delhi: McGraw-Hill;1996.31-41

(2) Bourne GL. The Human Amnion and Chorion. Chicago,Year Book,1962

(3) Gary Cunningham F, Kenneth J Leveno, Steven L Bloom, John C Hauth, Larry Gilstrap III, Katharine D Wenstrom. Implantation, Embryogenesis, and Placental Development. In: Williams Obstetrics,Editors. Gary Cunningham F, Kenneth J Leveno, Steven L Bloom, John C Hauth, Larry Gilstrap III, Katharine D Wenstrom. 22 ed.New York: McGraw-Hill; 2005.66-68

(4) Onnig Tamizian, Arulkumaran S, Prelabour rupture of membranes. In:The management of labour,Editors . Arulkumaran S, Leonie K Penna,Bhaskar Rao K.2 ed. Hyderabad: Orient Longman;2005.306-318

(5) Fernando Arias, Premature Rupture of the Membranes. In:Practical guide to high-risk pregnancy and delivery, Editor. Fernando Arias. 2 ed. Missouri:Mosby;2002.100-113

(6) Usha R Krishna, Monisha H Shah,Prelabour Rupture of Membranes. In:Obstetrics and Gynecology for Postgraduates,Editors, Ratnam SS,Bhaskar Rao K,Arulkumaran S.2 ed.vol 1. Hyderabad: Orient Longman;1999.96-108

(7) Egarter C, Grunberger W, Husslein P. [Prostaglandin E2 gel for ripening the cervix and/or labour induction in the unripe cervix at the end of pregnancy]. Z Geburtshilfe Perinatol 1986;190:83-86.

(8) Bredow V, Straube W, Goretzlehner G. [Experiences with labour induction at term with a PGE2 gel (Prepidil Gel) in unripe cervix]. Geburtshilfe Frauenheilkd 1990;50:865-869.

(9) Ekman G, Ulmsten U, Wingerup L. Intracervical application of PGE2-gel combined with early intravenous infusion of oxytocin for induction of term labour in women with unripe cervix. Arch Gynecol 1983;234:61-65.

(10) Gonen R, Samberg I, Degani S. Intracervical prostaglandin E2 for induction of labour in patients with premature rupture of membranes and an unripe cervix. Am J Perinatol 1994;11:436-438.

(11) Chua S, Arulkumaran S, Yap C, Selamat N, Ratnam SS. Premature rupture of membranes in nulliparas at term with unfavorable cervices: a double-blind randomized trial of prostaglandin and placebo. Obstet Gynecol 1995;86:550-554.

(12) Bernstein P, Leyland N, Gurland P, Gare D. Cervical ripening and labour induction with prostaglandin E2 gel: a placebo-controlled study. Am J Obstet Gynecol 1987;156:336-340.

(13) el-Qarmalawi AM, Elmardi AA, Saddik M, el-Abdel HF, Shaker SM. A comparative randomized study of oral prostaglandin E2 (PGE2) tablets and intravenous oxytocin in induction of labour in patients with premature rupture of membranes before 37 weeks of pregnancy. Int J Gynaecol Obstet 1990;33:115-119.

(14) Valentine BH. Intravenous oxytocin and oral prostaglandin E2 for ripening of the unfavourable cervix. Br J Obstet Gynaecol 1977;84:846-854.

(15) Lange AP, Secher NJ, Nielsen FH, Pedersen GT. Stimulation of labour in cases of premature rupture of the membranes at or near term. A consecutive randomized study of prostaglandin E2-tablets and intravenous oxytocin. Acta Obstet Gynecol Scand 1981;60:207-210.

(16) Ekman-Ordeberg G, Uldbjerg N, Ulmsten U. Comparison of intravenous oxytocin and vaginal prostaglandin E2 gel in women with unripe cervixes and premature rupture of the membranes. Obstet Gynecol 1985;66:307-310.

(17) Ulmsten U, Wingerup L, Andersson KE. Comparison of prostaglandin E2 and intravenous oxytocin for induction of labour. Obstet Gynecol 1979;54:581-584.

(18) Trofatter KF, Jr. Endocervical prostaglandin E2 gel for preinduction cervical ripening. Clinical trial results. J Reprod Med 1993;38:78-82.

(19) Ashrafunnessa, Khatun SS, Chowdhury SA, Begum SR, Rashid M, Khatun MS. Induction of labour by intracervical prostaglandin gel and oxytocin infusion in primigravid women with unfavorable cervix. Bangladesh Med Res Counc Bull 1997;23:66-71.

(20) Nelson GH, Bryans CI, Jr. A comparison of oral prostaglandin E2 and intravenous oxytocin for induction of labour in normal and high-risk pregnancies. Am J Obstet Gynecol 1976;126:549-554.

(21) Papageorgiou I, Tsionou C, Minaretzis D, Michalas S, Aravantinos D. Labour characteristics of uncomplicated prolonged pregnancies after induction with intracervical prostaglandin E2 gel versus intravenous oxytocin. Gynecol Obstet Invest 1992;34:92-96.

(22) Rayburn W, Woods R, Eggert J, Ramadei C. Initiation of labour with a moderately favorable cervix: a comparison between prostaglandin E2 gel and oxytocin. Int J Gynaecol Obstet 1989;30:225-229.

(23) Goeschen K. Premature rupture of membranes near term: induction of labour with endocervical prostaglandin E2 gel or intravenous oxytocin. Am J Perinatol 1989;6:181-184.

(24) Herabutya Y, Prasertsawat P. Induction of labour using intracervical prostaglandin E2 gel: the outcome. J Med Assoc Thai 1991;74:491-497.

(25) Vrtacnik-Bokal E, Cerar V. [Comparison of prostaglandin E2 and oxytocin infusions for induction of labour in primiparas at term with an unripe cervix and premature rupture of fetal membranes]. Jugosl Ginekol Perinatol 1991;31:63-66.

(26) Ray DA, Garite TJ. Prostaglandin E2 for induction of labour in patients with premature rupture of membranes at term. Am J Obstet Gynecol 1992;166:836-843.

(27) Pollnow DM, Broekhuizen FF. Randomized, double-blind trial of prostaglandin E2 intravaginal gel versus low-dose oxytocin for cervical ripening before induction of labour. Am J Obstet Gynecol 1996;174:1910-1913.

(28) Zahradnik HP, Quaas L, Kroner-Fehmel EE, Kieback DG, Lippert TH. [Cervix ripening using drugs before oxytocin labour induction. Clinical study of a new prostaglandin E2 triacetin gel]. Geburtshilfe Frauenheilkd 1987;47:190-192.

(29) Atad J, Hallak M, Auslender R, Porat-Packer T, Zarfati D, Abramovici H. A randomized comparison of prostaglandin E2, oxytocin, and the double-balloon device in inducing labour. Obstet Gynecol 1996;87:223-227.

(30) Bilgin T, Kadioglu M, Yildirim V, Cengiz C. A randomized trial of intracervical prostaglandin gel and intravenous oxytocin in prelabour rupture of membranes with unripe cervix at term. Clin Exp Obstet Gynecol 1998;25:46-48.

(31) Cabrol D, Bernard N, Chouraqui A et al. [Ripening of the cervix uteri at term by a single intracervical application of prostaglandin E2 gel]. J Gynecol Obstet Biol Reprod (Paris) 1988;17:527-534.

(32) Granstrom L, Ekman G, Ulmsten U. Cervical priming and labour induction with vaginal application of 3 mg PGE2 in suppositories in term pregnant women with premature rupture of amniotic membranes and unfavorable cervix. Acta Obstet Gynecol Scand 1987;66:429-431.

(33) Kuvacic I, Skrablin S, Drazancic A, Fuduric I, Hodzic D. [Peroral and intracervical administration of prostaglandin E2 for stimulation of term labour in premature rupture of fetal membranes]. Jugosl Ginekol Perinatol 1990;30:143-147.

(34) Steiner H, Weitzel R, Zahradnik HP. [Comparison of labour induction with intravenous prostaglandin E2 and intravenous oxytocin (author's transl)]. Geburtshilfe Frauenheilkd 1976;36:773-777.

(35) Chua S, Arulkumaran S, Kurup A, Anandakumar C, Tay D, Ratnam SS. Does prostaglandin confer significant advantage over oxytocin infusion for nulliparas with pre-labour rupture of membranes at term? Obstet Gynecol 1991;77:664-667.

(36) Herabutya Y, Suchatwatnachai C, Prasertsawat P. Comparison of intravenous oxytocin with and without vaginal prostaglandin E2 gel in term pregnancy with premature rupture of membranes and unfavorable cervix. J Med Assoc Thai 1991;74:92-96.

(37) Jackson GM, Sharp HT, Varner MW. Cervical ripening before induction of labour: a randomized trial of prostaglandin E2 gel versus low-dose oxytocin. Am J Obstet Gynecol 1994;171:1092-1096.

(38) McCaul JF, Rogers LW, Perry KG, Jr., Martin RW, Allbert JR, Morrison JC. Premature rupture of membranes at term with an unfavorable cervix: comparison of expectant management, vaginal prostaglandin, and oxytocin induction. South Med J 1997;90:1229-1233.

(39) Magann EF, Perry KG, Jr., Dockery JR, Jr., Bass JD, Chauhan SP, Morrison JC. Cervical ripening before medical induction of labour: a comparison of prostaglandin E2, estradiol, and oxytocin. Am J Obstet Gynecol 1995;172:1702-1706.

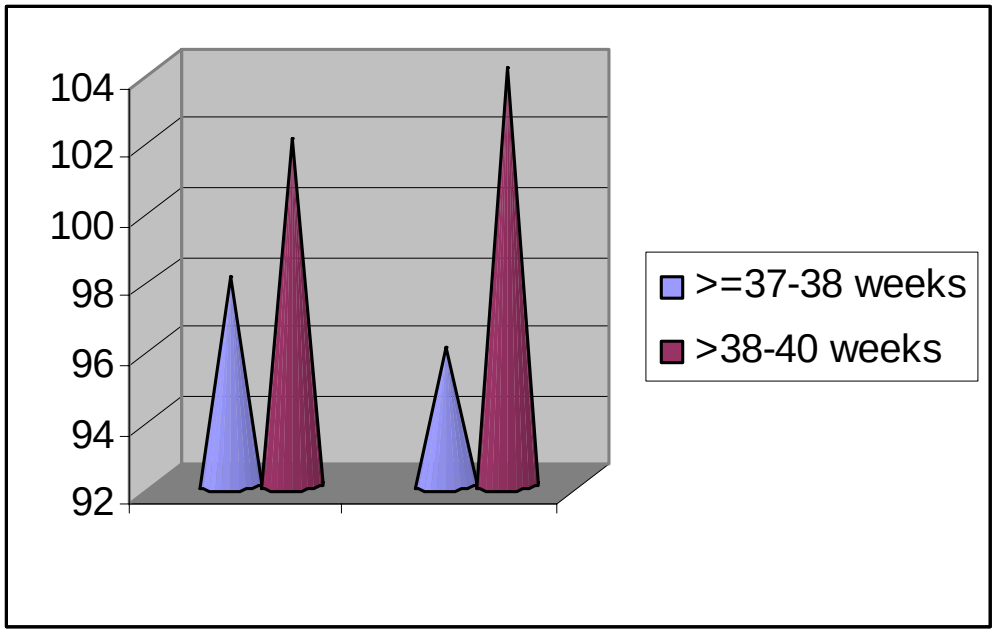
(40) Andersen K, Moller M, Rix P, Larsen KW, Ladehoff P, Zdravkovic M. [Induction of labour. Prostaglandin E2 vaginal tablets compared with intravenous oxytocin for induction of labour in premature rupture of the membranes and immature cervix]. Ugeskr Laeger 1990;152:3705-3707.

(41) Malik N, Gittens L, Gonzalez D, Bardeguez A, Ganesh V, Apuzzio J. Clinical amnionitis and endometritis in patients with premature rupture of membranes: endocervical prostaglandin E2 gel versus oxytocin for induction of labour. Obstet Gynecol 1996;88:540-543.

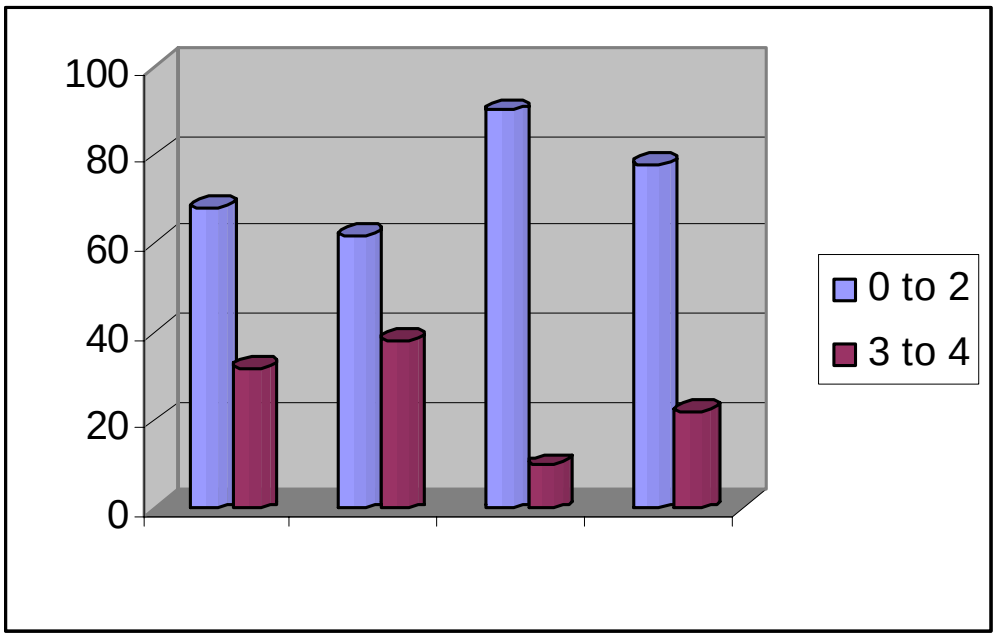
(42) Bredow V, Straube W. [Fetal outcome after cervical ripeness-adjusted labour induction with prostaglandin E2 in relation to cervix status. Results of a multicenter study]. Zentralbl Gynakol 1993;115:530-536.

(43) Kalia M, Atam K, Kochhar M. Comparative evaluation of oral prostaglandin E2 and intravenous oxytocin for induction of labour. Indian J Med Res 1989;90:453-458.

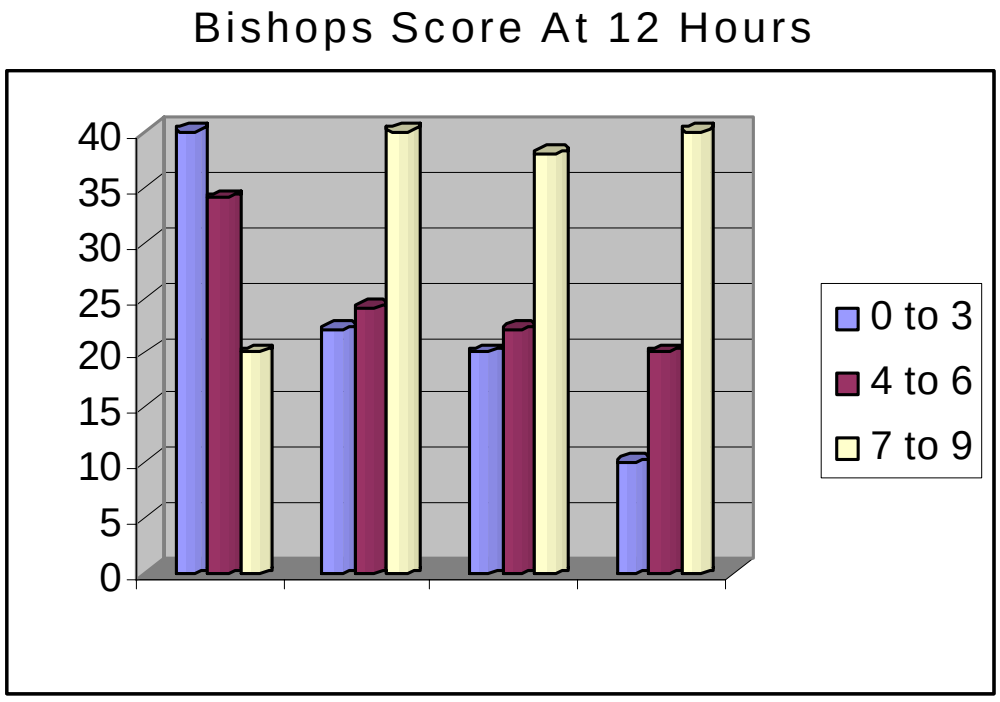
(44) Meikle SF, Bissell ME, Freedman WL, Gibbs RS. A retrospective review of the efficacy and safety of prostaglandin E2 with premature rupture of the membranes at term. Obstet Gynecol 1992;80:76-79.

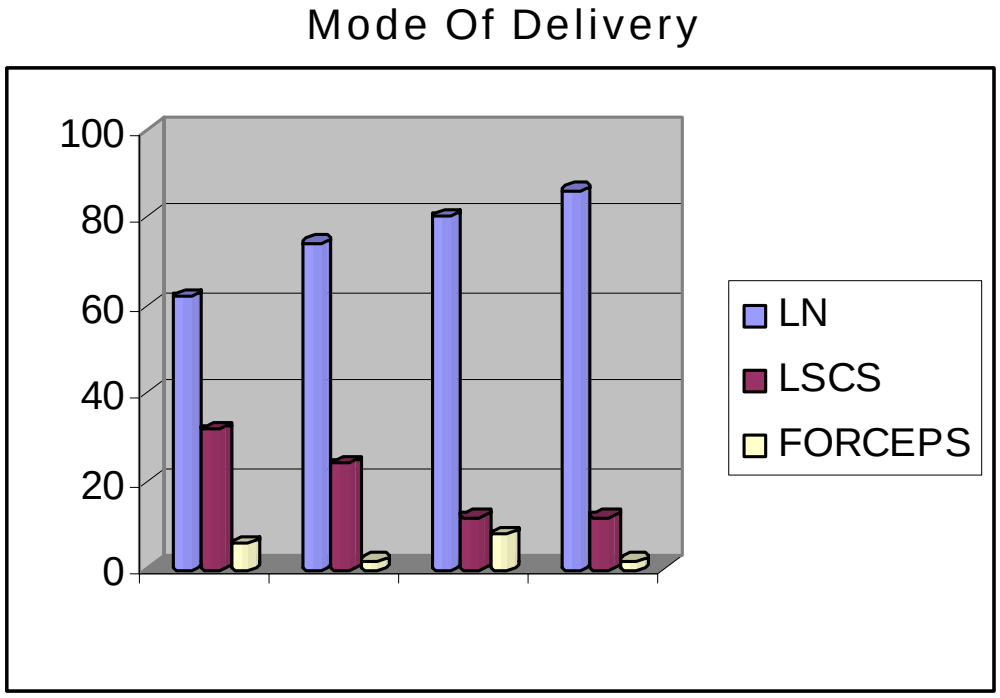


OX-Oxytocin, PG-Prostaglandin.



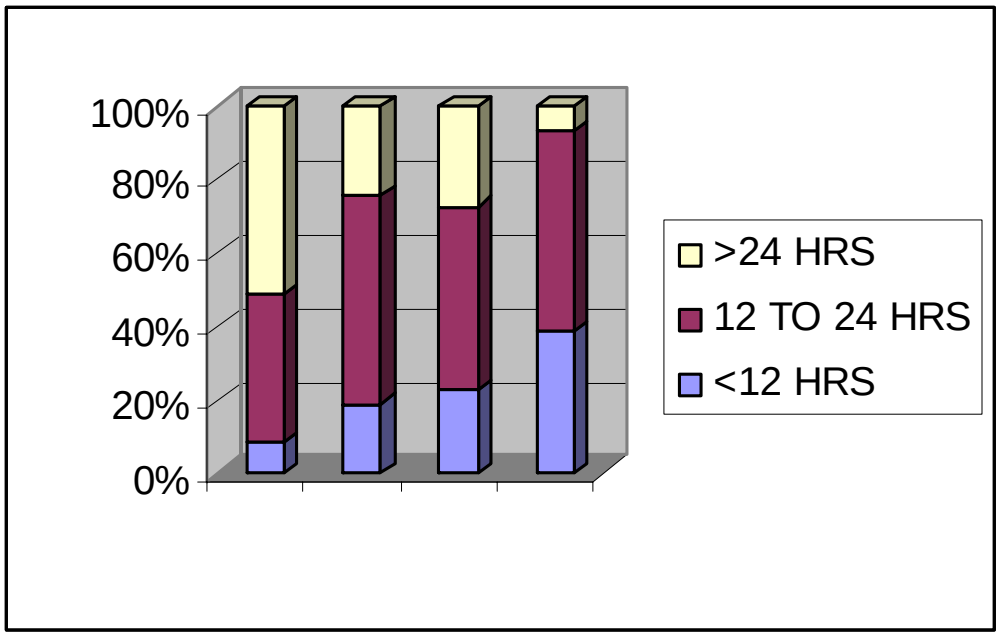
OX-0-Oxytocin Nulliparous
OX-1-Oxytocin Para-1
PG-0-Prostaglandin E2 gel Nulliparous
PG-1-Prostaglandin E2 gel Para-1



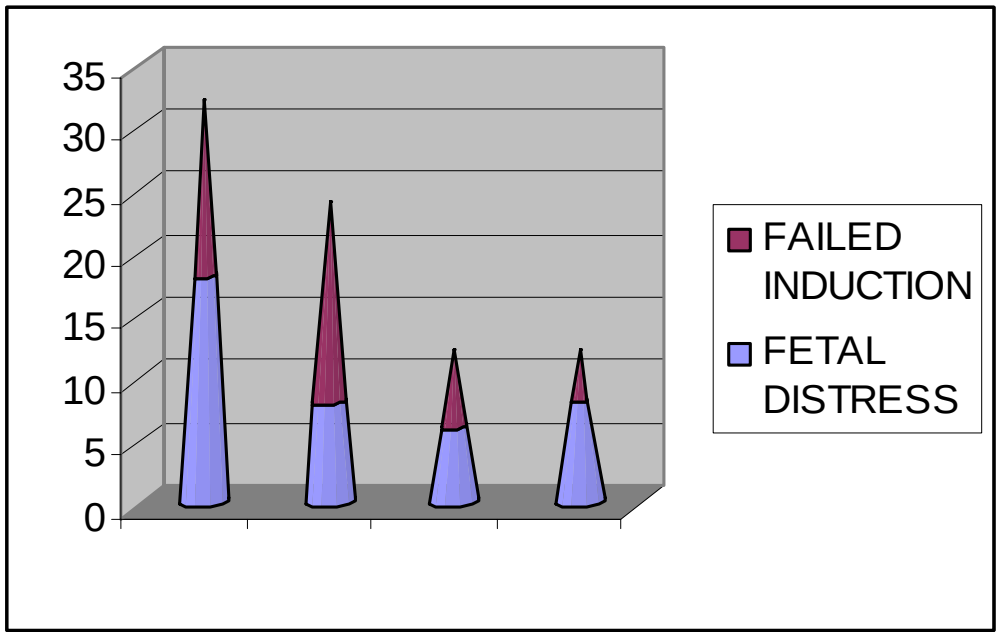


OX-0-Oxytocin Nulliparous
OX-1-Oxytocin Para-1
PG-0-Prostaglandin E2 gel Nulliparous
PG-1-Prostaglandin E2 gel Para-1

Induction Delivery Interval



Indication For Lower Segment Caesarean Section(LSCS)



OX-0-Oxytocin Nulliparous
OX-1-Oxytocin Para-1
PG-0-Prostaglandin E2 gel Nulliparous
PG-1-Prostaglandin E2 gel Para-1

History

Name

Husbands Name

Age

Inpatient Number

Height

Last Menstrual Period

Expected Date Of Delivery

Period Of Gestation

Duration Of Prelabor Rupture Of Membranes At Admission

Menstrual History

Married For

Obstetric Code G P L A

Last Child Birth

Weight

Blood Group

Immunisation

Examination

Temperature

Pulse Rate

Pedal Edema

Cardiovascular System

Respiratory System

Per Abdomen

Per Speculum

Blood Pressure

Pallor

Per Vaginal

Bishops Score At 0 Hrs 12 Hrs 24 Hrs

Ultrasound

Non Stress Test

Induction Agent

Number Of Doses

Induction Delivery Interval

PROM Delivery Interval

Date And Time Of Delivery

Mode Of Delivery

Baby

Alive

Birth Weight

Sex

Apgar

Resuscitation

Complications

Newborn Intensive Care Unit Admission

Duration Of Stay

Maternal Complications

Fever

Shivering

Hyperstimulation

Chorioamnionitis

Endometritis

Postpartum Hemorrhage

Rupture Uterus

Tachy Systole

Hypertonus

Condition At Discharge