

Review Article

ADMINISTRATION OF MISOPROSTOL AND OXYTOCIN DRIP IN TERM PREGNANCY WITH PRELABOR RUPTURE OF MEMBRANES : LITERATURE REVIEW

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ABSTRACT

Premature rupture of the membranes (PROM) occurs when the fetal membranes rupture before regular uterine contractions begin. This obstetric challenge remains a significant concern due to heightened risks of maternal and fetal complications. Managing PROM often involves inducing labor to mitigate potential complications. A variety of pharmacological and non-pharmacological methods are used for IOL. Pharmacological methods include oxytocin, prostaglandin (PG) analogues like misoprostol and smooth muscle stimulants such as herbs or castor oil. This study seeks to assess and compare the impact of misoprostol and oxytocin induction on the duration of labor in a term pregnancies.

Keywords: Labor induction, Gestational age, Cervix Assesment, oxytocin.

INTRODUCTION

Premature Rupture of membranes (PROM) refers to the breaking of the fetal membranes before the onset of regular uterine contractions. PROM continues to be one of the most challenging obstetric issues due to the increased rates of maternal and fetal morbidity and mortality. Numerous studies have concentrated on determining the appropriate management in such cases.¹ The primary question regarding the management of PROM patients revolves around whether to allow them to deliver spontaneously or to induce labor. Labor induction (IOL) is the intentional initiation of labor after reaching a gestational age of 24 weeks.² There is a potential risk of complications (such as cesarean section, prolonged labor, postpartum hemorrhage (PPH), birth trauma, etc.) for both the mother and the baby if the pregnancy exceeds the considered term. IOL is commonly employed widely to prevent these issues and enhance health outcomes.² Over 20% of pregnancies undergo IOL, particularly in cases with deviations from normal physiological processes, such as hypertension, diabetes, fetal growth restriction, or macrosomia.^{1,2}

Various pharmacological and non-pharmacological methods are available for IOL. Pharmacological methods involve the use of oxytocin, prostaglandin analogs (PG), and smooth muscle stimulants like herbs or castor oil, while non-pharmacological methods include mechanical actions such as digital cervical stretching and membrane sweeping, hygroscopic cervical dilators, balloon catheters, artificial rupture of membranes, and nipple stimulation.³

The success of IOL depends on cervical changes that ensure effective uterine contractions with progressive cervical dilation and effacement. Cervical maturity is assessed through the Bishop scoring system developed in 1964.⁴ Oxytocin is used for IOL when the cervix is sufficiently mature (Bishop score of 6 or more), whereas if the cervix is not mature, prostaglandins are typically placed in the vagina or on the cervix to ripen it and initiate uterine contractions.⁴

Prostaglandins have been used since the 1960s for IOL, with prostaglandin E (PGE) intravaginally or intracervically considered the most effective agent. PG use has been shown to increase normal delivery rates and reduce cesarean section rates. Misoprostol, an affordable, readily available PG, stable at room temperature, and with minimal side effects, has become a common choice. Oxytocin is also frequently used for IOL, either alone or in combination with other drugs. Risks associated with oxytocin infusion include potential fetal hypoxia and asphyxia, uterine rupture, fluid retention, postpartum hemorrhage, and amniotic fluid embolism.⁵

METHOD

The method employed involves a literature review using search engines such as Google Scholar, PubMed, and NCBI. The search is conducted using keywords such as labor induction, term pregnancy, misoprostol, and oxytocin. The search is limited to journals published within the last 5 years.

DISCUSSION

Induction of Labor

Labor induction is an effort to deliver the fetus when there are no signs of labor or when not in labor, with the possibility that the fetus can survive outside the womb beyond 28 weeks of gestation. Two essential factors are required for the onset of the labor process: cervical maturity and effective uterine contractions. Both factors must be met for successful labor induction. The assessment of induction, according to the Bishop score, involves evaluating the cervix to predict the success of labor induction and can be considered as follows: A Bishop score of 2-4 indicates less success, a score of 5-6 is questionable but attempted, and a score of > 6 is mostly successful.⁶

The cervix itself consists of loose and dense connective tissue. The main component of this connective tissue is collagen, with some elastic tissue. In addition to the connective tissue, there is a limited amount of muscle tissue. Collagen consists of regular solid fibers

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arranged in parallel units linked together with cross-links. Additionally, there are some mast cells and other inflammatory cells scattered throughout. The basic substance of this connective tissue is a complex proteoglycan composed of glycosaminoglycan (GAG) chains as the core protein, strongly bound to hyaluronic acid chains. The dominant GAG in the cervix is dermatan sulfate, both of which consist of hyaluronic acid, giving it a hydrophilic nature.⁶

Fibroblasts with numerous cytoplasmic projections extend from one fiber to another, forming myometrial gaps in its basic substance. As pregnancy progresses, increased vascularity leads to the migration of leukocytes and macrophages out of blood vessels into the cervical stroma. The inflammatory process results in a reduction in the amount of collagen and a relative increase in glucuronic acid and heparin sulfate GAGs.

Cervical maturation is associated with a decrease in the number of collagen fibers, a reduction in the strength of collagen fibers, and a decrease in the strength of the extracellular matrix. Changes associated with cervical maturation include an increase in decorin in the cervix (dermatan sulfate proteoglycan 2), leading to the separation of collagen fibers. All these changes result in thinning and softening of the cervix. With uterine contractions and cervical dilation during labor, there is a reorientation of collagen fibers according to the pressure exerted by the passing fetus. Cervical maturation usually begins before the onset of labor and is crucial for both cervical opening and the passage of the fetus.⁷

Indication Induction of Labor

Indications for labor induction are primarily categorized into maternal, fetal, or social conditions, or a combination of these factors, which may be either pre-existing or potential. Prior to initiating induction, several critical factors require evaluation and consideration. These include⁵:

- Reasons for induction and any contraindications
- Gestational age
- Cervical condition using the Bishop score
- Pelvimetry and Fetal size
- Amniotic membranes and the volume and quality of amniotic fluid
- Fetal wellbeing through fetal heart rate.

The overall health and wellbeing of the baby are crucial considerations. It's important to acknowledge potential risks associated with induction, such as an increased likelihood of cesarean section, hyperstimulation, fetal distress, uterine rupture, meconium aspiration, and umbilical cord prolapse resulting from amniotomy. Careful consideration of these factors and ongoing monitoring are paramount to minimizing risks and ensuring the safety of both the mother and the baby throughout the induction process.

Cervix Assessment

Some obstetric experts believe that the condition of the cervix can estimate the timing of childbirth, although the relationship has not been fully proven. The most commonly used method to assess the condition of the cervix is the Bishop score because it is simple and has the best predictive value. This scoring system involves evaluating cervical dilation, effacement, consistency, position, and fetal head descent. Other methods mentioned in the literature, aside from scoring, include cervical ultrasonography and assessment of fetal fibronectin in cervical secretions. A Bishop score of 5 or more is considered significant for a mature cervix and predicts the success of labor induction. Dilation is measured based on the diameter of the

stretched cervical opening. Dilation and effacement complement each other, and both are crucial factors in the first stage of labor. Effacement measures the stretching of the cervix, similar to the analogy of a rubber band where the more it stretches, the thinner it becomes.¹

Kontraindication of Normal Labour

Kontraindications to labor induction are based on the conditions of both the mother and the fetus. Maternal contraindications include⁵:

- A history of uterine trauma,
- Abnormalities in the uterus, vagina, or pelvis,
- The presence of placenta previa or suspected placental abruption,
- The presence of herpes type II in the genital tract,
- Grand multiparity,
- Over distension of the uterus, such as in twin pregnancies or polyhydramnion,
- The presence of cervical carcinoma.

Fetal contraindications for labor induction include:

- Fetal malformations (transverse or breech presentation),
- Low birth weight, (3) the presence of fetal distress.

Misoprostol and Oxytocin as Labor Inductor

Pharmacologically, misoprostol is a synthetic analog of prostaglandin E1 (PGE1). It is widely available in tablet form, typically in 100 or 200 µg doses, and is accessible in nearly all countries. Misoprostol is well-absorbed and undergoes rapid deesterification by the liver to form the free acid, which plays a role in its clinical effects. Natural prostaglandin E has been proven to inhibit gastric acid secretion and smooth muscle contractions. The administration of a single oral dose of misoprostol results in an increase in intrauterine tone. Regular contractions are essential for the success of induction or abortion processes. In the cervix, prostaglandin analogs reduce hydroxyproline in the cervix, leading to the breakdown and dissolution of collagen, allowing the cervix to dilate.⁷

Oxytocin is a peptide released from the posterior pituitary. In conditions of insufficient oxytocin, the labor process may slow down, necessitating intravenous oxytocin infusion. Oxytocin enhances the activity of quiescent smooth muscle cells and slows the conduction of electrical activity, promoting the recruitment of more contracting muscle fibers, thereby increasing the strength of weak contractions. Oxytocin is initiated through an infusion of dextrose or saline with the following specifications: 2.5 units of oxytocin in 500 cc of dextrose or saline, starting at a rate of 10 drops per minute, with the rate increased by 10 drops every 30 minutes until adequate contractions occur. Adequate contractions are defined as having three contractions lasting more than 40 seconds each. Once adequate uterine contractions are achieved, the infusion is maintained until the baby is delivered.¹

In the case of an immature and insufficiently supportive cervix, the process of cervical ripening is crucial before considering induction. Misoprostol, aside from its uterotonic effects, also proves to be highly beneficial for cervical ripening, especially in cervixes with a Bishop score of less than 5. The study observed a significant utilization of misoprostol. Its safety, cost-effectiveness, and ease of administration and storage have established it as the preferred drug in economically disadvantaged countries. The World Health Organization (WHO) has

recognized the value of 25 µg intravaginal misoprostol, including it in the complementary list for induction of labor.⁸

A meta-analysis from the Cochrane database concludes that vaginal misoprostol is more effective for inducing labor compared to conventional methods using oxytocin. However, the most feared side effect is hyperstimulation, necessitating close monitoring and further studies. Additionally, a lower induction failure rate is observed, leading to a lower rate of cesarean sections. According to several clinical trials comparing misoprostol with oxytocin as the most commonly used induction protocol today, it is mentioned that the use of misoprostol shows better results. In the group using misoprostol, the average induction time required was 253 minutes, whereas oxytocin required 352 minutes. Regarding the interval from induction to the end of labor, the misoprostol group also showed significantly better results. In the misoprostol group, 81% of pregnant women gave birth within 24 hours, while in the oxytocin group, it was only 62%. Vaginal delivery occurred in 81% of the misoprostol group and 64% in the oxytocin group. The use of misoprostol for cervical ripening and induction led to a 47% reduction in the risk of cesarean section (risk ratio = 0.53).^{2,8}

CONCLUSION

Among the various pharmacological agents used for induction, oxytocin and misoprostol are currently the most common. Oxytocin drip is the most widely used protocol, but research indicates that oxytocin drips tend to be less effective on an unsoftened cervix. It was found that misoprostol is the most frequently used drug for induction of labor compared to oxytocin. Misoprostol is currently gaining more attention because, in addition to inducing contractions in the uterus, it also has an effect on cervical ripening. Misoprostol is also cost-effective, stable at room temperature, easy to store, and easy to use. In cases where the cervix is still rigid, the use of misoprostol can provide advantages over oxytocin, such as shorter induction time, faster progress in labor, and lower failure rates.

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