Original Article

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Comparative Study of Titrated Oral Misoprostol Solution and Oxytocin to Induce Labor Conducted at Kannur Medical College

K M Asokan[1], Smitha Santhosh[2]

[1]Professor, Department of Obstetrics and Gynecology, Kannur Medical College, Anjarakandy, Kannur, Kerala, India,
[2]Associate Professor, Department of Obstetrics and Gynecology, Kannur Medical College, Anjarakandy, Kannur, Kerala, India

Abstract

Introduction: Various methods are used for inducing labor. Out of these, two common methods are oral misoprostol and oxytocin intravenous drip. A comparative study of titrated oral misoprostol solution and intravenous oxytocin in the effectiveness of induction of labor was conducted at Kannur Medical College during a period of 3-year from 2010 to 2013.

Objectives: (1) To compare the efficacy of misoprostol and oxytocin in inducing labor. (2) To compare the complications of misoprostol and oxytocin. (3) To compare the induction-to-active labor time. (4) To compare the induction-to-delivery time of misoprostol and oxytocin.

Methods: A total number of cases selected for study purpose were 280 for a period from March 2010 to February 2013; all were term pregnancies. Misoprostol group received 25 μg oral solution every 3 h, and oxytocin group received a titrated dose starting from 4 mIU with an increment of 4 mIU every half an hour. The time between onset of induction and delivery has been recorded; so does the time between induction and active labor. Maternal and fetal complications also were noted. Vaginal delivery, not effected and ended with cesarean was considered failure.

Result: Failure of induction by misoprostol was less with misoprostol (19.8%) comparing to oxytocin which was 39.2% with statistical significance ($P < 0.001$). Induction-to-delivery time was shorter for misoprostol group ($P < 0.04$). Induction-to-active labor was also shorter for misoprostol group ($P < 0.05$). Complications, maternal, and fetal were similar in both groups.

Conclusion: Misoprostol is a safe and effective method of induction of labor superior to intravenous oxytocin drip.

Key words: Arrest of descent, Arrest of dilatation, Cesarean, Dysfunctional labor, Labor induction, Misoprostol, Oxytocin, Protracted descent, Protracted dilatation, Vaginal delivery

INTRODUCTION

Induction implies stimulation of contractions before the spontaneous onset of labor, with or without ruptured membranes.[1]

Induction is indicated when the benefits of delivery outweigh the risk of continuation of pregnancy in utero. The more common indications include pre-labor rupture of membranes, gestational hypertension, oligohydramnios, non-reassuring fetal status, post-term pregnancy, and various maternal medical conditions such as chronic hypertension and diabetes.[2]

Oxytocin has been used for decades to induce or augment labor. Other effective methods include prostaglandins, such as misoprostol and dinoprostone, and mechanical methods those encompass stripping of membranes, artificial rupture of membranes, extra-amnionic saline infusion, transcervical balloons, and hygroscopic cervical dilators. Misoprostol is widely practiced for induction of labor. The American College of Obstetricians and Gynecologists (2013b) reaffirmed its recommendation for use of the drug because of proven safety and efficacy.[2]

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Corresponding Author: Dr. K M Asokan, Professor of Obstetrics and Gynecology. Kannur Medical College, Anjarakandy, Kannur, Kerala Pin-670612. E-mail: drkmasokan@gmail.com

Importantly, as recommended in Guidelines for Perinatal Care, each obstetrical department should have its own written protocols that describe administration of these methods for labor induction and augmentation.[3]

Objectives of Study

1. To compare the efficacy of misoprostol and oxytocin in inducing labor
2. To compare the complications of misoprostol and oxytocin
3. To compare the induction-to-active labor time
4. To compare the induction-to-delivery time of misoprostol and oxytocin.

MATERIALS AND METHODS

The study period was 3 years from March 2010 to February 2013. The study was approved by the ethical committee of Kannur Medical College. The total number of cases taken for study purpose were 280.

Inclusion Criteria

1. Term pregnancy
2. Fetus with average weight assessed clinically and ultrasound.

Exclusion Criteria

1. Short women, height <147 cm
2. Cephalopelvic disproportion
3. Antepartum hemorrhage
4. Previous cesarean deliveries.

Informed consent was obtained from each lady. As soon as the pregnant lady entered into the labor room clinical evaluation was done and documented.

Drugs Used

Misoprostol used was Misoprost-200 manufactured by Cipla India Ltd. The strength was 200 μg oxytocin used was Pitocin, manufactured by Pfizer India Ltd, 1 ampoule contains 5 units oxytocin.

Methods

2 groups were created; the first one was induced by misoprostol and the second one induced by oxytocin. Bishop score was calculated for all cases. Scores 3 and 4 were chosen for study purpose. Three indications were considered for induction; postdated pregnancy, pre-eclampsia, and gestational diabetes. Misoprostol was used as solution by dissolving into 40 mL sterile water. Every lady of the first group was fed 5 mL solution (1 teaspoon) every 3 h, maximum 6 doses, 5 mL containing 25 μg. An increment of half teaspoon solution (12.5 μg) was added every 3 h. Oxytocin was administered as drip infusion. This was prepared by adding 5 units of Pitocin into 500 mL normal saline started with 2 mIU/min (4 drops per minute) and an increment of 2 mIU per minute is added every 30 minutes. Maximum dose was 36 m IU/min. Cervical dilatation was assessed every 4 hours by examination per vaginam. All the pregnant ladies were monitored by partogram and fetuses monitored by continuous electronic monitoring. Induction was stopped on the appearance of the following; presence of tachysystole and non-reassuring FH pattern. Tachysystole is defined as more than 5 contractions in 10 minutes. Tachysystole was controlled by terbutaline injection in one case of misoprostol administration. The active phase of labor is defined by cervical dilatation 4 cm or more. 3 contractions in 10 min are considered adequate. Regular rhythmic uterine contractions resulting into effacement and cervical dilatation was considered effective in labor induction. Failure to progress was assessed by no cervical dilatation in 4 h (arrest of dilatation) or no descent in 4 h (arrest of descent). Failure to achieve dilatation 1 cm/hour (protracted dilatation) or descent 1 cm/hour was also considered failure of progress or dysfunctional labor. The cesarean was done for the following situations; hyperstimulation syndrome, thick meconium stained liquor and failure to progress. Hyperstimulation syndrome is defined as tachysystole plus non-reassuring fetal heart rate (FHR) pattern. The non-reassuring pattern is a sign of fetal hypoxemia. It is diagnosed by the following abnormal features; tachycardia (FHR more than 180 a minute), reduced variability, late deceleration, and variable deceleration. All ladies were given adequate postpartum care and discharged on the 3rd day.

Statistical Analysis

Results were given as mean plus or minus SD. Statistical analysis was performed using the SPSS 16.0 statistical software package (SPSS Inc, Chicago, IL, USA). Time intervals were analyzed with Mann–Whitney U test, and other data were analyzed with the χ^2 for qualitative and Student's *t*-test for quantitative variables. A $P = 0.05$ was considered significant.

RESULT

Pregnant ladies from each group were studied for the demographic variables. No statistically significant difference was found (Table 1).

3 main indications of labor are taken into account (Table 2).

There was statistically significant difference in route of delivery, duration from induction-to-active phase and total duration of labor (Table 3).

Table 1: Demographic variables

Demographic variables	*n* (%) (*n*=140)		*P* value
	Misoprostol	Oxytocin	
Age	25±3 (53)	25±4 (53)	0.80
Gestational age	40±1.2	40±1.3	0.30
Parity nulli	56.0 (40.0)	62.0 (44.3)	0.40
Parity multi	84.0 (60.0)	78.0 (55.7)	0.40
Bishop score	3.2±1.4	3.1±1.4	0.10

Table 2: Indications of induction of labor

Indications	*n* (%) (*n*=140)	
	Misoprostol	Oxytocin
Post dated	120.0 (85.7)	118.0 (84.3)
Pre-eclampsia	16.0 (11.4)	17.0 (12.1)
GDM	4.0 (3.0)	5.0 (4.0)

Table 3: Labor details

Variables	*n* (%) (*n*=140)		*P* value
	Misoprostol	Oxytocin	
Vaginal delivery	113 (80.7)	82.0 (58.6)	<0.001
Delivery time [hours]	15.6±5.1	13.2±7.7	<0.05
Interval from induction-to-active labor (hours)	12.9±5.4	10.1±6.1	<0.04
Cesarean	27 (19.2)	58 (41.4)	<0.001

There was a significant increase in the rate of cesarean in oxytocin group ($P < 0.001$). The interval from induction-to-active phase (cervical dilatation ≥ 4 cm) was shorter in misoprostol group ($P < 0.04$) which is significant. The total duration of delivery also decreased in misoprostol group ($P < 0.05$) which also is significant.

There was no statistically significant difference in maternal complications in misoprostol group and oxytocin group. Important maternal morbidities were tachysystole, postpartum hemorrhage, blood transfusion, abruptio placentae, and vomiting (Table 4).

There was no statistically significant difference in the fetal complications also. Important fetal morbidities were aspiration of meconium and abnormal APGAR (Table 5). There was no maternal or fetal death in both groups.

DISCUSSION

Two common drugs used for labor induction are misoprostol and oxytocin.[4] There are so many studies on the advantages and disadvantages of oxytocin and misoprostol.[5,6] For example, Hofmeyr *et al.* suggest an effective dose of 25 μg of misoprostol every 4-6 h for reduction of complication rate.[7] In our study, a dose of 25 μg which was repeated every 3 h in a titrated dose

Table 4: Maternal complications

Variables	*n* (%) (*n*=140)		*P* value
	Misoprostol	Oxytocin	
Tachysystole	18.0 (12.9)	12.0 (8.5)	0.40
Postpartum hemorrhage	10.0 (7.1)	17.0 (12.1)	0.40
Blood transfusion	1.0 (0.7)	3.0 (2.3)	0.60
Placental abruption	2.0 (1.4	2.0 (1.4)	1.00
Gastrointestinal symptoms	13.0 (9.3	5.0 (3.6)	0.03

Table 5: Neonatal outcome

Variables	*n* (%) (*n*=140)		*P* value
	Misoprostol	Oxytocin	
Birth weight	3100±250	3150±250	0.50
1 m APGAR<4	3.0 (2.3)	4.0 (3.1)	1.0
5 m APGAR≤7	1.0 (0.7)	1.0 (0.7)	1.0
Meconium staining	0.0 (0.0)	1.0 (0.7)	1.0
NICU admission	1.0 (0.7)	5.0 (3.9)	0.2

for 6 doses was administered. Studies of Fonseca *et al.*[8] and de Aquino and Cecatti.[9] showed significant maternal and fetal complications in misoprostol-induced cases; tachysystole, meconium stained liquor and reduced APGAR. However, our study does not show such increased complications in misoprostol group. Maternal and fetal complications are more or less equal in both groups. A study by Fonseca *et al.*[8] and Kramer[10] show no statistical significance in the rate of cesarean and vaginal deliveries. Our study clearly reveals an increase of vaginal deliveries in the misoprostol group ($P < 0.001$). Two important separate studies by Oliveira *et al.*[11] and Sanchez-Ramos *et al.*[12] show significant reduction of induction-to-vaginal delivery time. Our study supports this ($P < 0.001$)

CONCLUSION

The following conclusions have been arrived at by our study. Titrated orally administered misoprostol is as safe as titrated oxytocin. Misoprostol is superior to oxytocin in the following aspects. Reduction in cesarean rate. Induction-to-delivery time is shorter. Induction-to-active phase duration is also shorter in misoprostol-induced labor.

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