Comparative Study between Continuous Use of Oxytocin Infusion Throughout the Active Phase of Labor Versus its Discontinuation and its Effect on the Course of Labor

AHMAD S.S.A. RASHWAN, M.Sc.; HASSAN M. GAAFAR, M.D. and AHMED M. MAGE M. MAGE D. M. M. M. MAGED MOHAMED, M.D.
The Department of Obstetrics & Gynecology, Kasr Al-Aini Hospital, Cairo University

Abstract

Objectives: To compare effects of continuation versus discontinuation of oxytocin through the active phase of labor on labor, fetus and mother.

Study Design: 200 pregnant women were classified into 2 groups. In group (A) 100 patients received continuous oxytocin infusion throughout labor till delivery of baby. Group (B) included 100 patients in whom the oxytocin infusion was discontinued once the active phase of labor is established.

Results: There was a statistically significant difference between the two study groups regarding induction to delivery interval (6.27 ± 0.95 vs 7.72 ± 1.09 respectively), active phase interval (3.01 ± 0.67 vs 3.74 ± 0.55, respectively), first stage interval (5.67 ± 1.13 vs 6.85 ± 1.011 respectively), second stage interval (36.2 ± 9.86 vs 45.16 ± 14.13 respectively), dose of analgesia (93.5 ± 16.9 vs 58.54 ± 19.04 respectively), the need for analgesia (100% vs 41% of patients respectively), meconium detection (29% vs 10% of patients respectively), non reassuring FHR (16% vs 6% of patients respectively), NICU admission (10% vs 4% of patients in respectively), and uterine hyperstimulation incidence (7% vs 0% of patients respectively).

Also there was statistically significant difference between group (A) and group (B) as regards the mode of delivery as the percentage of CS delivery increased in group (A) compared to group (B) (17% vs 7% respectively).

Conclusions: Continuing oxytocin has an advantage of shortening the stages of labor with poor patient tolerance and higher rate of CS.

Key Words: Oxytocin — Active labor — Analgesia — CS rate — Uterine hyperstimulation.

Introduction

INDUCTION implies stimulation of contractions before the spontaneous onset of labor, with or without ruptured membranes. Augmentation refers to stimulation of spontaneous contractions that are considered inadequate because of failed cervical dilatation and fetal descent. According to the National Center for Health Statistics, the incidence of labor induction in the United States was more than doubled from 9.5 percent in 1991 to 22.5 percent in 2006 [1].

Synthetic oxytocin is one of the most commonly used medications in the United States. It was the first polypeptide hormone synthesized, an achievement for which the 1955 Nobel Prize in chemistry was awarded [2]. Regarding labor, it may be used for induction or for augmentation of labor [3].

Oxytocin is the drug of choice for labor induction when the cervical examination shows that the cervix is favorable [4]. With oxytocin use, the American College of Obstetricians and Gynecologists recommends fetal heart rate and contraction monitoring similar to that for any high-risk pregnancy [5].

Although 15-25% of all pregnant women require oxytocin for either induction or augmentation of labor, and there are various studies about dosages of oxytocin for induction of labor, few studies have focused on the optimal duration of oxytocin administration [6].

The aim of this study is to compare effects of continuing or discontinuing oxytocin infusion on labor course once the active stage of labor is established.

Material and Methods

This is a prospective randomized study involving 200 pregnant women who underwent labor induction in Kasr Al-Aini Maternity Hospital, Cairo, Egypt from the 1st of September 2008 to the 15th of June 2010.
Full informed consent was obtained from all the patients involved in the study and details of the procedure were explained to them.

The women participated in this study, were divided into 2 groups, each consists of 100 women (60 of them are nulliparous & 40 are multiparous): Group (A) received continuous oxytocin infusion throughout labor till delivery of baby. Group (B) in whom the oxytocin infusion was discontinued once the active phase of labor is established.

All cases included had indication for induction of labor, age range was 20-30 years, gestational age 36-42 weeks, vertex presentation with no indication for CS (inadequate pelvis, cephalopelvic disproportion, persistent non-reassuring fetal heart rate, scarred uterus), no chronic or pregnancy induced illness and all had favorable cervix for labor induction (Bishop score >4) [3].

All patients involved in the study were subjected to detailed history taking on admission including personal, menstrual, obstetric, contraceptive, past and family history in addition to detailed physical examination including general, abdominal and local pelvic examination.

Induction of labor was started in all patients using the low dose protocol suggested by ACOG by oxytocin IV drip infusion at a rate of 1mIU/minute (5 IU of oxytocin was diluted in 500ml of 0.9% NaCl). The dose was increased every 20 minutes by 1mIU/minute until regular contractions at a rate of 3-5 per 10 minutes were reached. The maximal allowed dose of oxytocin was 20mIU/minute [5].

All patients were monitored throughout the labor stages by blood pressure, pulse and temperature measured every hour and auscultation of FHR by sonicaid and recorded every 15 minutes during the first stage of labor and every 5 minutes during the second stage [3]. Intervention was stopped when there is suspicious or abnormal FHR.

Vaginal examination was done every 1-2 hours and labor progress was assessed by partogram.

Primary outcome measure was the duration from induction to delivery in the two groups. Secondary outcome measures were the duration of labor stages, mode of delivery, abnormalities in fetal heart rate, detection of meconium upon rupture of membranes and uterine hyperstimulation.

Factors that lead to discontinuation of the intervention in the patients of group (A) were evaluated.

Data were statistically described in terms of mean ± standard deviation (SD), frequencies (number of cases) and percentages when appropriate. Comparison of quantitative variables between the study groups was done using student t-test for independent samples. For comparing categorical data, Chi square (χ²) test was performed. Exact test was used instead when the expected frequency is less than 5. A probability value (p-value) less than 0.05 was considered statistically significant. All statistical calculations were done using computer programs Microsoft Excel 2003 (Microsoft Corporation, NY, USA) and SPSS (Statistical Package for the Social Science; SPSS Inc., Chicago, IL, USA) version 15 for Microsoft Windows.

**Results**

200 pregnant women were divided into 2 equal groups; group (A) received continuous oxytocin infusion throughout labor till delivery while in group (B) oxytocin infusion was discontinued once the active phase of labor is established.

Table (1) shows that there was statistically nonsignificant difference between the two study groups regarding age, parity, BMI, GA and the dose of oxytocin needed in both groups.

There was a statistically significant difference between the two study groups regarding induction to delivery interval (6.27±0.95 vs 7.7±1.09 respectively). There was also a highly significant difference between the two groups in active phase interval (3.01±0.67 vs 3.74±0.55, respectively), first stage interval (5.67±1.13 vs 6.85±1.01 respectively), second stage interval (36.2±9.86 vs 45.16±14.13 respectively) and the dose of analgesia (93.5±16.9 vs 58.54±19.04 respectively).

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>23.2</td>
<td>24.1</td>
<td>&gt;0.05 NS</td>
</tr>
<tr>
<td>Parity</td>
<td>1.1</td>
<td>1.3</td>
<td>&gt;0.05 NS</td>
</tr>
<tr>
<td>BMI</td>
<td>25.7</td>
<td>26.3</td>
<td>&gt;0.05 NS</td>
</tr>
<tr>
<td>Induction to delivery time (hours)</td>
<td>6.27±11</td>
<td>7.7059</td>
<td>&lt;0.01 HS</td>
</tr>
<tr>
<td>GA (weeks)</td>
<td>40.64</td>
<td>40.43</td>
<td>&gt;0.05 NS</td>
</tr>
<tr>
<td>Active phase 1st stage</td>
<td>3.01</td>
<td>3.74</td>
<td>&lt;0.01 HS</td>
</tr>
<tr>
<td>2nd stage</td>
<td>36.20</td>
<td>45.16</td>
<td>&lt;0.01 HS</td>
</tr>
<tr>
<td>Dose of analgesia</td>
<td>93.50</td>
<td>19.04</td>
<td>&lt;0.01 HS</td>
</tr>
<tr>
<td>Dose of oxytocin</td>
<td>4.46</td>
<td>1.288</td>
<td>&gt;0.05 NS</td>
</tr>
</tbody>
</table>

Table (1): Demographic data and labor characteristics.
Table (2) shows that there was statistically highly significant difference between group (A) and group (B) as regards the need for analgesia [100% of patients in group (A) compared to 41% of patients in group (B)], the detection of meconium upon rupture of membranes [29% of patients in group (A) vs 10% of patients in group (B)], incidence of non reassuring FHR (16% vs 6% of patients in each group respectively), NICU admission (10% vs 4% of patients in each group respectively), and uterine hyperstimulation (7% vs 0% of patients in each group respectively).

Also the table shows that there was statistically significant difference between group (A) and group (B) as regards the mode of delivery as the percentage of CS delivery increased in group (A) compared to group (B) (17% vs 7% of patients in each group respectively).

As regards cases that discontinued intervention there was statistically significant difference between group (A) and group (B) (18% vs 8% of patients in each group respectively).

Table (2): Outcome parameters among the study groups.

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. &amp; %</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Need for analgesia</td>
<td>100</td>
<td>41</td>
<td>&lt;0.01 HS</td>
</tr>
<tr>
<td>Detection of meconium</td>
<td>29</td>
<td>10</td>
<td>&lt;0.01 HS</td>
</tr>
<tr>
<td>Non reassuring FHR</td>
<td>16</td>
<td>6</td>
<td>&lt;0.01 HS</td>
</tr>
<tr>
<td>NICU admission</td>
<td>10</td>
<td>4</td>
<td>&lt;0.01 HS</td>
</tr>
<tr>
<td>Uterine hyperstimulation</td>
<td>7</td>
<td>0</td>
<td>&lt;0.01 HS</td>
</tr>
<tr>
<td><strong>Mode of delivery:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS</td>
<td>17</td>
<td>7</td>
<td>&lt;0.01 HS</td>
</tr>
<tr>
<td>VD</td>
<td>83</td>
<td>93</td>
<td>&lt;0.01 HS</td>
</tr>
<tr>
<td>Cases who discontinued intervention</td>
<td>18</td>
<td>8</td>
<td>&lt;0.01 HS</td>
</tr>
</tbody>
</table>

**Comments**

Oxytocin is the primary and the most widely used agent for labor induction [7]. Despite its extensive use, there is no consensus regarding the initial dose, dosage increments and/or the maximal dose [8].

There is not enough data to know whether induction or augmentation of labor with oxytocin should be continued or stopped after the onset of active labor. This is an important issue considering that the main adverse effect of oxytocin is uterine hyperstimulation (six or more contractions in 10 minutes). This led to unnecessary fetal compromise, dysfunctional labor, and in the most extreme cases uterine rupture [9].

In our study we found that oxytocin continuation during the active phase has advantages regarding duration of most of labor phases and disadvantages usually related to neonatal and delivery outcome and patient tolerance to labor.

The current study found that continuation of oxytocin during the active stage resulted in shorter induction to delivery interval when compared to discontinuing it (induction to delivery interval 6.27±0.95 vs 7.7±1.09 respectively, the active phase duration 3.01±0.67 vs 3.74±0.55 respectively, first stage duration 5.67±1.13 vs 6.85±1.01 respectively, and second stage duration 36.2±9.86 vs 45.16±14.13 respectively).

Also this study found a highly statistically significant difference between the two study groups regarding the need for analgesia (100% vs 41% of patients respectively) and the needed dose of analgesia (93.5±16.9 vs 58.54±19.04 respectively). This also had an impact on cases that discontinued intervention (18% vs 8% of patients respectively).

The neonatal outcome was better in patients who discontinued oxytocin as there was a statistically significant difference regarding the detection of meconium upon rupture of membranes (29% vs 10% respectively), incidence of non reassuring FHR (16% vs 6% of patients respectively), and NICU admission (10% vs 4% of patients respectively).

In our study we found that there was statistically significant difference between group (A) and group (B) as regards the mode of delivery as the percentage of CS delivery increased in group (A) compared to group (B) (17% vs 7% of patients in each group respectively) and the incidence of uterine hyperstimulation (7% vs 0% of patients in each group respectively).

Daniel-Spiegel et al., in 1998 tried to answer this question “whether oxytocin induction of labor should be discontinued when active labor begins” so they enrolled 104 patients admitted for labor induction with oxytocin in Ha’Emek Medical Center, Afula. They randomly divided the patients into two groups. In group (A), infusion of oxytocin was incremental until 5cm dilatation and maintained at the same level from that point throughout labor. In group (B), infusion of oxytocin was incremental but was discontinued when cervical dilatation reached 5cm.

They found that the active phase of labor was shorter in group (B) compared to (A), but this difference was not statistically significant (2.6±2
Comparative Study between Continuous Use of Oxytocin Infusion

vs $3.3 \pm 2.9, p=0.07$). In group (A) there were six cesarean deliveries and in group (B) only three. No significant differences were found when the other outcome parameters were compared.

They concluded that “There is no advantage in continuing oxytocin infusion after the onset of active labor” [9].

Their study goes with our study in documenting shorter active phase and higher CS rate in patients who continues oxytocin but didn’t find the meconium and non reassuring FHR may be because of the smaller number of study cases.

Ustunyurt E. et al., in 2008 designed study involving 342 pregnant women who underwent labor induction at Department of Obstetrics and Gynecology, Zekai Tahir Burak Women’s Health Education Hospital, Ankara, Turkey. The aim of the study is to investigate the effects of discontinuing oxytocin infusion on labor outcomes once the active stage of labor is established.

This prospective study involved 342 pregnant women who were randomly divided into two groups. In the first group oxytocin was discontinued at the beginning of the active phase of labor, and in the other group, it was administered till delivery.

The results of Ustunyurt study were that duration of the active phase and the second stage of labor were longer in the oxytocin-discontinued group; however, this was not statistically significant. The rate of uterine hyperstimulation was significantly higher in oxytocin-continued group ($p<0.05$). The total cesarean delivery rate for the oxytocin-continued group was 6.9%, compared with 4.8% in the oxytocin-discontinued group ($p>0.05$) i.e. statistically non significant.

They concluded that “Discontinuing oxytocin infusion once the active stage of labor is established may be an alternative protocol in the developing countries where the conditions for fetal monitoring and emergency cesarean section are less available” [6].

This study goes with our study in documenting shorter active phase and higher rate of uterine hyperstimulation and higher CS rate in patients who continues oxytocin.

Girard et al., in 2005 studied 138 women with singleton pregnancy and a vertex presentation of over 34 gestational weeks, presenting a medical indication of induction of labor or a dystocia at onset of labor, from May 2005 to June 2006.

Two parallel groups were compared: Continuation of oxytocin until delivery versus discontinuation of oxytocin at the onset of the active phase. The clinically acceptable increase in mean duration of the active phase of labor (non-inferiority margin) was set at 60 minutes.

Equivalence of the two strategies (continuation vs. discontinuation of oxytocin) was not demonstrated ($p=0.97$ testing for non-inferiority), the active phase even being significantly longer by a mean of 113 minutes ($p=0.0001$ testing for superiority). The rates of cesarean sections, alterations of FHR and delivery hemorrhage were higher when oxytocin was continued, but not significantly. There were significantly more infants hospitalized in neonatology when oxytocin was continued ($p=0.028$).

They concluded that discontinuation of oxytocin at the onset of the active phase prolongs labor and there is no argument for discontinuing the infusion of oxytocin at the onset of the active phase [10].

From our study we can conclude that continuing oxytocin has an advantage of shortening the stages of labor but the patient tolerance is poor and the rate of CS is higher and closer fetal monitoring is needed as meconium stained liquor is higher. So we recommend discontinuing oxytocin once the active stage of labor starts especially in developing countries where continuous fetal monitoring is not available in all places.

References


