

## Cesarean Section Rate for Induction of Labor Using Low Dose Oxytocin in the Presence of an Unfavorable Cervix

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### ABSTRACT:

#### BACKGROUND:

Induction of labor (IOL) implies stimulation of uterine contractions before the spontaneous onset of labor, with or without ruptured membranes. The condition or favorability of the cervix is important to labor induction. Induction to active labor is usually successful with a cervical score of 9 or greater.

#### OBJECTIVE:

(A) to estimate the cesarean section rate for induction of labor with low dose Oxytocin in the presence of unfavorable cervix. (B) To analyze the possible predictors of unsuccessful induction.

#### PATIENTS AND METHOD:

This is a case series study done at Al-Batool Maternity Teaching Hospital with a total of 13000 deliveries per year.

Eighty pregnant ladies that underwent labor induction at 37 weeks of gestation or more with an unfavorable cervix (Bishop score  $\leq 5$ ). The study was conducted at Al-Batool Maternity Teaching Hospital in Mosul, north of Iraq from January to August 2005. The patients were assigned to receive 2 mIU/ min. oxytocin in one pint of intravenous fluid at day one. When contractions did not start by this dose, the patient is postponed to the second day to receive 2 and 4 mIU/min. oxytocin in two pints, respectively. If there was no response, we started the third day with 4, 8 and 16 mIU/min. in 3 pints, respectively, maintaining these doses if the contractions started. The primary outcomes were successful induction rate and cesarean delivery rate and fetal condition at birth.

#### RESULTS:

Primary cesarean delivery rate was (27.9%). Increasing Bishop Scores decreased the risk of failed induction.

#### CONCLUSION:

The use of the daily repeated low dose oxytocin infusion with gradual increase in this study is safe and may reduce the high rate of operative delivery associated with induction of labor.

**KEY WORDS:** labor induction. oxytocin. cesarean section. and bishop score.

### INTRODUCTION:

Induction of labor (IOL) implies stimulation of uterine contractions before the spontaneous onset of labor, with or without ruptured membranes. The most common indications for induction of labor were pre-eclampsia, oligohydramnios, early rupture of membranes, gestational age of 41 weeks and some maternal systemic diseases<sup>(1)</sup>. Another indication for induction of labor at term is when the patient reside an appreciable distance from the obstetrical facility (geographical indication)<sup>(2)</sup>. In the United States, the rate of IOL was 22.5% at 2006 more than doubled since 1990 (9.5%) and it is associated with increased risk for cesarean, especially in nulliparous patients<sup>(3)</sup>.

The condition or favorability of the cervix is important to labor induction. Induction to active labor is usually successful with a cervical score of 9 or greater<sup>(2)</sup>. Induction of labor results in a high failure rate if the cervix is not 'ripe'. In the presence of an unfavorable cervical score  $< 5$ , amniotomy or oxytocin use results in 50 and 25% failure rates, respectively<sup>(4)</sup>.

In the present study, we aimed to elucidate the effect of maternal age, parity, gestational age and Bishop Scores as predictors of failed induction presented as cesarean delivery after IOL.

#### PATIENTS AND METHOD:

This is a clinical trial conducted at Al-Batool Maternity Teaching Hospital in Mosul, north of Iraq. From January to August 2005, 80 women were included for labor induction. Inclusion criteria are as follows: (1) unfavorable cervical Bishop

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score of  $\leq 5$  with cervical dilatation restricted to  $\leq 2$  cm (2) singleton pregnancy  $> 37$  weeks gestation (dates confirmed by first trimester ultrasound) with cephalic presentation (3) ultrasound estimated fetal weight  $< 4000$  g (4) absence of spontaneous uterine contractions (i.e.  $< 3$  spontaneous contractions per hour) (5) a perception of good fetal movement by the mother. Exclusion criteria includes a previous cesarean delivery or other type of uterine surgery. The patients received one pint normal saline with an initial dose of 2 mIU / minute oxytocin (1 IU in 500 ml saline )in day one, otherwise one pint normal saline with a dose of 2 and then 4 mIU/minute were given, respectively, in the 2<sup>nd</sup> day, if the contractions were not established by the first dose. Similarly, 4, 8 and 16 mIU/minute were administered to the patients who were postponed to the 3<sup>rd</sup> day and so on. On the day of the onset of the contractions, the dose was doubled every 30 minutes until a contraction pattern of  $> 3$

contractions in 10 minutes was established, then the dose of oxytocin was stabilized.

Intermittent fetal auscultation was performed every 30 minutes. Neonatal outcome criteria were assessed as follows: (1) neonatal death, (2) emergency caesarean delivery performed for non-reassuring FHR which include fetal tachycardia, bradycardia, late deceleration and variable deceleration.

The t-test was used to identify any significant difference between means of the parameters for patients delivered by normal vaginal delivery and those delivered by cesarean section in any parameters studied<sup>(5)</sup>.

### RESULTS:

The total number of patients included in this study was 80 women who underwent induction of labor for different indications as shown in table 1. The main indication was postdatism (42.5%). Patients induced at 37 weeks were either had their membranes were ruptured or because of severe hypertension.

**Table 1: The indications for induction of labor in the patients included in the study**

Indication	NVD (%) (n=60)	CS (%) (n=19)	Vacuum (%) (n=1)	Total (%) (n=80)
Post date	26(43.33%)	8(42.11%)	0(0%)	34(42.5%)
Hypertension	14(23.33%)	7(36.84%)	1(100%)	22(27.5%)
Geographical	16(26.67%)	2(10.52%)	0(0%)	18(22.5%)
Rupture membrane	4(6.67%)	2(10.52%)	0(0%)	6(7.5%)

Sixty patients delivered by vaginal delivery (75%), while one patient (1.25%) delivered by vacuum assisted vaginal delivery and 19 patients (23.75%) delivered by cesarean section for different reasons.

Table 2 shows the indications for cesarean section. The most frequent indication for cesarean section was failure to progress of labor (68.42%).

**Table 2: The indications for cesarean section in the patients included in the study (n=19)**

Indication for cesarean section	Number	%
Failure to progress of first stage of labor	13	68.42
Fetal distress	4	21.1
Failure to induce uterine contractions by oxytocin	2	10.52
Total	19	100

The mean age of patients was 26.76 years (standard deviation, S.D= 7.03) ages ranged from 17-40 years old. Table 3 shows the age distribution groups of the patients in this study; most patients (43.75%) were in the age group of less than 25 years. The mean age of the patients who delivered

by cesarean section was 27.9(S.D 8.49). There was no significant difference between the mean ages of the patients who delivered by normal vaginal delivery and those who delivered by cesarean section ( $t = 0.76$ ,  $P$  value  $\leq 0.05$ ).

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**Table 3: The age distribution groups of the patients under the study.**

Age group (years)	NVD (%) (n=60)	CS (%) (n=19)	Vacuum (%) (n=1)	Total (%) (n=80)
<25	26(43.3%)	8(42.11%)	1(100%)	35(43.75%)
25-35	26(43.3%)	4(21.1%)	0(0%)	30 (37.5%)
>35	8(13.3%)	7(36.84%)	0(0%)	15(18.75%)
Mean± S.D	26.48±6.62	27.9± 8.49	23	26.76± 7.03

t = 0.76, P value ≤ 0.05

The mean parity of the patients under this study was 2.4 (S.D 2.77) ranging from (0-7). Table 4 shows the distribution of parity among the patients in this study; almost half of the patients (41.25%) were nulliparous. The mean parity of patients delivered by cesarean section was 3.05 (S.D 3.82)

with a range from (0-7). There was no significant difference between the mean parity of patients who delivered by normal vaginal delivery and the mean of those delivered by cesarean section (t = 1.12 at P value ≤ 0.05).

**Table 4: The distribution of parity among the patients under the study**

Parity	NVD (%) (n=60)	CS (%) (n=19)	Vacuum (%) (n=1)	Total (%) (n=80)
0	22(36.67%)	10(52.63%)	1(100%)	33(41.25%)
1-4	28(46.67%)	3(15.79%)	0(0%)	31(38.75%)
>5	10(16.67%)	6(31.58%)	0(0%)	16(20%)
Mean± S.D	2.23±2.35	3.05±3.82	0	2.4±2.77

t = 1.12 at P value ≤ 0.05

The mean gestational age was 40.2 (S.D 1.511) weeks with age ranged 37-42.86 weeks. Table 5 shows the distribution of the patients in this study according to gestational age in weeks. Most of the patients (43.75%) were equal or more than 40 weeks. The mean gestational age for the patients who delivered by cesarean section was 40.549 wks

(S.D 1.176) with a range from 38 wks to 42.86 wks. There was no significant difference between the mean gestational ages of those patients who delivered by normal vaginal delivery and those who delivered by cesarean section (t = 1.084, P value ≤ 0.05).

**Table 5: The distribution of patients according to gestational age in weeks**

Gestational age(weeks)	NVD (%) (n=60)	CS (%) (n=19)	Vacuum (%) (n=1)	Total (%) (n=80)
37-37.86	8(13.33%)	0(0%)	0(0%)	8(10%)
38-38.86	7(11.66%)	1(5.26%)	1(100%)	9(11.25%)
39-39.86	8(13.33%)	4(21.05%)	0(0%)	12 (15%)
40-40.86	14(23.33%)	5(26.32%)	0 (0%)	19 (23.75%)
41-41.86	17(28.33)	7(36.84%)	0 (0%)	24(30%)
42-42.86	6(10%)	2(10.5%)	0 (0%)	8(10%)
Mean± S.D	40.119±1.593	40.549±1.176	38.43	40.2± 1.511

t = 1.084, P value ≤ 0.05

All the patients in this study were examined by the researcher for assessing the Bishop scores. The mean Bishop scores in the patients in this study was 3.35 (S.D 1.192) ranged from 0-5. Table 6 shows the distribution of Bishop Scores in the patients under the study; just about half of the patients (42.5%) have Bishop Scores of 4. Nearly half of the cases (46.25%) have very unfavorable

cervical scores of less than 4. The mean Bishop scores for patients delivered by cesarean section were 2.84 (S.D 1.46) with a range from (0-5). There was a significant difference in the mean Bishop scores of those patients delivered by vaginal delivery and those patients delivered by cesarean section (t = 2.265, P value ≤ 0.05).

**Table 6: The distribution of Bishop Scores in the patients under the study**

Bishop scores	NVD (%) (n=60)	CS (%) (n=19)	Vacuum (%) (n=1)	Total (%) (n=80)(%)
0	2(3.33%)	2(10.53%)	0(0%)	4(5%)
1	1(1.66%)	1(5.27%)	0(0%)	2(2.5%)
2	3(5%)	4(21.05%)	1(100%)	8(10%)
3	18(30%)	5(26.32%)	0(0%)	23(28.75%)
4	29(48.33%)	5(26.32%)	0(0%)	34(42.5%)
5	7(11.66%)	2(10.53%)	0(0%)	9(11.25%)
Mean± S.D	3.53±1.05	2.84±1.46	2	3.35± 1.192

t = 2.265, P value ≤0.05

Excess uterine activity was absent in all cases. No adverse effects on fetal condition at birth were seen in association with this protocol.

### DISCUSSION:

The technique used for induction of labor should be efficient, reliable, safe and acceptable to the patient. These objectives will best be served by striving to mimic the normal physiology of parturition as closely as possible<sup>(6)</sup>. The gradual increase of uterine contractions and the establishment of labor in a similar way to that observed during spontaneous labor was apparent using low dose oxytocin. Notably, oxytocin is cheaper and safer than prostaglandin as there were no cases of rupture uterus in this study. There are studies suggesting that smaller dose regimens are effective as larger dose regimens and that adverse effects of oxytocin are dose related<sup>(7)</sup>.

Foley considers that caesarean section rate is the correct measure of efficacy of any method of induction<sup>(8)</sup>. Interestingly, the caesarean section rate in our study was (23.75%); none was performed due to uterine hyperactivity. The caesarean section rate in Al-Batool Maternity Teaching Hospital is (18.9%)<sup>(9)</sup>. While data for English hospitals in 2006–2007 showed an overall caesarean section rate of 24.3%, with a wide range of 12–33%<sup>(10)</sup>. This means that this method of IOL was effective. One of our aims is to identify the predictors of failed induction, however, it was found that increased maternal age, parity and gestational age have no relation with successful induction, and only increasing Bishop scores had relation with successful induction. Several previous studies identified the Bishop score<sup>(11)</sup> and parity<sup>(12)</sup> as independent predictors of successful induction. It was noticed that successful induction and normal vaginal delivery were achieved in any maternal age, parity, gestational age and Bishop Scores. Hence, it is possible to try this method in any patient with no known contraindication to oxytocin. In another word, fetal head position

could be other factor which affects success. Randomized clinical trials have shown that induction of labour does not result in higher caesarean delivery rates in women who are postterm<sup>(13)</sup>. This is in accordance with our study which showed that there was no significant difference between the mean gestational ages of those patients delivered by normal vaginal delivery and those delivered by caesarean section.

In our study, maternal age seems not to affect the result of induction. This finding was in agreement with another study<sup>(14)</sup>. However, the current study revealed that the patients above 35 years are less than those below 35 (15 versus 65); our older patients usually refused the induction and preferred elective caesarean section as a method of delivery. This may be due to grandmultiparity, which is associated with older age. Grandmultiparous women thought that elective caesarean section is easier and less painful than labor induction as they offered analgesia post operatively. The use of analgesia during labor may make the induction more acceptable, regrettably analgesia is not available to the laboring women in our hospital.

Very unfavorable cervical scores were present in (1.5%) of the cases of induction of labor<sup>(15)</sup>. In our study (46.25%) of cases have Bishop Scores of less than 4 and (42.5%) have Bishop Scores of 4. Our observations indicated that an increase in the score is corresponding to an increase in the success of induction with oxytocin (Table 6).

The use of single dose intracervical or intravaginal prostaglandin E2 gel for cervical ripening has little effect on labor induction, and does not alter the incidence of caesarean delivery<sup>(16)</sup>. The reported over all failure rates with misoprostol induction is as high as 16%<sup>(14)</sup>. However, this drug was unavailable during the period of conducting this study. There were reported cases of uterine tachysystole associated with prostaglandin<sup>(17)</sup>, while in this study no cases of uterine tachysystole or rupture uterus were reported. Upon the best

information of the author, there were no cases of chorioamnionitis associated with this study, since rupture membranes were done late after establishment of adequate uterine contraction. The limitation of pelvic examination during the slow infusion of the first two pints of saline help to decrease the incidence of chorioamnionitis.

The cause of fetal distress as an indication for cesarean section in this series (Table 2) could not be attributed solely to the use of oxytocin, as both hypertension and postdatism predisposed to this condition.

## CONCLUSION:

For those patients with very low Bishop Scores; it is worthy to do induction when termination of pregnancy is indicated regardless to maternal age, parity, and gestational age and Bishop Scores. The use of daily repeated low dose oxytocin in labor induction and cervical ripening is safe. This method can be used in busy hospitals, which lack adequate fetal and maternal monitoring as oxytocin is given slowly. There must be another factor that influences the success of induction other than the Bishop scores; we should search for this factor in order to predict the success of induction.

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