Induction of Labor with Oxytocin: When Should Oxytocin Be Held?

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Abstract:

Objective: To determine whether there is an increase in the cesarean delivery rate and labor length in women undergoing induction when oxytocin is discontinued in the active phase of labor.

STUDY DESIGN: Prospective randomized controlled trial of women undergoing induction of labor with a term singleton gestation during February 2009-August 2011. Women were randomized to either oxytocin as routinely used (ROUTINE) or oxytocin discontinuation (DC or DISCONTINUATION) once in active labor. Induction method and labor management were otherwise left at the discretion of the obstetrician. Analysis was by intention to treat.

RESULTS: 252 patients were eligible for study analysis: 128 patients randomized to ROUTINE and 124 patients randomized to DC once active labor was reached. Cesarean delivery (CD) rate was similar between the groups (ROUTINE 25.0% [n=32] vs. DC 19.4% [n=24], p=0.28). There was a higher chorioamnionitis rate (ROUTINE 5.5% [n=7] vs. DC 12.9% [n=16], p=0.04) and slightly longer active phase in those randomized to DC. In adjusted analysis, the rate of chorioamnionitis was not different by randomization arm but was explained by a longer active phase of labor [AOR 1.27 (95% CI 1.10, 1.47), p=0.001].

CONCLUSION: Discontinuation of oxytocin once active labor is reached may decrease receptor desensitization without significantly increasing the CD rate, but longer labor duration is associated with an increased risk of chorioamnionitis.

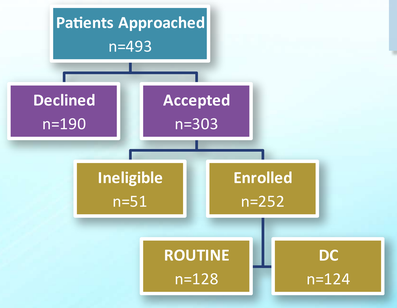
Methods:

Prospective randomized controlled trial of women undergoing induction with a singleton gestation ≥ 37 weeks at Lehigh Valley Health Network from February 2009 – August 2011. Women were randomized to either the ROUTINE group (oxytocin administered as an induction agent was continued once active labor was achieved) or the DISCONTINUATION group (oxytocin was discontinued once the patient was determined to be in active labor).

Primary outcome was cesarean delivery rate between groups. Secondary outcomes included length of latent phase of labor, length of active phase of labor and maternal/neonatal outcomes. Institutional review board approval was obtained.

Induction method and labor management was otherwise at the discretion of the provider. Active labor was defined both by cervical exam (4-5 cm with regular contractions) and clinical assessment. The provider could restart oxytocin at any time in patients assigned to the DISCONTINUATION group if felt to be clinically indicated.

Figure 1: Study enrollment algorithm



Inclusion criteria:

- Singleton gestation ≥ 37 weeks undergoing induction of labor with either misoprostol, oxytocin and cervical Foley balloon placement.

Exclusion criteria:

- Multiple gestations
- Previous cesarean delivery
- Documented fetal anomalies

Results:

- 128 randomized to ROUTINE group, 124 to DISCONTINUATION group.
- The most common method of induction in both groups was oxytocin.
- Oxytocin was restarted in the DISCONTINUATION group in 57 (47%) patients at the discretion of the provider.
- Cesarean delivery rate was similar between groups (ROUTINE 19.4% vs. DISCONTINUATION 25%, p=0.28).
- The median length of the active phase of labor (3.0 hrs vs. 3.9 hrs, p=0.02) and rates of chorioamnionitis (5.5% vs. 12.9%, p=0.04) were higher in the DISCONTINUATION group.
- After controlling for potential confounders, oxytocin discontinuation did not increase the rate of cesarean delivery (AOR 0.52 [95% CI 0.14 – 1.89], p=0.32).
- The risk of chorioamnionitis was not increased due to discontinuation of oxytocin (AOR 1.42 [95% CI 0.44, 4.57], p=0.56) but was related to nulliparity (AOR 4.94 [95% CI 1.20, 20.4], p=0.03), length of the active phase of labor (AOR 1.27 [95% CI 1.10, 1.47], p=0.001), and the Bishop score (AOR 0.31 [95% CI 0.10, 0.96], p=0.04).
- Only length of the active phase of labor was significantly associated with an increased risk of chorioamnionitis (AOR 1.26 [1.07, 1.47], p=0.004) when controlling for the length of the active phase and number of cervical exams.

Table 1. Demographic characteristics of the patient population by randomization group

Characteristics	Routine (n=128)	DC (n=124)	p-value
Maternal age (±SD)	27.0 ± 5.6	27.7 ± 5.7	0.33
Nulliparity (%)	63 (49.2)	54 (51.6)	0.70
Marital status (%)			
Married	56 (43.8)	66 (53.2)	
Divorced/widow	1 (0.7)	1 (0.8)	
Never married	71 (55.5)	57 (46.0)	0.32
Race/ethnicity (%)			
Caucasian	87 (68.0)	81 (65.3)	
African American	8 (6.3)	7 (5.7)	
Latina	27 (21.0)	30 (24.2)	
Other	6 (4.7)	6 (4.8)	0.95
Insurance (%)			
Government	53 (41.4)	44 (35.5)	
Private	60 (46.9)	61 (49.2)	
Self-Pay	15 (11.7)	6 (4.8)	0.54
Resident service [vs. private] (%)	57 (44.5)	58 (46.8)	0.72
Tobacco use (%)	17 (13.3)	18 (14.5)	0.78
Alcohol use (%)	0 (0)	1 (0.8)	0.31
Drug use (%)	0 (0)	2 (1.6)	0.15
Body mass index - kg/m² (±SD)	31.6 ± 7.3	31.0 ± 7.4	0.51
Any co-morbidity (%)	88 (69.3)	81 (65.3)	0.50
Pregestational diabetes (%)	1 (0.8)	1 (0.8)	0.99
Gestational diabetes (%)	14 (10.9)	17 (13.7)	0.50
Essential hypertension (%)	5 (3.9)	6 (4.8)	0.71
Gestational hypertension or preeclampsia (%)	46 (35.9)	41 (33.1)	0.63
Obesity (%) [BMI ≥ 30]	40 (31.3)	30 (24.2)	0.21
History of preterm birth (%)	3 (2.4)	7 (5.7)	0.19

Table 2. Intrapartum characteristics of the patient population by randomization group

Characteristics	Routine (n=128)	DC (n=124)	p-value
Gestational age at admission (weeks)	39.8 ± 1.3	40.0 ± 1.0	0.19
Primary indication for labor induction (%)			
Prolonged pregnancy	33 (25.8)	35 (28.2)	
Premature rupture of membranes	6 (4.7)	9 (7.3)	
Non reassuring testing	14 (10.9)	5 (4.0)	
Oligohydramnios	14 (10.9)	12 (9.7)	
Gestational hypertension or preeclampsia	21 (16.4)	19 (15.3)	
Intrauterine growth restriction	1 (0.8)	1 (0.8)	
Any diabetes	10 (7.8)	13 (10.5)	
Elective	19 (14.8)	15 (12.1)	
Other	19 (7.8)	15 (12.1)	0.54
First method of induction (%)			
Misoprostol	22 (17.2)	21 (17.0)	
Oxytocin	99 (77.3)	89 (71.8)	
Foley bulb and oxytocin	7 (5.5)	14 (11.3)	0.24
Insurance (%)			
Government	53 (41.4)	44 (35.5)	
Private	60 (46.9)	61 (49.2)	
Self-Pay	15 (11.7)	6 (4.8)	0.54
Bishop score (median)	5 (0-10)	5 (0-10)	0.82
Bishop score >4 (%)	82 (64.1)	79 (63.7)	0.95
Membrane status (%)			
Amniotomy	104 (81.3)	100 (80.6)	
Spontaneous rupture of membranes	15 (11.7)	13 (10.5)	
Premature rupture of membranes	9 (7.0)	11 (8.9)	0.84
Anesthesia (%)			
Epidural	123 (96.1)	117 (94.4)	
Spinal	1 (0.8)	0 (0)	
Local	1 (0.8)	2 (1.6)	
Intravenous sedation	0 (0)	1 (0.8)	
None	3 (2.3)	4 (3.2)	0.63

Table 3. Labor and delivery characteristics by randomization group

Cesarean delivery (%)	Routine (n=128)	DC (n=124)	p-value
Cesarean delivery (%)	32 (25.0)	24 (19.4)	0.28
Indications for cesarean delivery (%)			
Nonreassuring fetal heart tracing	8 (25.0)	7 (29.0)	
Arrest of the active phase	12 (37.5)	11 (45.8)	
Arrest of descent	7 (21.9)	6 (25.0)	
Failed induction of labor	2 (6.3)	0 (0)	
Malpresentation	2 (6.3)	0(0)	
Other	1 (3.0)	0(0)	0.53
Oxytocin dose in active labor (mu/min)	9.8 ± 5.4	10.8 ± 6.3	0.25
Maximum oxytocin dose (mu/min)	13.0 ± 6.8	13.1 ± 6.7	0.85
Intrapartum complications			
Preeclampsia	5 (3.9)	2 (1.6)	
Chorioamnionitis	7 (5.5)	16 (12.9)	
Abruptio placentae	1 (0.8)	1 (0.8)	
Other*	12 (9.4)	8 (6.5)	0.29
Postpartum complications			
Postpartum hemorrhage	7 (5.5)	8 (6.5)	
Preeclampsia diagnosed postpartum	1 (0.8)	0 (0)	
Endometritis	0 (0)	1 (0.8)	
Acute blood loss anemia	13 (10.2)	21 (17.0)	0.32
Latent phase of labor (hours)			
Mean	9.6 ± 6.8	10.2 ± 5.0	0.43
Median	7.7 (1.3, 54.6)	10.6 (0.3, 23.7)	0.06
Active phase of labor (hours)			
Mean	3.8 ± 2.9	4.8 ± 3.5	0.02
Median	3.0 (0.1, 15.3)	3.9 (0.1, 15.5)	0.02
Second stage of labaor (hours)			
Mean	1.0 ± 1.2	1.1 ± 1.3	0.53
Median	0.50 (0.0, 6.7)	0.50 (0.0, 6.5)	0.77

*Other – includes conditions such as elevated blood pressures without a diagnosis of hypertension or elevated temperature without diagnosis of chorioamnionitis

Table 4. Unadjusted analysis of potential predictors of cesarean delivery and chorioamnionitis

Variable	Cesarean delivery	Chorioamnionitis
Nulliparity	RR 5.91 (2.91, 12.0), p<0.001	RR 6.56 (2.0, 21.5) p<0.001
Chorioamnionitis	RR 1.91 (1.08, 3.37), p=0.04	----
Bishop score >4	RR 0.46 (0.29, 0.72), p<0.001	RR 0.36 (0.16, 0.81), p<0.001
Resident vs. Private	RR 1.12 (0.70, 1.79), p=0.64	RR 0.45 (0.20, 1.02), p=0.05
Any co-morbidity	RR 1.46 (0.84, 2.50), p=0.17	RR 0.63 (0.29, 1.38), p=0.25
Length of latent phase	OR 1.09 (1.03, 1.16), p=0.004	OR 1.07 (1.01, 1.14), p=0.03
Length of active phase	OR 1.22 (1.06, 1.40), p=0.005	OR 1.36 (1.19, 1.55), p<0.001
Number cervical exams	OR 1.11 (0.99, 1.25), p=0.08	OR 1.45 (1.22, 1.73), p<0.001

Conclusion:

In women undergoing induction, discontinuation of oxytocin once in active labor is not associated with an increased rate of cesarean delivery, but it is associated with longer labor duration and increased risk of chorioamnionitis.