

# INDUCTION OF LABOR WITH USE OF A FOLEY CATHETER AND EXTRAAMNIOTIC CORTICOSTEROIDS

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## ABSTRACT

The purpose of this study is to show the effect of extraamniotic administration of corticosteroids to shorten the times to either active labor and/or delivery. This is a double blind randomized study. 65 patients who were candidates for the termination of pregnancy between the ages of 16-45, with intact membranes and unripe cervix were randomly divided into two groups, a study group (n=34) and a control group (n=31). In the study group, 20mg of dexamethasone was infused through a Foley catheter into the extraamniotic space and the infusion was continued with normal saline in both groups.

The result of the study showed that the interval of induction to active phase of labor was  $6.6 \pm 2.33$  hours in the study group and  $8.2 \pm 3$  hours in the control group ( $t = 2.413$ ,  $p = 0.0187$ ). The interval of induction to delivery was  $8.4 \pm 2.62$  hours in the study group and  $10.05 \pm 3.35$  hours in the control group ( $t = 2.828$ ,  $p = 0.0063$ ).

In conclusion, corticosteroids may have a role in shortening the interval of induction to active phase of labor and the interval of induction to delivery.  
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**Keywords:** Corticosteroids, Induction of labor, Foley catheter.

## INTRODUCTION

Uterine contractions in labor sometimes do not begin spontaneously and due to the hazards to the mother or the fetus, induction of labor should be attempted. Induction of

labor in the presence of an unripe cervix is frequently indicated. Initial pharmacological efforts to effect cervical ripening targeted E2 preparations (dinoprostone). Subsequently developed pharmacological methods include either oral or vaginal prostaglandin E1 (misoprostol). These pharmacological techniques have been compared in a few studies to mechanical techniques such as extraamniotic saline infusion (EASI) through a transcervical 30mL balloon Foley catheter or to insertion of hygroscopic cervical dilators. It is likely that all of the described techniques have some benefit when compared with no attempt for cervical ripening.<sup>1</sup>

An association has been seen between fetal anencephaly and prolonged human gestation.<sup>2</sup> The adrenal glands of the anencephalic fetus are very small. The smallness of the adrenal glands is caused by failure of development of the fetal zone that normally accounts for most of

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the human fetal adrenal mass and C19-steroid. These findings were suggestive that in humans, as in sheep, the fetal adrenal glands are important for the timely onset of parturition. The extraamniotic infusion of corticosteroids is the way of induction of labor<sup>3</sup> that we used in our study. We successfully detected the beneficial effect of this method of induction in Zainab and Ghaem University Hospitals in Mashhad since March 1999.

### MATERIAL AND METHODS

This study was carried out in Zainab and Ghaem University Hospitals from March 1999 to July 2000, for a total duration of 16 months. All the admitted patients were evaluated for termination of pregnancy. The entry to study required vertex presentation, intact membranes and an unripe cervix (Bishop score <5).

The exclusion criteria were uterine anomalies, placenta previa, abnormal bleeding in the second or third trimester of pregnancy, fever, previous cesarean section or the presence of more than 3 contractions per 10 minutes.

The patients were grouped in two study and control groups in a double blind random way. The study group consisted of 34 patients and the control group consisted of 33 patients (group A and B respectively). There were no significant differences in age, gestational age, parity and mean fetal weight (Table I) and the indications of termination of pregnancy (Table II) between the two groups as evaluated by  $\chi^2$  test.

The questionnaire was filled after thorough explanation of the safety of the induction procedures to the patient and obtaining written consent.

The gestational age, indication of termination of pregnancy with the primary Bishop score were filled in the form. In the two groups, a 16Fr. Foley catheter was inserted under sterile conditions through the cervix and was fixed. In the study group (A), 20 mL of normal saline containing 20 mg of dex-

amethasone and in the control group (B), the same volume without dexamethasone, were infused into the extraamniotic space. The infusion was continued with pure normal saline at a rate of 1 mL per minute. Every 20 minutes, FHR was controlled and the Foley catheter was checked for expulsion every hour. In the case of nonexpulsion of the Foley catheter after 6 hours, which happened in two cases in group A, the patients were excluded from the final analysis and infusion of oxytocin was started.

The attempt to rupture the membranes was only undertaken in the active phase of labor.

The questionnaire was completed with data concerning the status of the Foley catheter, success of induction procedure, interval of induction to active phase of labor and delivery, vaginal versus cesarean section delivery, maternal complications and finally the APGAR score of the newborn. Then the results of the two groups were compared with the  $\chi^2$  and t-test.

### RESULTS

The factors evaluated in our study were 1) interval of induction to active phase of labor, 2) interval of induction to delivery, 3) fetal distress 4) the incidence of newborns with APGAR score <8 in the 5<sup>th</sup> minute after birth, and 5) vaginal versus cesarean section delivery.

There was no statistically significant difference between the study and control groups regarding the first through the third factor (Table II) with no adverse effect of dexamethasone on these factors. The study group showed shortened interval times of induction to active phase of labor and delivery.

### DISCUSSION

Ripening of the cervix is a prerequisite for the

**Table I.** Clinical data of study and control groups with extraamniotic normal saline infusion with and without dexamethasone.

Parameter	Study group N=34	Control group N=31	Statistical significance
Age (years)±SD	26±7.07	25±5.54	t=0.60 (t-test) p=0.55
Mean gestational age (weeks) ±SD	41±4.26	39±6.23	t=1.52(t-test) p=0.13
Nulliparity(%)	52.91	51.61	p=0.89 ( $\chi^2$ )
Mean fetal weight (Kg) ±SD	3.12±0.45	3.05±0.50	t=0.63(t-test) p=0.53

**Table II.** Indications of pregnancy termination in study and control groups with extraamniotic normal saline infusion with and without dexamethasone.

Parameter	Study group N=34 (%)	Control group N=31 (%)	Statistical significance
Post-term pregnancy	41.2 N= 14	35.5 N= 11	$p= 0.83$
Fetal death	32.4 N= 11	32.3 N= 10	$p= 0.79$
Hypertension	14.7 N= 2	19.4 N= 1	$p= 0.88$
Oligohydramnious	11.8 N= 4	12.9 N= 4	$p= 0.80$

**Table III.** The results of study of extraamniotic normal saline infusion with and without dexamethasone.

Parameter	Study group N=34 (%)	Control group N=31 (%)	Statistical significance
APGAR score/ 5 <sup>th</sup> min<8	13.04%, N= 4	19.5%, N= 6	$p=0.76 (\chi^2)$
Cesarean (%)	23.53 N= 8	22.58 N= 7	$p= 0.84 (\chi^2)$
Instrumental delivery (%)	5.88 N= 2	3.23 N= 1	$p= 0.92 (\chi^2)$
Normal vaginal delivery (%)	70.59 N= 24	74.9 N= 23	$p= 0.65 (\chi^2)$
Fetal distress (%)	5.33 N= 1	4.67 N= 1	$p= 0.65$
Mean time interval between induction of labor to the active phase (hours)±SD	6.6±2.33	8.2±3	$p= 0.019$ (t-test)
Mean time interval between induction of labor to delivery (hours) ±SD	8.4±2.62	10.5±3.35	$p= 0.006$ (t-test)

beginning of labor. The factors involved in ripening of the cervix are not thoroughly known, but the following are said to play a role in cervical ripening: PGE2 and PGF2 $\alpha$ , fetal fibronectin,<sup>11</sup> relaxin and estrogens with positive effects,<sup>4</sup> and progesterone with an inhibitory effect on the cervix.<sup>8</sup>

The other ways of induction of labor include intercourse, ingestion of castor oil, membrane stripping, amniotomy and nipple stimulation.<sup>18,6</sup>

There are also mechanical ways of induction such as prolonged tension in the cervical canal caused by placement of a Foley catheter in the extraamniotic space<sup>9</sup> or use of laminaria which causes dilatation of the cervix due to fluid absorption and chemical changes.<sup>5</sup> Estrogens and prostaglandins specially the E subtype have been used to successfully induce cervical dilatation.<sup>12</sup> Induction of labor can be attempted by using PG Gel,<sup>2</sup> dexamethasone and subsequent infusion of normal saline in the extraamniotic space.<sup>8</sup> In this study, we evaluated the usefulness of extraamniotic corticosteroids on

the shortening of the interval of induction to active phase of labor and interval of induction to delivery. Cervical dilatation with a balloon catheter was first attributed to Barnes by Woodman (1863). Using a Foley catheter is useful for preinduction cervical ripening and has been advised to be used in outpatient versus inpatient setting in a study by Sciscione and colleagues.<sup>15</sup> Sherman and colleagues (1996) summarized the results of 13 trials with balloon catheters and concluded that, with or without saline infusion, the method resulted in rapid improvement in Bishop score and shorter labors.<sup>17</sup> Mullin and colleagues in a study at Los Angeles found that extra-amniotic saline solution infusion with oxytocin administration appears more effective.<sup>13</sup> Although Ben-Aroya and colleagues found that PGE2 was superior to the Foley catheter for ripening of the uterine cervix,<sup>3</sup> but Helmin and Moller<sup>10</sup> and Sciscione and associates<sup>13</sup> (1999) reported catheter infusion to be more efficacious for ripening the cervix than 0.5 mg of intra-cervical prostaglandin E2.<sup>10,14</sup> Several variations of this

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method such as adding extraamniotic infusion of normal saline, prostaglandin gel or solution and corticosteroids are used currently.

Sherman and colleagues in a study in Israel found that cervical ripening by extraamniotic balloon and prostaglandin E2 infusion is faster and causes more spontaneous labor and a lower rate of oxytocin use than using normal saline alone.<sup>16</sup> Barkai in Israel in another study examined the hypothesis that corticosteroids, when administered extraamniotically, enhance the labor process and reduce the induction to delivery interval.<sup>1</sup> They concluded that induction of labor with use of an intracervical Foley balloon catheter and extraamniotic corticosteroids reduce the time interval from induction of labor to delivery. According to this study the extraamniotic balloon of the Foley catheter is an effective and safe method for induction of labor. The results of our study were comparable with the above study. The interval times of induction to active phase and induction to delivery were shorter in our study. There was no significant differences between the two groups in APGAR score, cesarean rate and instrumental delivery, but for an accurate judgment we need more cases.

In conclusion, the addition of corticosteroids to normal saline in the process of extraamniotic induction of labor leads to shortening of intervals of induction to active phase of labor and delivery. There may be a role for corticosteroids in the parturition process.

### REFERENCES

1. Barkai G, Cohen S, Kees S, et al: Induction of labor with use of Foley catheter and extraamniotic corticosteroids. *Am J Obstet Gynecol* Nov; 177(5): 1145-8, 1997.
2. Barrilleaux PS, Bofill JA, Terrone DA, et al: Cervical ripening and induction of labor with misoprostol, dinoprostone gel, and a Foley catheter: a randomized trial of 3 techniques. *Am J Obstet Gynecol* Jun; 186(6): 1124-9, 2002.
3. Ben-Aroya Z, Hallak M, Segal D, et al: Ripening of the uterine cervix in a post-cesarean parturient: prostaglandin E2 versus Foley catheter. *J Matern Fetal Neonatal Med* Jul; 12(1): 42-5, 2002.
4. Blackburn ST: Parturition and uterine physiology. In: Blackburn ST, (ed.), *Maternal, Fetal and Neonatal Physiology: A Clinical Perspective*. 2nd ed., Philadelphia: Saunders, pp. 130-157, 2003.
5. Boulvain M, Kelly A, Lohse C, et al: Mechanical methods for induction of labor. *Cochrane Database Syst Rev* (4): CD001233, 2001.
6. Boulvain M, Stan C, Irion O: Membrane sweeping for induction labor. *Cochrane Database Syst Rev* (2): CD0004, 2001.
7. Cunningham FG, Gant NF, Leveno KJ, et al: Normal labor and delivery. In: Cunningham FG, et al. (eds.), *Williams Obstetrics*, 21st ed., McGraw-Hill, pp. 251-290, 2001.
8. Cunningham FG, Gant NF, Leveno KJ, et al: Preterm birth. In: *Williams Obstetrics*, 21st ed., McGraw-Hill, pp. 689-727, 2001.
9. Greybush M, Singleton C, Atlas Ro, et al: Preinduction cervical ripening techniques compared. *J Reprod Med* Jan; 46(1): 7-11, 2001.
10. Helmin J, Moller B: Extraamniotic saline infusion is promising in preparing the cervix for induction of labor. *Acta Obstet Gynecol Scand* Jan ; 77(1): 45-9, 1998.
11. Kiss H, Ahner R, Hohlagschwandtner M, et al: Fetal fibronectin as a predictor of term labor: a literature review. *Acta Obstet Gynecol Scand* Jan; 79(1)3-7, 2000.
12. Roztocil A, Pila BK, Jelinek J, et al: A comparison of three preinduction cervical priming methods: prostaglandin E2 gel, Dilapan S rods and Estradiol gel. *Ceska Gynecol* Feb; 63(1): 3-9, 1998.
13. Mullin PM, House M, Paule RH, et al: A comparison of vaginally administered misoprostol with extra-amniotic saline solution infusion for cervical ripening and labor induction. *Am J Obstet Gynecol* Oct; 187(4): 847-52, 2002.
14. Sciscione AC, Mccullough H, Manley JS, et al: A prospective, randomized comparison of Foley catheter insertion versus intracervical prostaglandin E2 gel for preinduction cervical ripening. *Am J Obstet Gynecol* Jan; 180(1pt1): 55-60, 1999.
15. Sciscione AC, Muench M, Pollock M, et al: Transcervical Foley catheter for preinduction cervical ripening in an outpatient versus inpatient setting. *Obstet Gynecol* Nov; 98(5pt): 751-6, 2001.
16. Shreman DJ, Frenkel E, Pansky M, et al: Balloon cervical ripening with extra-amniotic infusion of saline or prostaglandin E2: a double-blind, randomized controlled study. *Obstet Gynecol* Mar; 97(3): 375-80, 2001.
17. Sherman DJ, Frenkel E, Tovbin J, et al: Ripening of the unfavorable cervix with extraamniotic catheter balloon: clinical experience and review. *Obstet Gynecol Surv* Oct; 51(10):621-7, 1996.
18. Summers L: Methods of cervical ripening and labor induction. *J Nurse Midwifery* Mar-Apr, 42(2): 71-85, 1997.