Effect of Umbilical Vein Oxytocin Injection on the Third Stage of Labor : A Randomized Controlled Study

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Abstract

To evaluate the effect of umbilical vein oxytocin injection on the duration of third stage of labor, and estimated blood loss within 24 hours postpartum, in 50 vaginal parturients at Rajavithi Hospital from March 1, 1994 and June 30, 1995. The parturients were randomized to administered either an umbilical vein injection of 20 units of oxytocin diluted to 20 ml with normal saline (oxytocin group) or only normal saline 20 ml (control group) immediately after cord clamping. There were 25 paturients in each group. The duration of the third stage of labor in the oxytocin group was significantly shorter than that in the control group. In only 1 case of the control group was manual placental removal performed. The estimated blood loss within 24 hours postpartum in both groups was not statistically different. Twenty units of umbilical vein oxytocin injection was effective to shorten the duration of the third stage of labor but were not effective to reduce the estimated blood loss within 24 hours postpartum. The need for a further large scale study in the future was suggested.

Postpartum hemorrhage was the most common cause of serious hemorrhage in obstetrics[1]. A retained placenta is usually diagnosed when the duration of the third stage of labor exceeds 30 minutes[1,2]. The prolonged third stage more than 30 minutes, should be associated with postpartum hemorrhage, puerperal infection[1]. Dombrowski et al reported that the frequency of postpartum hemorrhage increased when the duration of the third stage was beyond 10 minutes and peaked by 40 minutes regardless of gestational age[2]. They thought that this might be because manual placental removal was accomplished for those patients with active uterine bleeding, although manual removal per se might increase blood loss in some cases[2].

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Reddy et al[3] reported the oxytocin (20 unit) injection into the umbilical vein immediately after cord clamping, reduced the third stage and blood loss significantly. Ozcan et al[4] reported that administration of diluted oxytocin or saline intraumbilically did not seen to have any superiority to the traditional management of the third stage of labor. The objective of our double blind placebo controlled, randomized study was to examine the effect of umbilical vein oxytocin injection on the duration of third stage, and estimated blood loss for 24 hours postpartum.

METERIAL AND METHOD

Parturients delivered at Rajavithi Hospital between March 1, 1994 and June 30, 1995 who had the following criteria for enrollment : (1) vaginal delivery, (2) no antenatal complications, (3) no oxytocin or methylergonovine injection before placental delivery and (4) no history of oxytocin allergy. After written informed consent was obtained by our nurse, one of two envelopes was randomly selected, number I representing control group and number II, oxytocin group.

Immediately after umbilical cord clamping, we injected only normal saline solution 20 ml into the umbilical vein of the control group but injected oxytocin 20 unit (2 ml) plus normal saline solution 18 ml into those of the oxytocin group. Both the patients and the staff were blinded to the type of injected solution.

We calculated the sample size by using the formula[5].

$$N = \frac{2\delta^2 (Z_{1-\alpha} + Z_{1-\beta})^2}{M_c - M_t}$$

N = Number of appropriate sample in each group

δ = Standard deviation in control group

$Z_{(1-\alpha)}$ = Standard value from Table Z at the 95% confidence level = 1.64

$Z_{(1-\beta)}$ = Standard value from Table Z at 90% power of test = 1.28

M_c = Mean of the duration of the third stage of labor in control group

M_t = Mean of the duration of the third stage of labor in the oxytocin group

From the literature review, we found no previous study like our study, so we used all the data of Reddy et al[3].

Table 1. Obstetrical characteristics.

Date	grl (N=25)	gr2 (N=25)	P-value
Gravida			
Primigravida	8 (32%)	12 (48%)	0.38*
Multigravida	17 (68%)	13 (52%)	
Parity			
Nulliparous	11 (44%)	14 (56%)	0.57*
Parous	14 (56%)	11 (44%)	
Type of delivery			
Spontaneous	25 (100%)	23 (92%)	0.47*
Forceps extraction	0	2 (8%)	-**
Age (yr±S.D.)	26.3±3.9	24±5.2	0.08***
Gestational age (wk±SD.)	38.9±1.9	38.7±1.8	0.65***
Duration of 2nd stage (min±SD.)	24.9±20.5	24.3±25.4	0.91***
Birth weight (g±SD.)	3,066±364	3,030±430	0.75***
Placental weight (g±SD.)	598±65	582±110	0.54***

grl = Control group (Normal saline only injection group)
gr2 = Oxytocin group (Oxytocin and normal saline injection group)
* = Not significant by x^2-test P>0.05
** = Can't be evaluated because one or both sample size are zero
*** = Not significant by unpaired *t*-test P>0.05

$$M_c = 9.4 \text{ min } (+ 5.8)$$
$$M_t = 4.1 \text{ min } (+ 2.4)$$
$$\delta = 5.8 \text{ min}$$
$$N = \frac{2\,[(1.64+1.28)\,5.8]^2}{(9.4-4.1)^2}$$
$$= 20.4 \text{ case}$$

We decided to collect 20 per cent more than the calculated mumber for some error. The total number in each group was 25 cases.

Statistical Analysis

The data was analysed using Chi-square test (X^2), unpaired *t*-test, arithmetic mean and standard deviation. The level of statistical significance was noted at ($P<0.05$) All data was collected and analysed by using the computer program SPSS/PC+T and Epi Info.

RESULTS

Obstetrical characteristics of the women are shown in Table 1. We allocated 25 cases at random to the oxytocin group and the other 25 cases to the control group. Both groups were similar in all parameters except 2 cases of forceps extractions in the oxytocin group. We had no case delivered by vacuum extraction.

Table 2 shows the duration of the third stage of labor. Mean duration of the third stage in the oxytocin group was significantly shorter than that in the control group.

Estimated blood loss within 24 hours postpartum is shown in Table 3 and was found not significantly different in both groups. Manual placental removal was done only in 1 case of the control group.

Table 2. The duration of the third stage of labor.

Duration of the third stage (minutes)	gr1 (N=25)	gr2 (N=25)
< 5	-	20
5 - 9	15	5
10 - 14	8	-
15 - 19	1	-
20 - 24	-	-
25 - 29	-	-
> 30	1	-
Total	25	25
X±SD.	10.1±4.8	3.6±1.4

Statistically significant by unpaired *t*-test P=0.000005

Table 3. Estimated blood loss within 24 hours postpartum

Estimated blood loss (ml)	gr1 (N=25)	gr2 (N=25)
<100	-	-
100-199	6	9
200-299	10	10
300-399	6	6
400-499	2	-
>500	1	-
Total	25	25
X±SD.	241.4±108.2	203.2±76.9

Not significant by unpaired *t*-test P=0.14

DISCUSSION

Our experimental study was randomized in case sampling because the obstetrical characteristic data had almost no significant difference except only 2 cases of forceps extraction in the oxytocin group. There were two previous studies that injected oxytocin compared with normal saline into the umbilical vein. Bider et al[6] injected 20 ml, 30 ml, 40 ml of saline solution or oxytocin 10 unit in 20 ml saline solution or oxytocin 10 unit in 40 ml saline into the umbilical veins, 30 Seconds after cord clamping. Ozcan et al[4] injected 20 unit of oxytocin diluted to 40 ml with saline or 20 ml saline only into the umbilical vein immediately after cord clamping or 5 units of oxytocin intramuscular after placental expulsion.

Reddy et al[3] injected 20 units of oxytocin diluted in 30 ml of saline into the umbilical vein and another 20 units in 1,000 ml of lactated Ringer solution intravenously (125 ml/hour) in the second litre of intravenous fluid after delivery of the placenta for a of total 40 units of oxytocin in group 1. In group 2, patients received a total of 40 units of oxytocin in 2,000 ml of lactated Ringer solution intravenously at 125 ml/h only. Porter et al[7] injected 20 units of oxytocin diluted in 20 ml of saline into the umbilical vein in group 1 and gave 20 units of oxytocin by intravenous infusion at a rate of 125 ml/h in group 2.

The mean duration of the third stage in our study was significantly shorter than those of the control group like the study of Reddy et al[3] but the other study[4,6-16] had the opposite result. Combs and Laros[17] investigated the relation between third stage duration and hemorrhage and concluded that several measures of hemorrhage increased with third stage nearing 30 minutes or longer so, these significant differences on third-stage duration might be useless because both values 3.6 min in the oxytocin group and 10.1 min in the control group were quite different from the cut-off limit (30 min). The duration before injection of oxytocin into the umbilical vein varied from 1 to 60 minutes[7-16] of the retained placenta after the end of the second stage. The estimated blood loss within 24 hours postpartum in our study was found to show no significant difference in both groups. Only Reddy et al[3] and Porter et al[7] reported significant reduction of postpartum hematocrit decrease in oxytocin umbilical vein injection group.

Ozcan et al[4] whose study design was similar to our study found there was no significant difference in terms of the duration of the third stage, the blood loss in the third stage and post-partum hematocrit differences among the 3 groups. Because of the additional group in the study of Ozcan et al[4] may effect the different results about the mean duration of the third stage.

In our study we had only 1 case of manual placental removal in the control group, so we could not evaluate the statistical difference because of the very low cases. Collecting some more samples was suggested to find more manual removal of placental cases. In the other studies, there was no reported significant difference in manual placental removal rate between the groups[10,11,15,16].

The results of this study imply that 20 units of umbilical vein oxytocin injection should be a choice to shorten the third stage of labor for prevention of immediate postpartum hemorrhage.

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REFERENCES

1. Cunningham FG, MacDonald PC, Gant NF, Leveno KJ, Gilstrap LC. Williams Obstetrics 19th ed. East Norwalk : Appleton & Lange, 1993: 615-25.
2. Dombrowski MP, Bottoms SF, Saleh AA, Hurd WW, Romero R. Third stage of labor : analysis of duration and clinical practice. Am J Obstet Gynecol 1995; 172: 1279-84.
3. Reddy VV, Carey JC. Effect of umbilical vein oxytocin on puerperal blood loss and length of the third stage of labor. Am J Obstet Gynecol 1989; 160: 206-8.
4. Ozcan T, Sahin G, Senoz S. The effect of intra-umbilical oxytocin on the third stage of labor. Aust NZJ Obstet Gynaecol 1996; 36: 9-11.
5. Lemeshow S, Hosmer Jr DW, Klar J. Adequacy of sample size in health studies. Chichester : John Wiley & Sons, 1990: 36-40.
6. Bider D, Zolti M, Menashe Y, Dulitzky M, Maschiach S, BenRafael Z. Oxytocin or saline injected intra-umbilically did not influence the third stage of labour. Acta Obstet Gynecol Scand 1991; 70: 321-3.
7. Porter KB, O'Brien WF, Collins MK, Givens P, Knuppel R, Bruskivage L. A randomized comparison of umbilical vein and intravenous oxytocin during the puerperium. Obstet Gynecol 1991; 78: 254-6.
8. Golan A, Lidor AL, Wexler S, David MP. A new method for the management of the retained placenta. Am J Obstet Gynecol 1983; 146: 708-9.
9. Heinonen PK, Pihkala H. Pharmacologic management and controlled cord traction in the third stage of labor. Ann Chir Gynaecol (Suppl) 1985; 197: 31-5.
10. Hauksson A. Oxytocin injection into the umbilical vein in women with retained placenta : a questionable method. Am J Obstet Gynecol 1986; 155: 1140.
11. Kristiansen F, Frost L, Kasperson P, Moller BR. The effect of oxytocin injection into the umbilical vein for the management of the retained placenta. Am J Obstet Gynecol 1987; 156: 979-80.
12. Chestnut DH, Wilcox LL. Influence of umbilical vein administration of oxytocin on the third stage of labor : a randomized, double-blind, placebo-controlled study. Am J Obstet Gynecol 1987; 157: 160-2.
13. Young SB, Martelly PD, Greb L, Considine G,

Coustan DR. The effect of intraumbilical oxytocin on the third stage of labor. Obstet Gynecol 1988; 71: 736-8.
14. Wilken-Jenson C, Strom V, Nielsen MD, Rosenkild EB. Removing a retained placenta by oxytocin, a controlled study. Am J Obstet Gynecol 1989; 161: 155-6.
15. Huber MGP, Wildschut HIJ, Boer K, Kleiverda G, Hock FJ. Umbilical vein administration of oxytocin for the management of retained placenta is it effective ? Am J Obstet Gynecol 1991; 164: 1216-9.
16. Makkonen M, Suomo S, Saarikoski S. Intraumbilical oxytocin for management of retained placenta. Int J Gynecol Obstet 1995; 48: 169-72.
17. Combs CA, Laros RK. Prolonged third stage of labor : morbidity and risk factors. Obstet Gynecol 1991; 77: 863-7.

ผลของการฉีดออกซิโทซินเข้าทางหลอดเลือดดำของสายสะดือที่มีต่อระยะที่สามของการคลอด

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การศึกษาเพื่อเปรียบเทียบผลของการฉีดออกซิโทซินเข้าทางหลอดเลือดดำของสายสะดือต่อระยะที่สามของการคลอด และปริมาณการเสียเลือด ภายใน 24 ชั่วโมงแรกหลังคลอด ในมารดาที่คลอดบุตรทางช่องคลอด 50 ราย ที่คลอดในโรงพยาบาลราชวิถี ตั้งแต่ 1 มีนาคม 2537 ถึง 30 มิถุนายน 2538 โดยแบ่งมารดาเป็น 2 กลุ่มๆละ 25 คน โดยวิธีการสุ่มโดยกลุ่มแรกเป็นกลุ่มทดลอง จะได้รับออกซิโทซิน 20 ยูนิต ผสมกับน้ำเกลือนอร์มัล 0.9% รวมเป็น 20 มิลลิลิตร กลุ่มที่ 2 เป็นกลุ่มควบคุม จะได้รับแต่น้ำเกลือนอร์มัล 0.9% จำนวน 20 มิลลิลิตร โดยทั้งสองกลุ่มฉีดเข้าทางหลอดเลือดดำของสายสะดือทันทีหลังจากที่หนีบสายสะดือ ผลของการศึกษาพบว่า ระยะที่สามของการคลอดเฉลี่ยในกลุ่มทดลองสั้นกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ โดยมีเพียง 1 รายในกลุ่มควบคุมที่ต้องทำการล้วงรก ส่วนปริมาณการเสียเลือดภายใน 24 ชั่วโมงแรกหลังคลอดไม่มีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ การให้ออกซิโทซิน 20 ยูนิต ทางหลอดเลือดของสายสะดือสามารถลดระยะที่สามของการคลอดโดยไม่สามารถลดปริมาณการเสียเลือดภายใน 24 ชั่วโมงแรกหลังคลอด

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