Journal of Hainan Medical University

http://www.jhmuweb.net/

Prevention effect of hemabate on postpartum hemorrhage caused by uterine inertia

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ARTICLE INFO

Article history:
Received
Received in revised form
Accepted
Available online

Keywords:
Hemabate
Oxytocin
Uterine inertia
Postpartum hemorrhage
Prevention

ABSTRACT

Objective: To explore the prevention effect of hemabate on postpartum hemorrhage caused by uterine inertia. **Methods:** A total of 200 puerpera with single full-term delivery who were admitted in our hospital from May, 2015 to May, 2016 were included in the study and divided into vaginal delivery group and cesarean section with 100 cases in each group according to the delivery modes. According to the medication methods, each group was divided into hemabate group and oxytocin with 50 cases in each group. The puerpera in the hemabate group were given deep intramuscular injection of hemabate (250 μg) after fetus delivery, and the injection interval and dosage were adjusted according to the condition, with the maximum dose not exceeding than 2 mg. The puerpera in the oxytocin group were given oxytocin (10 U) and 0.9% NaCl after fetus delivery, iv drip, for 2 h. The amount of bleeding during delivery, 2 h and 24 h after delivery in each group was observed. A volume of 3 mL elbow venous blood before delivery and 24 h after delivery was extracted. The full automatic blood cell analyzer was used to detect 24 h hemoglobin decrease value in each group. The coagulation detector was used to detect the change of coagulation function (PT, APTT, and FIB) before delivery and 24 h after delivery. The blood pressure and heart rate in each group were observed. **Results:** The amount of bleeding during delivery, 2 h and 24 h after delivery in hemabate group was significantly less than that in oxytocin group (P<0.05). The hemoglobin decrease values 24 h after delivery in hemabate group with vaginal delivery and cesarean section were significantly lower than those in oxytocin group (P<0.05). The coagulation function indicators 24 h after delivery in each group were not significantly changed (P>0.05). The heart rate and blood pressure after medication in each group were not significantly different from those before medication, and the difference between the two groups was not statistically significant (P>0.05). **Conclusions:** Hemabate can effective prevent the postpartum hemorrhage caused by uterine inertia, significantly superior to that by oxytocin. It is safe and effective in application of vaginal delivery and cesarean section; therefore, it deserves to be widely recommended in the clinic.

1. Introduction

The postpartum hemorrhage refers to that the vaginal amount of bleed is greater than 500 mL 24 h after fetus delivery, is a common delivery complication, and ranks the first reason for the death in puerpera[1]. Uterine inertia, abnormal coagulation function, soft birth canal injury, and placental factor can cause postpartum hemorrhage, among which 75%-90% postpartum hemorrhage is caused by uterine inertia; therefore, positive prevention of uterine inertia after delivery is key to reduce the postpartum hemorrhage and death[2]. Currently, drug is preferred in the treatment of postpartum hemorrhage caused by uterine inertia. It is reported that the preventive medication after delivery and before bleeding can achieve a favorable effect, which can avoid the reduced drug sensitivity due to uterine hypoxia caused by postpartum hemorrhage[3]. Hemabate,

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Foundation project: The study was supported by the Scientific and Technological Support Project in Jiangsu Province with the number of 1402000320A2006.

a derivative of PGF2 , can cause the uterine rhythmic contraction. In recent years, it is reported that application of hemabate after delivery can prevent the postpartum hemorrhage[4]. The study is aimed to explore the prevention effect of hemabate on postpartum hemorrhage caused by uterine inertia.

2. Materials and methods

2.1. General materials

A total of 200 puerpera with single full-term delivery who were admitted in our hospital from May, 2015 to May, 2016 were included in the study, aged from 24 to 38 years old, with an average age of (27.5±4.2) years old; gestational week from 38 to 43 weeks, with an average of (39.7±1.4) weeks, and were divided into vaginal delivery group and cesarean section with 100 cases in each group according to the delivery modes. According to the medication methods, each group was divided into hemabate group and oxytocin with 50 cases in each group. All the puerpera accepted the treatments. Exclusion criteria were as follows: (1) those who postpartum hemorrhage were caused by placental factor, soft birth canal injury, and coagulation dysfunction; (2) those who had abnormal liver and renal function; (3) those who were allergic to related drugs. The difference of gender, age, and gestational weeks among each group was not statistically significant (P>0.05).

2.2. Methods

The puerpera in the hemabate group were given deep intramuscular injection of hemabate (250 μg) after fetus delivery, and the injection interval and dosage were adjusted according to the condition, with the maximum dose not exceeding than 2 mg. The puerpera in the oxytocin group were given oxytocin (10 U) and 0.9% NaCl after fetus delivery, ivdrip, for 2 h.

2.3. Observation indicators

The amount of bleeding during delivery, 2 h and 24 h after delivery in each group was observed. The amount of bleeding collection methods were listed in the following: (1) volume method: after fetus delivery, a blood collection container was placed under the buttocks of the puerpera to collect the vaginal bleed which was then poured into the measuring cup to measure the blood loss volume; (2) weighing method: the conversion was performed according to the blood specific gravity. Blood loss volume=(weight dressing weight-dry dressing weight)/1.05. A volume of 3mL elbow venous blood before delivery and 24 h after delivery was extracted. The full automatic blood cell analyzer was used to detect 24 h hemoglobin decrease value in each group. The coagulation detector was used to detect the change of coagulation function (PT, APTT, and FIB) before delivery and 24 h after delivery. The blood pressure and heart rate in each group were observed.

2.4. Statistical analysis

SPSS 18.0 software was used for the statistical analysis. The measurement data were expressed as mean±SD, and t test was used. Chi-square test was used for the enumeration data. P<0.05 was regarded as statistically significant difference.

3. Results

3.1. Comparison of amount of bleeding after delivery among each group

The amount of bleeding during delivery, 2 h and 24 h after delivery in hemabate group was significantly less than that in oxytocin group (P<0.05). The amount of bleeding during delivery, and 24 h after delivery in vaginal delivery group was less than that in cesarean section group, but the difference was not statistically significant (P>0.05) (Table 1).

3.2. Comparison of hemoglobin decrease values 24 h after delivery among each group

The hemoglobin decrease values 24 h after delivery in hemabate group with vaginal delivery and cesarean section (13.1±6.8 and 13.2±7.1) were significantly lower than those in oxytocin group (21.6±4.9 and 27.4±4.3) (P<0.05).

3.3. Comparison of coagulation function before delivery and 24 h after delivery among each group

The difference of PT, APTT, and FIB before delivery and 24 h after

Table 1
Comparison of amount of bleeding after delivery among each group (mL, mean±SD).

Groups		n	During delivery	2 h after delivery	24 h after delivery
Vaginal delivery	Hemabate group	50	98.8±49.2*	49.8±17.6*	218.4±41.5*
	Oxytocin group	50	219.6±149.8	92.3±23.5	392.6±67.5
Cesarean section	Hemabate group	50	102.4±23.5*	47.4±21.2*	220.6±53.3*
	Oxytocin group	50	259.7±138.9	89.3±36.5	419.6±76.4

*P<0.05, when compared with oxytocin group.

delivery among each group was not statistically significant (P>0.05) (Table 2).

3.4. Comparison of heart rate and blood pressure after delivery among each group

The heart rate and blood pressure after medication in each group were not significantly different from those before medication (P>0.05), and the difference between the two groups was not statistically significant (P>0.05) (Table 3).

4. Discussion

The postpartum hemorrhage is a severe complication during the delivery, among which uterine inertia is a common reason for developing postpartum hemorrhage[5]. The postpartum hemorrhage can cause uterine ischemia and hypoxia to reduce the drug sensitivity, which can affect the therapeutic effect to a certain degree; therefore, preventive application of oxytocic drugs before the occurrence of bleeding after delivery can achieve a better effect[6].

Oxytocin is traditionally applied in the treatment of postpartum hemorrhage caused by uterine inertia to promote the uterine contraction and prevent the bleeding, with different prevention effects due to different sensitivity to oxytocin[7]. Oxytocin is characterized by rapid effect taking and small adverse reactions, but its half-life period is short, with action time only of 1-6 min, and depends oxytocin receptors to plays its role, with a receptor saturation. When the receptors are saturated, the increased oxytocin dosage will not increase the uterine contraction effect, but will increase the occurrence of adverse reactions[8]. Some researches demonstrate that the daily dosage of oxytocin should not exceed than 60 U. The excessive dosage can probably induce coronary ischemia, blood pressure elevation, pulse acceleration, and water intoxication; therefore, the recommended daily oxytocin dosage in the clinic should be controlled at 60-80U[9,10].

Hemabate, a strong effective contraction agent, natural PGF2 synthetic analogue, can combine with the oxytocin receptors on the uterine smooth muscle to cause uterine rhythmic contraction, which can increase the uterine contraction frequency and tension[11]. In a non-pregnancy state, the content of uterine oxytocin receptors is low, is gradually increased with the gestational weeks, and reaches peak when delivery; therefore, hemabate has a strong contraction effect on the uterus during pregnancy and delivery, while nearly has no contraction effect on the non-pregnancy uterus[12,13]. Hemabate has a rapid effect taking, and can take effect 3min after medication, with effect taking reaching peak after 30 min, and lasting for 120 min with intramuscular injection; therefore, hemabate can preferably prevent the occurrence of postpartum hemorrhage after delivery[14,15].

The results in the study showed that the amount of bleeding during delivery, 2 h and 24 h after delivery in hemabate group was significantly less than that in oxytocin group (P<0.05), indicating that hemabate has a similar pharmacological action with oxytocin released by the posterior pituitary, both of which can cause uterine rhythmic contraction to increase the contraction frequency and tension, but its clinical effect is significantly superior to that by oxytocin. It is reported that hemabate can increase the uterine contraction frequency, range, and tension, which is significantly superior to that by oxytocin; therefore, hemabate can effectively reduce the postpartum amount of bleeding[4]. The results in the study showed that the hemoglobin decrease values 24 h after delivery in hemabate group with vaginal delivery and cesarean section were significantly lower than those in oxytocin group (P<0.05), indicating that hemabate has effects of rapid effect taking and long action time. The results in the study showed that the coagulation function indicators 24 h after delivery in each group were not significantly changed (P>0.05); the heart rate and blood pressure after medication in each group were not significantly different from those before medication (P>0.05), suggesting that within the effective range, hemabate will not affect 24 h coagulation function indicators, heart

Table 2
Comparison of coagulation function before delivery and 24 h after delivery among each group (n=50, mean±SD).

Groups		PT (s)		APTT (s)		FIB (g/L)	
		Before delivery	24 h after delivery	Before delivery	24 h after delivery	Before delivery	24 h after delivery
Vaginal delivery	Hemabate group	11.4±0.4	11.5±0.5	27.7±3.4	27.5±3.5	458.4±37.6	457.4±36.9
	Oxytocin group	11.5±0.3	11.5±0.4	27.4±3.7	27.5±3.6	457.7±38.2	456.8±39.8
Cesarean section	Hemabate group	11.6±0.4	11.7±0.2	27.8±4.1	27.6±4.0	457.3±41.2	456.6±40.8
	Oxytocin group	11.5±0.5	11.6±0.4	27.5±3.2	27.6±3.7	456.8±42.6	458.3±38.9

Table 3
Comparison of heart rate and blood pressure after delivery among each group (n=50, mean±SD).

Groups		Hear rate (times/min)		SBP (mmHg)		DBP (mmHg)	
		Before medication	After medication	Before medication	After medication	Before medication	After medication
Vaginal delivery	Hemabate group	74.6±3.8	75.7±5.1*	117.3±10.4	109.7±12.5*	76.7±8.5	77.4±9.3
	Oxytocin group	73.8±4.2	74.5±4.6	113.7±12.3	115.2±10.7	77.8±9.2	76.9±10.7*
Cesarean section	Hemabate group	76.1±3.7	75.3±3.9*	115.6±11.4	117.3±10.2*	79.6±7.6	78.5±9.3*
	Oxytocin group	75.4±5.3	76.2±3.5	116.5±11.8	115.8±11.1	78.6±8.2	77.9±10.5

*P>0.05, when compared with the oxytocin group.

rate, and blood pressure.

In conclusion, Hemabate can effective prevent the postpartum hemorrhage caused by uterine inertia, significantly superior to that by oxytocin, and is safe and effective in application of vaginal delivery and cesarean section; therefore, it deserves to be widely recommended in the clinic.

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