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Observation on the effect of carbetocin in preventing postpartum hemorrhage caused by uterine inertia

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ABSTRACT

Objective: To explore the effect of carbetocin in preventing postpartum hemorrhage caused by uterine inertia. **Methods:** A total of 256 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 the vaginal delivery group and cesarean section group with 128 cases in each group according to the delivery ways. According to the medication, each group was divided into the carbetocin group and oxytocin group with 64 cases in each group. After fetus delivery, the puerpera in the carbetocin group were given intravenous injection of carbetocin (100 μg), while the puerpera in the oxytocin group were given intravenous injection of oxytocin (10 U)+0.9% NaCl (500 mL) for 2 h. The amount of bleeding at delivery, 2 h and 24 h after delivery in each group was observed. A volume of 5 mL elbow venous blood before delivery and 24 h after delivery was extracted. The automatic blood cell analyzer was used to detect the decreased value of 24 h hemoglobin in each group. The coagulation detector was used to detect PT, APTT, and FIB before delivery and 24 h after delivery. The blood pressure and heart rate before and after medication in each group were observed. **Results:** The amount of bleeding at delivery, 2 h and 24 h after delivery in the carbetocin group was significantly less than that in the oxytocin group (P<0.05). The decreased value of 24 h hemoglobin after delivery in the carbetocin group was significantly less than that in the oxytocin group (P<0.05). The indicators of coagulation function 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 changed when compared with before medication (P>0.05). **Conclusions:** Carbetocin can effectively prevent the postpartum hemorrhage caused by uterine inertia, and 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 bleeding was greater than 500 mL 24 h after fetus delivery, and is a main reason for causing maternal death[1]. According to the statistics, 75%–90% postpartum hemorrhage is caused by the uterine inertia; therefore, positive prevention of uterine inertia after delivery is key to reduce the postpartum hemorrhage[2]. Currently, medication is the first choice for the treatment of postpartum hemorrhage caused by uterine inertia. It is reported that preventive medication before bleeding after delivery can achieve a favorable effect to avoid the reduced sensitivity to the drugs due to the uterine anoxia after hemorrhage, which can affect the therapeutic effect[3]. Carbetocin contains the long-acting oxytocin for the synthesis of agnoists, and can cause rhythmic contraction of uterus. In recent years, application of carbetocin after delivery in preventing the postpartum hemorrhage has been reported[4]. The study was aimed to explore the effect of carbetocin in preventing postpartum hemorrhage caused by uterine inertia.

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2. Materials and methods

2.1. General materials

A total of 256 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; gestational week from 38 to 43 weeks, with an average of (39.7±1.4) weeks. The puerpera were divided into the vaginal delivery group and the cesarean section group with 128 cases in each group according to the delivery ways. According to the medication, each group was divided into the carbetocin group and oxytocin group with 64 cases in each group. All the puerpera were wiling to accept the treatments. Exclusion criteria: (1) those who had placental factors, coagulation dysfunction, soft birth canal injury, and hepatic and renal dysfunction; (2) those who were allergic to related drugs. The comparison of age, gender, and gestational week among each group was not statistically significant (P>0.05).

2.2. Methods

After fetus delivery, the puerpera in the carbetocin group were given intravenous injection of carbetocin (100 μg), while the puerpera in the oxytocin group were given intravenous injection of oxytocin (10 U)+0.9% NaCl (500 mL) for 2 h.

2.3. Observation indicators

The amount of bleeding at delivery, 2 h and 24 h after delivery in each group was observed. The amount of bleeding collection methods were in the following: (1) volume method: after fetus delivery, the blood receiver was placed under the buttocks to collect the vaginal blood which was poured into the measuring glass to measure the blood loss volume; (2) weighing method: according to the blood proportion of 1.05 g=1 mL, the blood loss volume was calculated, i.e. (wet dressing weight−dry dressing weight)/10.5 = blood loss volume. A volume of 5 mL elbow venous blood before delivery and 24 h after delivery was extracted. The automatic blood cell analyzer was used to detect the decreased value of 24 h hemoglobin in each group. The coagulation detector was used to detect PT, APTT, and FIB before delivery and 24 h after delivery. The blood pressure and heart rate before and after medication 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.

3. Results

3.1. Comparison of amount of bleeding in different time after delivery among groups

The amount of bleeding at delivery, 2 h and 24 h after delivery in the carbetocin group was significantly less than that in the oxytocin group (P<0.05) (Table 1).

3.2. Comparison of the decreased value of 24 h hemoglobin after delivery among groups

The decreased value of 24 h hemoglobin after delivery in the carbetocin group was significantly less than that in the oxytocin group (P<0.05) (Table 2).

Table 2

Comparison of the decreased value of 24 h hemoglobin after delivery among groups (g/L, n=64, $\bar{x}\pm s$).

Groups	Decreased value of 24 h hemoglobin	
	Vaginal delivery	Cesarean section
Carbetocin group	13.1±6.8*	13.2±7.1*
Oxytocin group	21.6±4.9	27.4±4.3

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

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

The comparison of PT, APTT, and FIB before delivery between the two groups was not statistically significant (P>0.05). The indicators of coagulation function 24 h after delivery in each group were not

Table 1

Comparison of amount of bleeding in different time after delivery among groups (mL, n=64, $\bar{x}\pm s$).

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

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

significantly changed (P>0.05) (Table 3).

3.4. Comparison of the heart rate and blood pressure before and after medication among groups

The comparison of HR, SBP, and DBP before medication among each group was not statistically significant (P>0.05). HR, SBP, and DBP after medication in the two groups were slightly fluctuated, but were not significantly different from those before medication (P>0.05) (Table 4).

4. Discussion

The postpartum hemorrhage is a severe complication during the delivery, while uterine inertia is the most common reason[5]. After the postpartum hemorrhage, the drug sensitivity is reduced due to the ischemia and hypoxia, which can affect the therapeutic effect to a certain degree; therefore, preventive application of contraction agents before bleeding and after delivery can achieve a preferable effect[6].

Traditionally, oxytocin is involved in the treatment of postpartum hemorrhage caused by uterine inertia to promote the uterine contraction in order to prevent bleeding which can achieve different effects due to different sensitivity to oxytocin[7]. Oxytocin is characterized by rapid effect initiating and less adverse reactions, but its half-life period is short, with action time as only 1–6 min, whose action depends on its receptors which can be saturated. When oxytocin reaches a saturation state, the additional dosage can not increase the contraction intensity, but will increase the adverse reactions[8]. Some researches demonstrate that the daily dosage of oxytocin should not exceed 60 U. The excessive oxytocin can induce coronary ischemia, pulse acceleration, blood pressure elevation, and water retention; therefore, it is recommended the daily dosage of oxytocin should be controlled between 60–80 U in the clinic[9,10].

Carbetocin contains the long-acting oxytocin for the synthesis of agnoists, can combine with its receptors to cause rhythmic contraction of uterus, and increase the contraction frequency and tension[11]. It is reported that in a state of non-pregnancy, the oxytocin receptors are few. With the increasing of gestational week, the oxytocin receptor level is gradually increasing, and reaches the peak during delivery; therefore, carbetocin has a strong contraction effect on the uterus during the pregnancy period and at delivery, but has no contraction on the non-pregnancy uterus[12,13]. Carbetocin has a rapid effect taking, and can take effect 2 min after medication, with a long half-lifer period which can last for 60 min by intravenous injection, and can last for 120 min by intramuscular injection; therefore, it can better prevent the occurrence of postpartum hemorrhage after delivery[14,15].

The results in the study showed that the amount of bleeding at delivery, 2 h and 24 h after delivery in the carbetocin group was significantly less than that in the oxytocin group (P<0.05), indicating that carbetocin has a similar pharmacological effect with oxytocin, can cause the rhythmic contraction, and increase the contraction frequency and tension, with a significant clinical effect superior to that by oxytocin. It is reported that carbetocin can increase the contraction frequency, range, and tension, with a significant effect superior to that by oxytocin, and can effectively reduce the amount of bleeding after delivery[16]. The results in the study showed that the decreased value of 24 h hemoglobin after delivery in the carbetocin group was significantly less than that in the oxytocin group (P<0.05), indicating that carbetocin has advantages of rapid effect taking and long action time. The results in the study showed that the indicators of coagulation function 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 changed when compared with before medication (P>0.05), indicating that within

Table 3

Comparison of coagulation function before delivery and 24 h after delivery among groups (n=64, $\bar{x}\pm s$).

Delivery	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	Carbetocin 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	Carbetocin group	11.6±0.4	11.7±0.2	27.8±4.1	27.6±4.0	457.3±41.2	457.6±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 4

Comparison of the heart rate and blood pressure before and after medication among groups (n=64, $\bar{x}\pm s$).

Delivery	Groups	HR (times/min)		SBP (mmHg)		DBP (mmHg)	
		Before medication	After medication	Before medication	After medication	Before medication	After medication
Vaginal delivery	Carbetocin 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	Carbetocin 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

the effective range, carbetocin can not affect 24 h coagulation function, heart rate, and blood pressure.

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

References

[1] Yan JY, Huang KH, Liu QM, et al. Study on the clinical value of risk factors and high-risk rating system of postpartum hemorrhage. *Chin J Pract Gynecol Obstetr* 2014; **30**(10): 791-797.

[2] Lan JJ, Zhong XP, Wu FY, et al. Clinical study on carprost joint or separate with oxytocin to prevent postpartum hemorrhage. *Pract Pharm Clin Remed* 2014; **17**(1): 106-108.

[3] Feng SQ. Treatment progress of postpartum hemorrhage caused by uterine inertia. *Youjiang Med J* 2014; **42**(3): 375-377.

[4] Li GL. Clinical observation on the effect of carbetocin in preventing the postpartum hemorrhage caused by uterine inertia. *Chin J Infect Control* 2014; **29**(2): 237.

[5] Zhang FL, Xu YL, Liu XH, et al. Clinical analysis of the reason and related risk factors of postpartum hemorrhage in 135 cases. *J Pract Obstetr Gynecol* 2014; **30**(2): 144-146.

[6] Zhang L, Yang J. Effect analysis of misoprostol in combined with oxytocin in preventing the postpartum hemorrhage. *China Modern Med* 2015; **22**(35): 97-99.

[7] Yang X. Effect of lenonurus injection in combined with oxytocin on the third labor stage and postpartum hemorrhage. *J Changchun Univ Tradit Chin Med* 2016; **32**(2): 365-366.

[8] Xiong CM. Comparison of the efficacy of oxytocin in different types in preventing the postpartum hemorrhage after cesarean section. *J Clin Med Literat* 2015; **2**(3): 469-470.

[9] Pan FY. Effect analysis of oxytocin in different dosages in preventing the postpartum hemorrhage. *J Bethune Milit Med Coll* 2015; **13**(1): 64-65.

[10] Wang ZH. Observation on the clinical efficacy of umbilical injection of oxytocin in preventing placental adhesion and postpartum hemorrhage. *Publ Med Forum Mag* 2016; **20**(1): 68-69.

[11] Xin Y. Clinical observation of carbetocin in preventing the postpartum hemorrhage caused by uterine inertia. *Modern J Integr Tradit Chin Western Med* 2015; **24**(17): 1901-1903.

[12] Wang XM. Clinical observation of carbetocin in preventing the postpartum hemorrhage caused by uterine inertia. *Lab Med Clin* 2014; **11**(5): 672-673.

[13] Han XQ, Li RY, Sun YL, et al. Observation on the efficacy of carbetocin in preventing the postpartum hemorrhage caused by uterine inertia. *Med J Chin People Arm Police Force* 2016; **27**(25): 479-481.

[14] Peng Y. Clinical observation on carbetocin in preventing the postpartum hemorrhage caused by uterine inertia in 60 cases. *Matern Child Health Care China* 2014; **29**(7): 1120-1121.

[15] Han LX, Yu F, Hou HY, et al. Effect analysis of carbetocin in preventing the postpartum hemorrhage after cesarean section in puerpera with pregnancy-induced hypertension. *J Int Obstetr Gynecol* 2014; **41**(4): 423-425.

[16] Wang YF, Wu CF, Li AY. Effect analysis of carbetocin in preventing the postpartum hemorrhage after cesarean section. *Matern Child Health Care China* 2016; **31**(9): 1979-1982.