

## Ultrasound Mediated Lower Abdominal Aorta Balloon Block on Research and Application of Timing of Surgery in Pernicious Placenta Previa during Childbirth

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**Abstract:** Objective: Study on ultrasound mediated lower abdominal aorta balloon block application in timing of pernicious placenta previa during childbirth. Method: 19 pernicious placenta previa patients, those were from Department of Obstetrics and Gynecology, the 2nd Affiliated Hospital of Zhengzhou University during the September 2015 to April 2016. 10 patients were randomly selected as the childbirth before group, another 9 patients were randomly selected as the childbirth after group that the two groups respectively before and after on the delivery of the fetus to apply the ultrasound mediated lower abdominal aorta balloon occlusion. Were compared between the two groups of blood loss, intraoperative blood products and the use of special oxytocic drugs and neonatal Apgar immediately scores and maternal and child outcome efficacy index. Results: The amount of bleeding during operation on the childbirth before group was less than the childbirth after group with a statistical significance ( $t = -4.956$ ,  $P = 0.001$ ); the blood transfusion rate and special promoting uterine contraction drugs usage effects on the childbirth before group was less than the childbirth after group with a statistical significance ( $P = 0.020$ ,  $P = 0.005$ ); the neonatal Apgar immediately score on the childbirth before group were higher than the childbirth after group with a statistical significance ( $Z = -2.289$ ,  $P = 0.022$ ); the rate of safety and well in mother and infant on the childbirth before group is higher than the childbirth after group significantly ( $Z = -3.426$ ,  $P = 0.001$ ). Conclusion: The preferred time of ultrasound mediated lower abdominal aorta balloon occlusion in the pernicious placenta Previa cesarean section is on the before delivery.

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**Keywords:** ultrasound mediated; placenta Previa; lower abdominal aorta balloon occlusion; delivery; production; Apgar immediately scores.

### 1. Introduction:

Pernicious placenta previa is one of the common obstetric acute and severe complications [1] and it clinically often occurs massive hemorrhage which is difficult to control, diffuse intravascular coagulation (DIC), shock and other serious complications occurred in the main characteristics. At the same time, it is an urgent mission to solve the problem that the high rate of cesarean section and the high rate of maternal and infant mortality.

### 2. Material and Methods:

**2.1. Object of study;** 19 cases of placenta previa patients from the obstetric Section at the 2nd Affiliated Hospital of Zhengzhou University during September 2015 to April 2016. All cases were examined by ultrasound and MRI before operation, both of which indicated that the placenta attached to the anterior wall of the uterus. Pregnant women's ages were between the ages of 26-36, who had the history with 1-2 cesarean section surgery. Terminations of

pregnancy gestational age were between 28<sup>+6</sup> and 38<sup>+3</sup> weeks. According to the different time of balloon occlusion of the lower abdominal aorta, the cases were divided into two groups. Randomly selected in 10 cases ultrasound was performed before delivery guide under the lower abdominal aorta balloon occlusion surgery as childbirth before group; the remaining 9 cases ultrasound was performed after delivery guide under the lower abdominal aorta balloon blocking operation as the childbirth after group.

**2.2. Equipment;** Mobile ultrasound, CORDIS balloon dilatation catheter, 8F arterial sheath, arterial suture device, general operation room and anesthesia related equipment.

### 2.3 Surgical methods;

**2.3.1.** The operations of two groups both were in the general operation room. Ultrasound physician probed the abdominal aorta preoperatively on the left of the abdomen of pregnant women, and measured the diameter and located the renal artery opening and the

bifurcation of the abdominal aorta, and measured the distance.(see Fig. 1 and 2) They determined the

CORDIS balloon dilation catheter model.



Figure 1. The preoperative ultrasonic detection of abdominal aorta, and measured. Red arrows to the bifurcation of the abdominal aorta and renal artery opening between the distance, yellow arrows to the abdominal aorta.



Figure 2: preoperative ultrasound detection. The blue arrow is the bifurcation of the abdominal aorta, the green arrow is renal artery opening.



Figure 3. Ultrasound guided femoral artery puncture. Red arrow is the femoral artery puncture needle

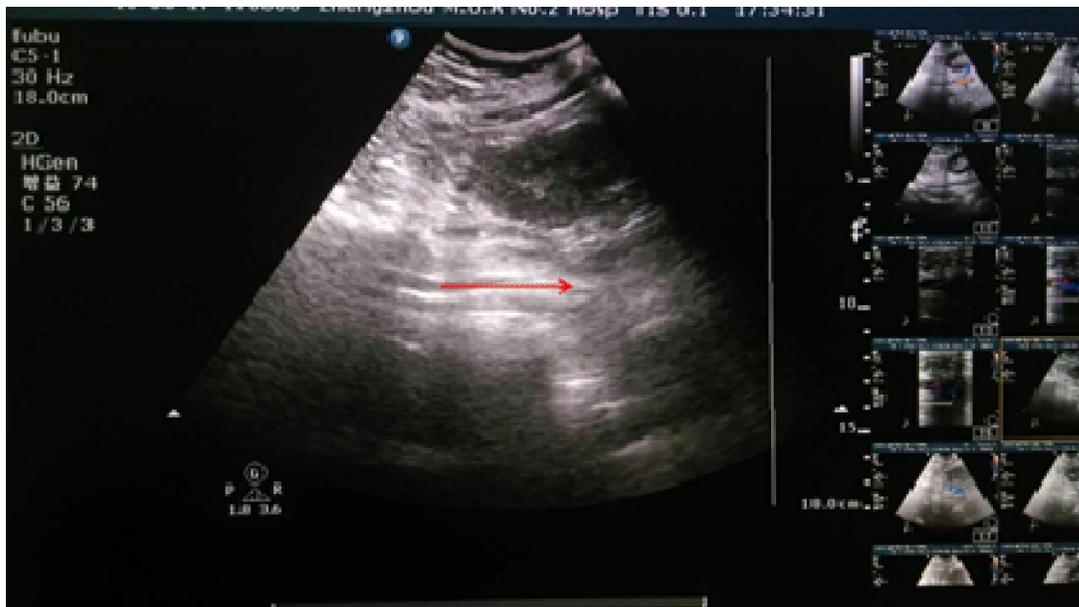


Figure 4: ultrasound guided balloon positioning. The red arrow is the balloon, which located between the bifurcation of the abdominal aorta and renal artery opening.

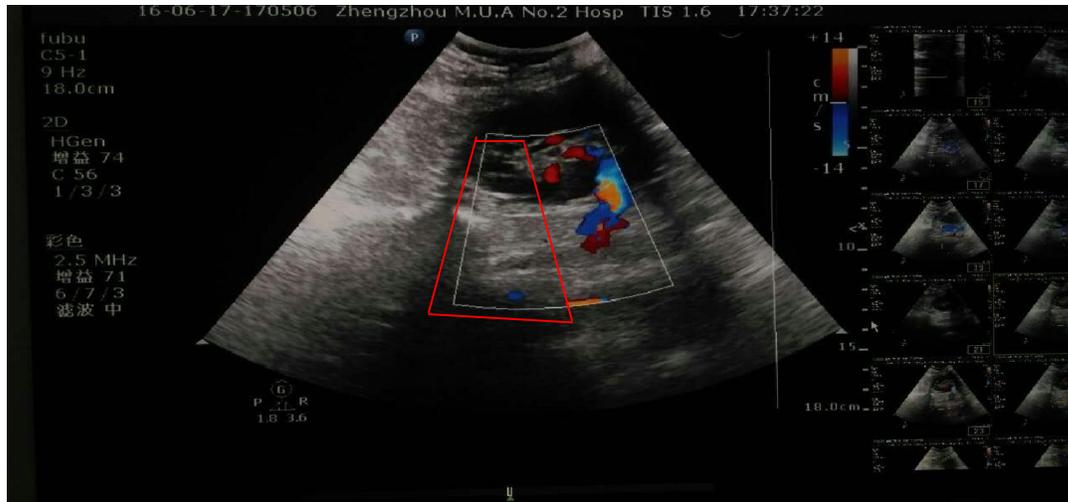


Figure 5: ultrasound monitoring the blood flow during the operation. In the red line, no blood flow signal appeared after the balloon dilated.

**2.3.2.** The intervention. Anesthesia reached, interventional physician began the implementation of ultrasound mediated lower abdominal aorta balloon catheterization. Puncturing was from the right femoral artery (see Figure 3), and the CORDIS balloon dilatation catheter was inserted into the abdominal aorta, which located between the renal artery openings and the bifurcation of the abdominal aorta. Then the balloon was fixed and indwelt.(see Fig.4).Ultrasound confirmed the balloon position again, when the balloon is closed. All things were in readiness, cesarean section was begun.

**2.3.3.** The childbirth before group. When incising the uterus muscle layer, interventional physician dilated balloon to block the blood supply. Ultrasound monitored blood flow dynamics at the same time. (see Fig. 5) After open the uterus muscle layer, the surgeon directly expanded incision by hand. Then gathering fingers of the right hand together at the placental site in uterine incision entered vertically and quickly into the uterine cavity. Simultaneously, the fetus was delivered rapidly. Interventional physician dilated balloon after delivery of the fetus in the childbirth after group.

**2.3.4.** After the fetuses were delivered, the fetuses were given immediately Apgar score and were immediately cut the umbilical cord. Oxytocin was injected intrauterine, and then uterine contraction was observed. Waiting for the 3-5 minutes until the contraction of the uterus harden, the placenta was manually removed. Placenta accrete was blunted dissection. After delivery of the placenta, intrauterine

massage was immediately implemented with a stem gauze pad to promote a further uterus contraction. Then repeatedly "8" sutured of uterine cavity and cervix internal ora at the surface of placental separation with 0/1 vicryl suture. Cervix internal ora was not easy to expose and was difficult to sew up, so we sutured a week around the cervical by the lifting type suture, and then closed the balloon to observe whether there was active bleeding.

**2.4.** The blood soaked gauze pad, gauze, dressing weight minus the weight before the operation. According to the 1.05g blood conversion of 1 ml blood, and blood is attracting the barrel and after cleaning out the vaginal blood.

**2.5.** Statistical analysis of all data uses SPSS 21.0. The normal distribution of the data described by means of representation ( $\bar{X} \pm S$ ), non-normal distribution data is described by M (Q) said. Measurement data were compared with t test (normal distribution) or non-parametric test (non normal distribution), and  $\chi^2$  test or the Fisher exact probability test was used to compare categorical data.  $P < 0.05$  for the difference has statistical significance.

### 3. Result:

**3.1.** Comparison on general condition between two groups; Age, gestational age, gestational week, history of cesarean section, preoperative complications, anesthesia and incision methods were not statistically significant( $P > 0.05$ ), see table 1 below;

Table 1. comparison on general condition between two groups

Group	case	Ages		History of cesarean section	Gestational weeks	Complication			Anesthesia Methods		Operative incision*	
			Times of pregnancy			ye s	no t	United	General anesthesia	crosscut	Slitting	
Childbirth before group	10	31.3±3.3	2.9±1.7	1 (0)	36.6±1.2	8	2	9	1	9	1	
Childbirth after group	9	30.9±3.5	3.0±1.5	1 (0.5)	35.0±2.4	8	1	5	4	7	2	
<i>t/Z/χ<sup>2</sup> value</i>		0.263	-0.137	-0.710	1.855	—	—	—	—	—	—	
<i>P value</i>		0.796	0.893	0.478	0.081	1.000	—	—	1.141	—	0.582	

\*Incision of cesarean section were selected in the operative incision.

**3.2.** Comparison of two groups of cases in the operation (to see Table 2 below):

**3.2.1.** Two groups of patients in bleeding volume comparison and childbirth before the group average (300ml) was significantly lower than that of childbirth after group (1311ml), and the difference has statistical significance ( $t=-4.956$ ,  $P=0.001$ ).

**3.2.2.** The use of intraoperative blood products rate of childbirth before group (30%) was lower than

childbirth after group (88.9%), and the difference was statistically significant ( $P=0.020$ ).

**3.2.3.** Intraoperative effects of drug use rate of expulsion childbirth before group (20.0%) was lower than childbirth after group (88.9%), and the difference was statistically significant ( $P=0.005$ ); two groups of patients were not found in the patients with hysterectomy.

Table 2. comparison in operation in two groups

group	cases	Intraoperative blood loss (ml)	Blood products used		uterine contractions drug used			Hysterectomy
			yes (%)	not (%)	yes (%)	not (%)	yes (%)	n (%)
Childbirth before group	10	300.0±200.0	3 (30.0)	7 (70.0)	2 (20.0)	8 (80.0)	0 (0.0)	10 (100.0)
Childbirth after group	9	1311.1±581.9	8 (88.9)	1 (11.1)	8 (88.9)	1 (11.1)	0 (0.0)	9 (100.0)
<i>t/ x<sup>2</sup> Value</i>		-4.956	—	—	—	—	—	—
<i>P Value</i>		0.001	0.020	—	0.005	—	—	—

**3.3.** Comparison of maternal and infant outcomes after operation: Two cases of fetus after Apgar immediate score of the medians were 10. Two groups of cases after delivery of fetus median immediate Apgar score was 10, but childbirth before group of discrete tendency (interquartile range) was less than childbirth after group, and the difference was statistically significant ( $Z=-2.289$ ,  $P=0.022$ ). In

each group were randomly divided into three groups according to the operation after the mother and baby common condition. The results showed that two groups of cases of maternal and child outcome distribution of different ( $Z=-3.426$ ,  $P=0.001$ ), to see table 3 below;

Table 3: Comparison of maternal and infant outcomes after operation

Groups	Case	Apgar score	Maternal and infant outcomes*		
			preferably	commonly	poorly
Childbirth before group	10	10 (0)	8	2	0
Childbirth after group	9	10 (6)	0	7	2
Z value		-2.289		-3.426	
P value		0.022		0.001	

\*Preferably: mother and child are good; Commonly: mother is good, baby to be in ICU;  
Poorly: mother is good, baby due to severe asphyxia to be in ICU

#### 4 Discussion:

Angstmann<sup>[2]</sup> pointed out that cesarean section in pernicious placenta previa, average amount of bleeding can be up to 3000~5000mL. After cesarean section, endometrial was damaged. When the incision scar healing, endometrial defected, and placental villi easily penetrated muscularis and serosa layer, even to the bladder and pelvic wall tissue, which formed placenta previa or accrete<sup>[3]</sup>. Placenta accreta and refractory bleeding determine the inevitable high rate of hysterectomy, reported that up to 55% to 75%<sup>[4-5]</sup>. Liu Chuan, Xian LAN Zhao<sup>[6]</sup> also pointed out previously effective method is hysterectomy. For patients, hysterectomy in exchange for control of bleeding, will lead to loss of fertility of this serious adverse outcomes.

For the treatment of pernicious placenta previa, traditional surgical method is difficult to control bleeding. There is still not unified guide. In recent years, the development of interventional operation brings a new way of treatment for pernicious placenta previa. Qiu Zhongyuan<sup>[7]</sup>, who pointed out that current control method of pernicious placenta Previa cesarean section postpartum hemorrhage, included the main internal iliac or uterine artery ligation, intrauterine balloon compression, internal iliac artery embolism and abdominal aorta balloon blocking. Although the above methods in a certain extent, can decrease the hysterectomy rate in the pernicious placenta Previa cesarean section, in order to ensure more patients to preserve fertility, more secure method still requires clinicians to further explore.

In this study, the present study was not reported in the present study of the ultrasound mediated abdominal aortic balloon occlusion<sup>[2-3]</sup>. Ultrasound mediated ultrasound has the following unique advantages: first, accurate measurement of the diameter of the abdominal aorta, in order to select the appropriate balloon diameter, so that the balloon to

achieve accurate blocking; two is to guide the femoral artery puncture, to avoid the mistake of shares in the femoral vein caused by femoral arteriovenous fistula may be; three is to guide the balloon, and positioning the balloon position; four is the intraoperative monitoring of blood flow state, you can determine whether the complete block; five is that ultrasound can monitor without contrast agent, no radiation damage, so that health care workers and patients are not required special protection equipments.

The so-called "balloon blocking" is to create a "no blood" environment, so that it can reduce bleeding during surgery, but also provide convenient conditions for surgical suture hemostasis in order to accurately suture hemostasis. And the pernicious placenta Previa cesarean section to produce the intraoperative hemorrhage most ominous Chung time is cut the myometrium and / or opens the placenta. If at this time there is no blockage of blood flow, it can not achieve reduce intraoperative hemorrhage, only provide surgical suture for convenient conditions. This study is for the best time of balloon occlusion, the choice on the childbirth before the delivery of the fetus as the blocking time, it is not only to reduce the bleeding, and provides surgical suture for convenient conditions. Otherwise, it can't be in the hemorrhage of the most turbulent reduce bleeding. On the results of this study, childbirth before group operation bleeding volume average (300ml) were significantly lower childbirth after group (1311ml), reduce the intraoperative blood product and contraction effects of drug use, without a case of hysterectomy.

Before the delivery of the fetus, balloon was dilated. Due to blocking the abdominal aorta and blocking the placental blood supply, blood when open the placenta is residual placental sinus blood. Due to the blocking of the placental blood supply, so the speed of delivery determines the fetuses' conditions. If the fetuses can be delivered in a few seconds,

quickly disconnected umbilical, soon after the delivery the fetus will establish the circulation of the blood. As a result, fetal in uterus only had tens of seconds of ischemia. The research results suggest that although the two cases of fetal childbirth after immediate Apgar score had a median of 10, but childbirth before group, the score of discrete tendency to less than childbirth after group, and no obvious adverse effects and childbirth before groups of maternal and infant outcomes better after childbirth group.

The balloon located between the opening of renal artery and the bifurcation of the abdominal aorta, so that it can avoid blocking the renal and mesenteric blood supply. There is no less sensitive tissue and organ in this area, which has less effect on systemic hemodynamics, and is relatively safe in the experienced interventional physician<sup>[8]</sup>. In the process of operation, from began blocking to suture the lower uterine segment, it was about ten to twenty minutes, and then closed the balloon 1 ~ 2 minutes to observe the bleeding. If there was bleeding site, feasible quadratic or cubic block, to avoid the long time ischemia. Therefore, the method is safe and effective, and it is worthy of clinical application.

## 5. Conclusion:

**5.1.** The study results show that ultrasound mediated lower abdominal aorta balloon catheter preset operation before pernicious placenta previa cesarean section, the best blocking time is prior to the delivery of the fetus.

**5.2.** This operation can significantly reduce the blood loss in caesarean section, reduce the usage of blood products and special oxytocic drugs, without obvious adverse effects on maternal and neonatal outcomes.

**5.3.** The surgery completes in the general operating room, which greatly reduces the patients' economic and psychological burden, and provides a new way to treat patients with pernicious placenta previa and / or placenta accrete.

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