

Risk Warning Of Dangerous Placenta Previa In Predelivery And Analysis Of The Outcome Of Delivery

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Abstract: Objective: To conduct analysis on the clinical outcome of establishment of surgical procedure after discussion by MDT by implementing prenatal ultrasound high risk warning for patients with dangerous placenta previa .Methods: 106 patients diagnosed as PPP after 28 weeks of gestation and delivered by cesarean section from January 2016 to December 2018 were selected in our hospital. According to the depth of intraoperative placenta implantation, they were divided into PA group (38 cases), PI group (35 cases) and PP group (33 cases).Results: 1. Comparison of general conditions between the three groups: There were no statistical significance in age, gestational weeks of delivery, time of initial prenatal bleeding, and proportion of occurrence of prenatal bleeding among the three groups ($P > 0.05$).2. Comparison of the amount of blood loss during the operation, time of operation and blood transfusion between groups.3. Comparison recombination rate of preoperative color Doppler ultrasound, ICU occupancy rate, rate of hysterectomy and urinary system injury rate between groups.4. Comparison of intraoperative methods for hemostasis between PI and PP: 2 cases with hysterectomy in the PI group, 13 cases with hysterectomy in the PP group, and the success rate of uterus retention was 85.85%.During the operation, bilateral uterine artery ligation and compression suture for corpus uteri and lower uterine segment were performed, and wedge resection for uterine was performed when necessary. The integrated application of various hemostasis techniques played a good hemostatic effect. Conclusion: In this study, detailed preoperative preparation and evaluation were conducted through identification of preoperative high-risk factors, high risk early warning by color Doppler ultrasound diagnosis. Besides, MDT discussion was made accordingly to formulate the therapeutic schedule for the operation and flexible and various methods for hemostasis would be adopted in accordance with the conditions in implantation and hemorrhage, which proved to have received good clinical effect.

Dangerous placenta previa refers to the existence of cesarean section or hysteromyomectomy in the past, and this pregnancy is occurred with placenta previa. The patients whose placenta previa is attached to the scar site caused by the original surgery will higher risk of placental adhesion, implantation caused hemorrhage and fatal hemorrhage. The cesarean section rate in China has been in upward trend with the highest standing at 52.6%. With the efforts made in advocacy of the two-child policy, more and more women of childbearing age with cesarean section were eager to give birth to another child, leading to a gradual increase of PPP incidence. In this study, the risk warning analysis was carried out before the operation for dangerous placenta previa, and the clinical procedures were carried out for individuals for analysis on impact on the clinical outcome.

1. Data and methods

1.1 Research objects:106 patients diagnosed as dangerous placenta previa after 28 weeks of gestation examined in our hospital with cesarean delivery from January 2016 to December 2018

were selected. According to the depth of placenta implantation during operation, there were 38 cases with placental adhesion (PA group), 35 patients with placenta implantation group (PI group) and 33 cases with penetrating placenta implantation (PP group).

1.2 Research methods: Preoperative evaluation and preparation were conducted according to placenta location and implantation status before the operation by color Doppler ultrasonography, as a result, the surgical treatment plan was formulated after MDT discussion. Besides, the information of all PPP patients in age, parity, the number of previous cesarean delivery, the number of abortion or curettage, history of uterine flesh tumour removal surgery, whether there was a prenatal hemorrhage, when initial bleeding occurred, whether the placenta implantation indicated by color Doppler ultrasound before the operation was consistent with intraoperative placenta implantation should be collected in a detailed manner. Besides, conditions of the placenta location, the implant situation, the amount of hemorrhage, how long the operation lasted, hemostasis methods, whether for blood transfusion, the amount of blood transfusion, intraoperative injury, ICU admission conditions, hysterectomy, postoperative complications and neonatal birth weight, neonatal asphyxia and conditions of new infants transferred into NICU and so on should be recorded during the operation.

1.3 Statistical methods: All data were statistically analyzed by SPSS19.0 software, measurement data were expressed by mean \pm standard deviation ($\bar{X} \pm s$), one-way analysis of variance was used for comparison between groups. Blood transfusion rate, ICU admission rate, hysterectomy rate and other incidence data were expressed in relative numbers. Besides, and Chi-square test or Fisher exact probability method was used for comparison of rates. $P < 0.05$ was considered statistically significant.

2. Results

2.1 Comparison of general conditions between groups: There were no statistically significance in age, gestational weeks, when the first prenatal hemorrhage occurred, and proportion of occurrence of prenatal hemorrhage among the three groups ($P > 0.05$).

Table 1. Comparison of general conditions among the three groups

Groups	PA (n=38)	Group PI (n=35)	Group PP (n=33)	Group F value/ χ^2	P value
Age (years old)	34.74 \pm 3.66	33.80 \pm 3.01	33.84 \pm 3.32	0.252	0.778
Weeks of gestation (weeks)	36.60 \pm 2.68	35.63 \pm 2.84	36.10 \pm 2.75	1.151	0.320
When the prenatal hemorrhage occurred (weeks)	13.28 \pm 2.56	20.27 \pm 2.69	14.66 \pm 2.68	1.981	0.143
proportion of occurrence of prenatal hemorrhage n (%)	16(42.11)	22(62.85)	16(48.48)	3.255	0.196

2.2 The amount of hemorrhage, hours/minutes for the operation, and the amount of blood transfused were conducted for comparison among the three groups: in terms of amount of bleeding in the operation, hours/minutes for the operation, infusion of red blood cell, plasma, and cryo-precipitation, PP group $>$ PI group $>$ PA group was demonstrated, and there were statistical significance in the differences ($P < 0.01$).

Table 2. Comparison of the amount of bleeding, hours for operation and the amount of blood transfusion among the groups

Groups	PA (n=38)	Group PI Group (n=35)	PP Group (n=33)	F Value	P Value
The amount of bleeding in the operation (ml)	565.79±186.39	1731.43±451.64	3022.73±1020.50	132.177	0.000
Minutes for the operation (min)	53.08±6.96	73.00±16.10	127.52±31.78	123.428	0.000
Infusion of red blood cell (U)	0.26±0.15	6.00±3.56	17.45±8.49	99.206	0.000
The amount of plasma infused (ml)	0.00±0.00	508.57±326.63	1630.30±824.80	98.143	0.000
Cry o-precipitation infused (U)	0.00±0.00	3.14±1.28	24.39±18.48	48.274	0.000

2.3 Comparison of coincidence rate of color ultrasound before the surgery among the groups, ICU occupancy rate, hysterectomy rate, and injury rate of urinary system among the three groups: There were no statistical significance in diagnosis accordance rate by Color Doppler ultrasound of the three groups before operation in differences ($P > 0.05$). However, as far as ICU occupancy rate, hysterectomy rate, and injury rate of urinary system were concerned, PP group $>$ PI group $>$ PA group ($P < 0.05$) were proved to be feasible with statistical significance.

Table 3. Comparison of coincidence rate of color ultrasound before the surgery, ICU occupancy rate, hysterectomy rate, and injury rate of urinary system among the three groups

Groups	PA (n=38)	Group PI Group (n=35)	PP Group (n=33)	χ^2 Value	P Value
Coincidence of ultrasound before operation n(%)	30 (78.95)	27 (77.14)	29 (87.88)	1.4636	0.4810
ICU occupancy rate n(%)	0 (0.00)	4 (11.43)	20 (60.61)	40.7898	0.0000
Hysterectomy rate n(%)	0 (0.00)	2 (5.71)	13 (39.39)	25.6235	0.0000
The injury rate of urinary system n(%)	0 (0.00)	1 (2.86)	7 (21.21)	13.0367	0.0015

2.4 Comparison of intraoperative hemostasis methods between PI and PP: The intraoperative hemostasis methods are shown in the Table 4 below, including 2 cases with hysterectomy in the PI group and 13 cases with hysterectomy in the PP group with the overall hysterectomy rate reaching 14.15% and the success rate of uterus retention of 85.85%. The hemorrhage caused by dangerous placenta is severe with the maximum hemorrhage 5500ml, so hemostasis is of crucial significance. Bilateral uterine artery ligation should be initially performed during the operation to reduce the blood supply, then suture in local areas for hemostasis (suture in form of number eight), compression based suture for corpus uteri (B-Lynch) and compression suture in the lower uterine segment (Cho suture, Hwu suture) should be performed due to placenta previa was generally implanted in the lower uterine segment. Patients in PI group and PP group with deeper placenta implantation were performed with wedge resection in lower uterine segment, which was partially removed then placenta and mesometrium were implanted. Finally, suture can be accomplished (3P for reconstruction). If hemostasis failed to be performed, hysterectomy should be conducted for patients. As shown in the Table 4 below, uterine artery ligation and compression suture for corpus

uteri and lower uterine segment should be performed, and, if necessary, wedge resection for uterine should be performed. The integrated application of various operation for hemostasis had been proved to be good in hemostasis.

Table 4. Comparison of hemostasis methods between PI and PP during operation

Methods for hemostasis	PI Group		PP Group	
	Cases (n)	Average amount of hemorrhage (ml)	Cases (n)	Average amount of hemorrhage (ml)
Suture in local area performed in form of character “8”+Cho suture+bilateral uterine artery ligation	18	1461.11	2	1975.00
Suture in local area performed in form of character “8”+Hwo suture+bilateral uterine artery ligation	11	1600.00	3	1700.00
Suture in local area performed in form of character “8”+Cho suture+B-Lynch+bilateral uterine artery ligation	1	1900.00	6	2333.33
Suture in local area performed in form of character “8”+Hwo suture+B-Lynch+bilateral uterine artery ligation	2	2300.00	2	2450.00
Suture in local area performed in form of character “8”+Wedge resection in lower uterine segment+Cho+bilateral uterine artery ligation	-	-	1	2700.00
Suture in local area performed in form of character “8”+Wedge resection in lower uterine segment+Hwo+bilateral uterine artery ligation	-	-	3	2466.67
Suture in local area performed in form of character “8”+Wedge resection in lower uterine segment+Cho+B-Lynch+bilateral uterine artery ligation	1	2500.00	1	2600.00
Suture in local area performed in form of character “8”+Wedge resection in lower uterine segment+Hwu+B-Lynch+bilateral uterine artery ligation	-	-	2	2600.00
Suture in local area performed in form of character “8”+sectional resection in lower uterine segment+Cho+B-Lynch+bilateral uterine artery ligation+hysterectomy	2	3100.00	8	4012.50
Suture in local area performed in form of character “8”+wedge resection in lower uterine segment+Hwu+B-Lynch+bilateral uterine artery ligation+hysterectomy	-	-	5	4360.00

3. Discussion

3.1 The mechanism and risk factors of PPP placenta implantation

Dangerous placenta previa is a special type of placenta previa. As the placenta is attached to the scar from the previous cesarean section with placenta implantation, resulting in uncontrollable postpartum hemorrhage. Besides, hysterectomy is required for patients in severe conditions and patients will be deprived of fertility function endangering the life of the mother and child. Placental implantation may be related to the endometrium dysplasia or damage at the implantation site of the fertilized egg. Due to dysplasia or damage of decidua at the base of the scar in the uterus, the chorionic membrane directly invades the myometrium, thus destroying the integrity of myometrium and inducing the occurrence of placenta previa with placental implantation. Research findings by Xie Xing revealed that the incidence of dangerous placenta previa with placental implantation was 38.2%. Yu L et al. [2] showed that 70.6% of 51 patients with dangerous placenta previa had placental implantation, and 75% of the patients with placental implantation had adverse pregnancy outcomes. The major risk factors already known of dangerous placenta previa was the cesarean section conducted before. Jauniaux E [3] discovered that the patients with placenta previa, will be faced with more risks of placental implantation with the increase of cesarean section in quantity. The incidence of placental implantation was 3.3% for 1 cesarean section, 11% for 2 cesarean sections, 40% for 3 cesarean sections, 61% for 4 cesarean sections, and 67% for 5 cesarean sections. Other risk factors include maternal age, parity, multiple curettage, and the scarred uterus caused by myomectomy. Research by Dai Yimin indicated [4] that PA, PI and PP accounted for 55.5%, 38.8% and 5.5% of the 18 cases undergoing hysterectomy due to PPP. The analysis on the results showed that the number of women with one delivery was as high as 22.2 per cent and the number of women with multiple deliveries was 77.7 per cent. Analysis on risk factor displayed a history of cesarean section and placenta previa of 55.5% and 33.3%. Jauniaux E et al. [5] studied that bladder injury was the most commonly seen complication of patients with placental implantation after hysterectomy with an incidence of 13.5%. This study showed that the risk factors of placenta implantation related to the times of pregnancy, the number of delivery and previous cesarean delivery in PA, PI, PP group have significant statistical significance ($P < 0.01$), and with the increase of the number of pregnancy and delivery as well as the depth of placenta implantation, the possibility with severe complications will increase. As for ICU occupancy, uterus resection rate, injury rate of urinary system, PP group > PI group > PA group with statistical significance ($P < 0.05$). There was one patient with injury of urinary system in PI group and 7 patients with injury of bladder in PP group. The urological injury rate was 7.54%.

3.2 Ultrasonic diagnosis of PPP placenta implantation

Currently, the most important and common means of PPP is ultrasonic diagnosis. Prenatal diagnosis by ultrasound can be conducive in reducing morbidity and mortality of fetus and pregnant women. The sensitivity and specificity of ultrasound diagnosis of PPP combined with placenta implantation were 77-87%, 96-98% respectively, and the positive predictive value was 65-93% and NPV 98% respectively [6]. In the Guideline for the Diagnosis and Treatment of Placental Implant Diseases (2018), it was pointed out that retrospective study on ultrasonographic diagnosis of placental implant found that the most common ultrasonic symptoms in placental adhesion were the disappearance of "bright band" (62.1%) and grafts (71.4%). The ultrasonic symptoms of placental implantation were disappearance of "bright band" (84.6%) and high vascularization (60.0%). The ultrasonographic signs of penetrating placenta were abnormal placental lacuna (82.4%) and highly vascularized (54.5%).

In the middle and late stages of pregnancy, ultrasonography showed the deficiency placental or irregularity of low echo area between implantation site and the myometrium. There were many large and irregular lacuna in the placenta. Under the gray scale, the missing of echo and interruption would be detected in bright bladder wall. The thickness of the muscular layer covering the placenta is <1 mm or undetectable; The uterine serous layer is protruding or deformed, placental

tissue has passed through the placenta percreta, as a result, invading the bladder was frequently seen in forms. A large number of blood flow signals were observed between the myometrium and the posterior wall of the bladder, suggesting that there may be a large number of dense and dilated blood vessels in this area (multiple directional blood flow and aliasing artifacts were confirmed) [7].

Research by Lingling Zhu et al. [8] demonstrated that the irregular shape of placental lacunae (vascular space) in placenta ($P=0.008$), extrusion of placenta to the bladder ($P < 0.0001$) and turbulent blood flow in lacuna under Doppler ultrasound ($P=0.008$) were predictive factors for placental implantation. The results of this study indicated that the coincidence rate of preoperative color ultrasound and intraoperative diagnosis was 78.95% in the PA group, 77.14% in the PI group and 87.88% in the PP group, indicating that the accuracy of prenatal ultrasound in the diagnosis of placenta previa is relatively high, which is the main diagnostic basis for the dangerous placenta previa and provides reliable evidence for the clinical preparation before surgery.

3.3 The treatment for hemostasis of PPP

PPP is accompanied by placenta implantation, and it was hard for hemostasis during operation. In addition to the use of agents for uterine contractions (carbetocin and carboprostol) to enhance contractions. Besides, local suture, compression suture for corpus uteri and lower uterine segment, uterine stuffing, arterial ligation, interventional therapy and other methods can be adopted for hemostasis. The goal is to prevent bleeding as quick as possible in an effective manner by the most skillful methods for hemostasis. Bilateral uterine artery ascending branch ligation is easy for operation, which proved the bad effect after transfixion, so secondary transfixion can be conducted, which is the preferred method of conservative operation for hemostasis. At present, the blood loss in PPP surgery is significantly decreasing. In China, abdominal aortic balloon is adopted to reduce hemorrhage and preserve the uterus. Research by Melekoglu et al. [9] demonstrated that the internal iliac artery ligation combined with the hemostatic suture of the lower uterine segment achieved a good hemostatic effect in conservative treatment of PPP, and the success rate of uterus retention was 84.3%. Baihui et al. [10] showed in his research that transverse parallel compression suture achieved a good effect in PPP combined placental implantation, and the success rate of hemostasis was 93.8%.

Studies [11] have shown that the hysterectomy in lower segment in (3P reconstruction) in PPP with placental implantation can significantly reduce intraoperative blood loss, uterine resection rate and average hospitalization costs. The method of blocking the blood supply was adopted in this research, that is, bilateral uterine artery ligation + compression suture for corpus uteri (B - Lynch suture) + compression suture in lower uterine segment (Cho suture or Hwo suture). For patients with deeper implantation in PI and PP groups, wedge resection in lower uterine segment was to be performed. The integrated application of methods for hemostasis can receive better hemostatic effect in conservative treatment for dangerous placenta previa.

Above said, Dangerous placenta previa with placenta implantation proves to be the clinical problem for obstetrician. The identification of high risks, color Doppler ultrasound diagnosis for warning of high risks should be performed for preparation before the surgery and MDT discussion so as to formulate treatment plans in the operation. Multiple methods for hemostasis can be adopted in flexible manner according to the implantation conditions and hemorrhage to reduce the amount of hemorrhage and reduce the damage rate of bladder as well as the resection rate. Finally, the possibility of occurrence of complications can be reduced with good clinical effect.

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