Discussion on perioperative anesthesia rescue treatment for DIC parturients with severe placental abruption

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Research article

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Abstract

Background: To investigate perioperative anesthesia rescue treatment method and effect of DIC parturients with severe placental abruption.

Methods: Designed as a retrospective inductive analysis, the present study included 6 parturients of DIC with severe placental abruption who were admitted to Dalingshan Hospital of Dongguan City from January 2013 to December 2018. The research further studied and analyzed the perioperative anesthesia treatment of 6 DIC parturients with severe placental abruption. Observation indicators included (1) Preoperative evaluation, (2) Intraoperative conditions, and (3) Follow-up after operation.

Results: (1) Preoperative evaluation: 25 cases of severe placental abruption were grade III ASA, including 3 stillbirths. (2) Intraoperative conditions: 6 cases of DIC parturients were confirmed to have severe placental abruption, including 3 stillbirths. (3) Postoperative follow-up: All the 6 parturients were cured without any complications.

Conclusion: Standardized rescue processing method with multidisciplinary cooperation, rapid and advanced intervention, and simultaneous multiple measures can improve the operative safety of parturients with placental abruption.

Background

The incidence of placental abruption is 1%–2% abroad and 0.46%–2.1% in China. Disseminated intravascular coagulation (DIC) combined with placental abruption is a rare complication during caesarean section, which, however, is characterized by fierce trend, rapid progress, dangerous condition and high mortality. Without prompt and proper management, it may endanger the lives of both mothers and infants [1][2][3]. From January 2013 to December 2018, all 6 DIC parturients with severe placental abruption were cured in Dalingshan Hospital of Dongguan City, and no complications occurred postoperatively. The present report is as follows:

Methods

2.1 General information

In this study, a total of 10,461 parturients aged 15–46 years old were collected in Dalingshan Hospital of Dongguan City from January 2013 to December 2018, including 3,338 cases of cesarean section (31.9%) and 7,123 cases of spontaneous delivery (68.1%). There were 79 cases of placental abruption (0.76%), among which 25 cases (0.24%) were severe placental abruption and 6 DIC parturients (0.06%) with severe placental abruption. The perioperative anesthesia rescue treatment of 6 DIC parturients with severe placental abruption was studied and analyzed. Observation indicators were: (1) Preoperative evaluation; (2) Intraoperative conditions; and (3) Follow-up after operation.

2.2 Inclusion and Exclusion Criteria

Inclusion criteria: Patients who met the diagnostic criteria of severe placental abruption (grade III) and DIC at the same time.

Exclusion criteria: Patients who did not meet the diagnostic criteria of severe placental abruption (grade III) and DIC.

1. The presence of basic diseases that easily caused DIC, such as infection, malignant tumors, obstetric complications, large-scale surgery and trauma, etc.
2. The presence of more than two clinical manifestations described below:
 - (1) Multiple bleeding tendency;
 - (2) Microcirculatory failure or shock which was not easily explained by the primary disease;
 - (3) Symptoms and signs of multiple microvascular embolism, such as skin, subcutaneous, mucosal embolism and necrosis as well as early organ dysfunction such as kidney, lung and brain;
 - (4) Effective anticoagulant therapy.
3. Laboratory tests met the following criteria (with three or more abnormalities simultaneously):
 - (1) The platelet count was lower than $100 \times 10^9 / L$ or progressively decreased.
 - (2) Fibrinogen was less than 1.5 g/L or progressively decreased, or more than 4.0 g/L;
 - (3) The 3P test showed positive, FDP of fibrin degradation product was higher than 20 mg/L or D-dimer increased (positive).
 - (4) The prothrombin time (PT) shortened or prolonged for more than 3 s or activated partial thromboplastin time (APTT) prolonged for more than 10 seconds.
 - (5) Antithrombin and molecular markers of coagulation, fibrinolysis and platelet activation might be considered for patients with difficult miscellaneous diseases or other particularities.
 - (6) The percentage of fragmented red cells in peripheral blood was more than 10%.
 - (7) The erythrocyte sedimentation rate (ESR) was less than 10 mm/h.

The diagnostic criteria of DIC can be simply summarized as “123”, i.e., 1 was susceptible to basic diseases, 2 represented more than 2 clinical symptoms, and 3 showed that there were at least 3 positive items for related laboratory tests.

2.3 Methods

The study adopted retrospective inductive analysis. Six parturients of DIC with severe placental abruption were treated by standardized rescue treatment on the basis of multidisciplinary cooperation, rapid and advanced intervention, and multiple measures at the same time. The specific measures are: multi-disciplinary cooperation, consultation and treatment of obstetricians and gynaecologists to identify the condition in time; the operating room opens a green channel, and the nurses provide timely assistance to the operation and anesthesiologists after taking the patient to the operating room (take items, blood, etc.); anesthesia The doctor is quick and capable, and the shortest time to complete the shallow general anesthesia-induced tracheal intubation for maternal conditions; the obstetrician and gynaecologist can make decisions and quickly stop bleeding; remove the cause of DIC as soon as possible, according to the intraoperative maternal bleeding, vital signs, etc. Unequal test results come out) Take measures to supplement blood coagulation factors and improve circulation and respiratory function, and actively correct pathological conditions such as hypovolemia, hypotension, coagulation function, severe anemia, water-acid electrolyte acid-base balance disorder, and prevention and treatment of DIC.

Results

(1) Preoperative evaluation: There were 25 cases of severe placental abruption (grade III ASA), including 3 stillbirths. (2) Intraoperative conditions: There were 6 cases of DIC parturients with severe placental abruption, including 3 stillbirths. (3) Postoperative follow-up: All the 6 DIC parturients with severe placental abruption were cured without any complications.

Discussion

4.1 It is rare that placental abruption combines with DIC during cesarean section. However, such situation has a ferocious onset, rapid progression and dangerous illness with high mortality rate. Without in time or appropriate treatment, it can endanger the lives of both mothers and infants ^{[1][2][3]}. Anesthesia treatment has its particularity, which requires multidisciplinary cooperation and joint consultation to eliminate the causes of DIC, supplement coagulation factors, as well as improve circulation and respiratory function as soon as possible. Consequently, it may contribute to active correction of pathological conditions such as hypovolemia, hypotension, coagulation function, severe anemia, acid-base balance disorder of water and electrolyte, so as to save lives at full steam[3][4].

4.1.1 Departments of Gynecology and Obstetrics, Anesthesia, Operation Room, Blood Bank, Ultrasound, Pediatrics and other departments should work closely together to reflect the good environment of the hospital, the superb first-aid level of relevant departments and the team spirit of medical risk management in the Departments of Gynecology and Obstetrics.

4.1.2 The whole treatment should be standardized and orderly, and the personnel of all parties should be well trained. Obstetricians and gynecologists should timely identify the condition; the operating room should open a green channel, and nurses should provide timely assistance for the surgeons and anesthesiologists (take surgical articles, check blood samples, etc.) after delivery of patients to the

operation room; anesthesiologists should be able to complete induced tracheal intubation under general anesthesia in the shortest time; gynecologists and obstetricians should be resolute in decision-making and complete hemostasis of operation rapidly; anesthesiologists should be calm in the process and devote themselves to monitoring, performing blood transfusion and infusion, correcting acid and supplementing calcium, and preventing DIC[5][6].

4.1.3 The key points of first-aid and resuscitation for obstetric massive hemorrhage should be fully in place. It is essential for rapid diagnosis, establishment of effective fast venous and respiratory pathways, rapid stabilization of vital signs, rapid access to blood sources, and uninterrupted continuous support of blood products of blood components in the blood bank. Obstetricians and gynecologists should carry out rapid hemostasis. During the operation, surgeons and nurses should take comprehensive measures to prevent the triangle of death caused by hypothermia, metabolic acidosis and coagulation dysfunction. The whole treatment measures should be in place quickly and accurately to win new life for patients [4][5][6].

4.2 Specifically, the following eight aspects should be accomplished:

4.2.1 Be “fast”, i.e., early detection and diagnosis, green channel establishment for rapid rescue treatment. Early diagnosis and correct treatment are the key to prevent DIC induced by placental abruption.

4.2.2 The general anesthesia with tracheal intubation should be selected without hesitation, which is a safe and fast method, so as to lay a good foundation for the follow-up rescue treatment.

4.2.3 Placental abruption is easy to induce DIC. Cesarean section should be performed as soon as possible to terminate pregnancy. Surgical interventions such as uterine packing, intrauterine balloon compression hemostasis, B-Lynch suture, selective arterial embolization, ligation and hysterectomy when necessary are important steps to improve and rescue DIC caused by placental abruption [7][8][9]. None of the subjects underwent hysterectomy due to timely rescue in the present study.

4.2.4 Focus on the correction of hypovolemia. Light general anesthesia maintains hemodynamic stability and effective tissue perfusion, and protects the main organs such as heart, lung, kidney and brain.

4.2.5 Early transfusion of fresh frozen plasma, cryoprecipitation, erythrocyte and hormone can contribute to improving coagulation function and preventing DIC in placental abruption. Fresh frozen plasma is needed when PT and APTT are prolonged by 1.5 times as much as normal; meanwhile, patients with fibrinogen <80–100 mg/ml, platelet <50×10⁹ /L and Hb <80 g/L require the transfusion of cryoprecipitation, platelet and erythrocyte, respectively[8][9]. Our experience is: In the specific rescue, the most important thing is to take the above measures to intervene according to the intraoperative maternal bleeding, vital signs, etc., do not wait for the test results.

4.2.6 Correction of acid and supplementation of calcium, application of hormones, oxytocin and vasoactive drugs are available to stabilize the intrauterine environment, increase stress and promote

uterine contraction.. [8][9]

4.2.7 Pay attention to respiratory management improvement. Mechanical ventilation with small tidal volume and the best PEEP protective pulmonary ventilation strategy can prevent lung injury, improve oxygenation function and correct hypoxemia.

4.2.8 During arteriovenous puncture catheterization, monitoring of vital signs and biochemical indicators are conducive to perioperative diagnosis, rescue and treatment. [10].

Conclusion

The study adopted retrospective inductive analysis. Six parturients of DIC with severe placental abruption were treated by standardized rescue treatment on the basis of multidisciplinary cooperation, rapid and advanced intervention, and multiple measures at the same time.

To sum up, it can improve the safety of operation for placental abruption parturients by standardized rescue treatment with multidisciplinary cooperation, rapid and advanced intervention, and multiple measures.

Abbreviations

DIC: disseminated intravascular coagulation

Declarations

-Ethics approval and consent to participate

To protect patient privacy, we do not list the names of all cases. All information is collected through the verbal consent of the parties and there is no ethical issue under Chinese law.

-Consent to publish

All authors agree to publish.

-Availability of data and materials

All the data and materials are availability for research.

- Competing interests

The authors declared that they have no conflicts of interest to this work.

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-Authors' Contributions

As the communication author, Hua Wang provided the main ideas and writing of the thesis. Shihong Wang collected and processed the first-hand data as the first author and communicated with the participants.

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Table 1

Table 1: Classification of placental abruption

Grades	Clinical features
Grade 0	A small clot behind the placenta, but no clinical symptoms
Grade I	Vaginal bleeding, uterine tenderness and forced uterine contraction; no shock in parturients, no fetal distress
Grade II	Vaginal bleeding; no shock in parturients; fetal distress
Grade III	Extrauterine bleeding; obvious forced contraction of uterus; board-like rigidity of the abdomen during palpation; with 30% of which showing abnormal coagulation function