



PLACENTAL ATTACHMENT ABNORMALITIES, RETAINED PLACENTAL FRAGMENTS IN THE UTERINE CAVITY, UTERINE ATONY, COMPLICATIONS OF CONGENITAL AND ACQUIRED COAGULOPATHIES, HEMORRHAGIC SHOCK, AND DISSEMINATED INTRAVASCULAR COAGULATION (DIC) SYNDROME.

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Abstract

This article discusses some of the most serious emergency conditions encountered in obstetric practice, including placental attachment abnormalities, retained placental fragments in the uterine cavity, uterine atony, congenital and acquired coagulopathies, hemorrhagic shock, and disseminated intravascular coagulation syndrome, known as DIC. These conditions may occur as direct causes or severe complications of postpartum hemorrhage and can pose an immediate threat to maternal health and life.

The article analyzes their etiology, risk factors, pathophysiology, clinical manifestations, diagnostic approaches, and treatment principles. Special attention is given to the importance of early recognition, timely intervention, multidisciplinary management, and preventive measures in reducing maternal morbidity and mortality.

Keywords: postpartum hemorrhage, placenta accreta spectrum, uterine atony, coagulopathy, hemorrhagic shock, DIC syndrome, obstetric emergencies.

Introduction

Obstetric emergencies remain one of the most urgent problems in maternal healthcare. Among them, postpartum hemorrhage is particularly dangerous because it can worsen within a very short period of time and lead to hemorrhagic shock, disseminated intravascular coagulation, multiple organ failure, and maternal death. Therefore, early recognition of bleeding, accurate identification of its cause, and rapid medical intervention are essential tasks in obstetric practice.

The main causes of postpartum hemorrhage are commonly explained using the “4 Ts” principle: **Tone**, which refers to uterine atony; **Tissue**, which refers to retained placenta or placental fragments; **Trauma**, which includes injuries to the birth canal; and **Thrombin**, which refers to coagulation disorders. This article focuses mainly on the conditions related to tone, tissue, and thrombin, as well as their severe consequences, including hemorrhagic shock and DIC syndrome.

Placental attachment abnormalities, retained placental fragments, and uterine atony are direct causes of postpartum hemorrhage. Coagulopathies may either intensify bleeding or develop as a result of massive blood loss. Hemorrhagic shock and DIC syndrome are life-threatening complications that often occur when diagnosis or treatment is delayed or insufficient. The purpose of this article is to present the clinical significance, mechanisms of development, diagnostic approaches, and treatment principles of these obstetric pathologies in accordance with the IMRAD structure.



Materials and Methods

This article was prepared as an analytical review. Scientific and clinical information related to obstetric emergencies, postpartum hemorrhage, placental pathology, uterine atony, coagulopathies, hemorrhagic shock, and DIC syndrome was summarized and analyzed.

The review focused on the following key areas:

1. Definitions, risk factors, and clinical consequences of placental attachment abnormalities.
2. Mechanisms of bleeding associated with retained placental fragments in the uterine cavity.
3. The role of uterine atony in postpartum hemorrhage.
4. The significance of congenital and acquired coagulopathies in obstetric practice.
5. The pathological chain leading to hemorrhagic shock and DIC syndrome.
6. Diagnostic methods, treatment principles, prevention strategies, and modern clinical approaches.

This article is not an experimental study. It is a review article based on the systematic analysis of existing scientific and clinical knowledge.

Results

1. Placental Attachment Abnormalities

Placental attachment abnormalities are characterized by abnormal or excessively deep attachment of the placenta to the uterine wall. Among these conditions, the **placenta accreta spectrum** is especially important. It includes three main forms: **placenta accreta**, **placenta increta**, and **placenta percreta**.

In placenta accreta, the placenta attaches directly to the muscular layer of the uterus. In placenta increta, placental tissue invades deeper into the myometrium. In placenta percreta, the placenta penetrates through the uterine wall and may even reach neighboring organs. These conditions can cause severe and difficult-to-control bleeding during or after delivery.

The main risk factors for placenta accreta spectrum include previous cesarean section, placenta previa, previous uterine surgery, advanced maternal age, multiparity, and the use of assisted reproductive technologies. The risk is especially high when placenta previa is combined with a history of cesarean delivery.

2. Retained Placental Fragments in the Uterine Cavity

Retained placental fragments occur when placental tissue, membranes, or small pieces of the placenta remain inside the uterine cavity after delivery. This condition interferes with normal uterine contraction and may cause continued bleeding.

Normally, after the placenta separates, the uterus contracts and compresses the blood vessels at the placental site. If placental fragments remain inside the uterus, the uterus cannot contract effectively. As a result, the blood vessels remain open, and postpartum hemorrhage may develop.

Clinically, this condition may present with persistent or excessive bleeding, a soft and enlarged uterus, abdominal pain, fever, foul-smelling lochia, and signs of secondary infection. Diagnosis is based on clinical examination, careful inspection of the placenta after delivery, and ultrasound examination when necessary.

3. Uterine Atony

Uterine atony is the failure of the uterus to contract adequately after childbirth. It is considered the most common cause of postpartum hemorrhage. When the uterus does not contract properly, the blood vessels at the placental site are not compressed, leading to heavy bleeding.



Risk factors for uterine atony include multiple pregnancy, polyhydramnios, fetal macrosomia, prolonged labor, very rapid labor, grand multiparity, chorioamnionitis, the use of medications that relax the uterine muscles, and exhaustion during labor.

Clinically, uterine atony presents with a soft or “boggy” uterus, heavy vaginal bleeding, tachycardia, low blood pressure, pallor, dizziness, and, in severe cases, signs of shock. Treatment includes uterine massage, oxytocin and other uterotonic drugs, bimanual uterine compression, balloon tamponade, and, if necessary, surgical interventions.

4. Congenital and Acquired Coagulopathies

Coagulopathies are disorders of the blood clotting system and increase the risk of bleeding in obstetric patients. Congenital coagulopathies include von Willebrand disease, hemophilia carrier states, platelet function disorders, and deficiencies of certain clotting factors. Acquired coagulopathies may develop due to liver disease, vitamin K deficiency, severe preeclampsia, HELLP syndrome, sepsis, DIC, or massive hemorrhage.

In coagulopathy, bleeding may continue even when the uterus is well contracted. Important clinical signs include oozing from injection sites, bleeding from mucous membranes, bruising, excessive bleeding during surgery, and abnormal laboratory results.

Diagnosis requires laboratory evaluation, including complete blood count, platelet count, prothrombin time, activated partial thromboplastin time, fibrinogen level, D-dimer, and other coagulation tests. Treatment focuses on correcting the underlying cause and replacing necessary blood components.

5. Hemorrhagic Shock

Hemorrhagic shock is a severe condition caused by significant blood loss, resulting in inadequate delivery of blood and oxygen to the tissues. In obstetrics, it may develop as a result of uterine atony, retained placental tissue, placenta accreta spectrum, birth canal trauma, placental abruption, or coagulopathy.

Clinical signs of hemorrhagic shock include tachycardia, low blood pressure, cold and clammy skin, pallor, restlessness, oliguria, altered consciousness, and collapse. In pregnant women, early signs may appear late because of physiological compensatory mechanisms. For this reason, objective assessment of blood loss and continuous monitoring of vital signs are extremely important.

Treatment includes stopping the source of bleeding, establishing intravenous access, administering fluids and blood products, providing oxygen, correcting coagulopathy, and treating the underlying cause. In severe cases, a massive transfusion protocol may be required.

6. Disseminated Intravascular Coagulation Syndrome

Disseminated intravascular coagulation, or DIC syndrome, is a serious condition in which the hemostatic system becomes abnormally activated throughout the body. Fibrin accumulates in small blood vessels, platelets and clotting factors are consumed, and the patient develops a simultaneous risk of thrombosis and severe bleeding.

In obstetric practice, DIC may develop due to placental abruption, amniotic fluid embolism, severe preeclampsia, HELLP syndrome, sepsis, retained dead fetus, or severe postpartum hemorrhage.

Clinical signs may include petechiae, ecchymoses, bleeding from mucous membranes, oozing from puncture sites, signs of thrombosis, and organ dysfunction. Laboratory findings usually include



thrombocytopenia, prolonged prothrombin time and activated partial thromboplastin time, decreased fibrinogen, and elevated D-dimer and fibrin degradation products.

Discussion

The conditions analyzed in this article are closely interconnected from a pathophysiological point of view. Placental attachment abnormalities or retained placental fragments can prevent the uterus from contracting properly. This may lead to uterine atony and postpartum hemorrhage. During severe blood loss, clotting factors, platelets, and fibrinogen are depleted, which may result in coagulopathy and further aggravate bleeding.

Although uterine atony is the most common cause of postpartum hemorrhage, bleeding in clinical practice is often multifactorial. For example, uterine atony may occur together with retained placental tissue or coagulopathy. Therefore, every case requires a comprehensive diagnostic approach rather than focusing on only one possible cause.

Hemorrhagic shock and DIC syndrome often develop when medical care is delayed or when the source of bleeding is not controlled in time. These conditions cause profound hemodynamic and hemostatic disturbances in the maternal body. DIC is particularly difficult to manage because transfusion of blood components alone is not enough; the underlying cause must also be treated.

Modern obstetric care emphasizes the importance of a multidisciplinary team approach. Obstetricians, anesthesiologists, resuscitation specialists, hematologists, neonatologists, surgeons, blood bank staff, and nurses must work together in a coordinated way. Such teamwork significantly increases the chances of saving the mother's life.

Prevention is also essential. Reducing unnecessary cesarean sections, identifying high-risk pregnancies early, actively managing the third stage of labor, monitoring uterine tone, observing women at risk of coagulopathy, and following emergency obstetric protocols can help prevent severe complications.

Conclusion

Placental attachment abnormalities, retained placental fragments in the uterine cavity, uterine atony, congenital and acquired coagulopathies, hemorrhagic shock, and DIC syndrome are important obstetric emergencies that may threaten maternal life. Although each condition has its own clinical significance, they often form a pathological chain that worsens the patient's condition.

In these situations, early diagnosis, identification of the bleeding source, rapid treatment, timely use of blood components, and multidisciplinary management are crucial. Detecting high-risk pregnant women before delivery and referring them to properly equipped medical facilities are also essential for protecting maternal health.

Overall, effective management of these pathologies requires clear clinical protocols, simulation training, modern diagnostic methods, transfusion readiness, and strong preventive measures in obstetric care.

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