International Journal of Pediatrics and Genetics
Vol. 3 No. 12 (2025)
ISSN: 2995-5483

Principles of Prevention of Thrombotic Complications in Obese Women Undergoing Cesarean Delivery

Nematullayeva D. U, Sadullayeva S.U.
Tashkent State Medical University, Department of Obstetrics and Gynecology and Pediatric Gynecology

Abstract: Obesity is one of the most important risk factors contributing to the development of thrombotic and thromboembolic complications during pregnancy and in the postpartum period. The risk increases significantly when pregnancy is completed by cesarean delivery, which itself represents a strong provoking factor for venous thromboembolism. The combination of obesity, surgical trauma, postoperative immobility, and pregnancy-related hypercoagulation creates extremely favorable conditions for thrombogenesis. This study is aimed at analyzing the main pathogenetic mechanisms of thrombotic complications in obese women undergoing cesarean delivery and evaluating the effectiveness of modern preventive strategies. Clinical observation and analysis of thromboprophylaxis methods demonstrated that the combined use of mechanical prevention, early mobilization, and pharmacological anticoagulation significantly reduces the incidence of deep vein thrombosis and pulmonary embolism. The results emphasize the necessity of individualized and evidence-based thromboprophylaxis in this high-risk group of patients.

Key words: obesity, cesarean delivery, venous thromboembolism, thrombosis prevention, anticoagulants, pregnancy

INTRODUCTION

In recent decades, obesity has become one of the most widespread and serious medical and social problems worldwide. According to global epidemiological data, the prevalence of obesity among women of reproductive age continues to grow steadily, leading to an increase in pregnancy-related complications. Obesity negatively affects almost all physiological systems, including carbohydrate and lipid metabolism, cardiovascular regulation, endocrine balance, and the hemostatic system. As a result, obese pregnant women represent a particularly vulnerable group with a high risk of adverse maternal and perinatal outcomes.

Pregnancy is characterized by profound adaptive changes in the coagulation system, resulting in a physiological hypercoagulable state. This mechanism is necessary to protect the woman from excessive blood loss during delivery. However, this natural adaptation increases the risk of thrombus formation, especially in the presence of additional predisposing factors. Obesity significantly amplifies this risk due to chronic low-grade inflammation, endothelial dysfunction, increased levels of procoagulant factors, and suppression of fibrinolysis. Adipose tissue also acts as an active endocrine organ producing biologically active substances that influence platelet function and vascular tone.

Cesarean delivery is currently one of the most frequently performed surgical operations in obstetric practice. Although this intervention is often lifesaving for both mother and fetus, it is associated with a higher incidence of postoperative complications compared to vaginal delivery. Surgical trauma, anesthesia, tissue damage, blood loss, and forced postoperative immobilization all contribute to

venous stasis and activation of the coagulation cascade. Therefore, cesarean delivery is considered an independent and powerful risk factor for venous thromboembolism.

When obesity and cesarean delivery are combined, the risk of thrombotic complications increases several times. Increased intra-abdominal pressure in obese women leads to impaired venous outflow from the lower extremities and the pelvic veins, creating favorable conditions for thrombus formation. Insulin resistance, dyslipidemia, and oxidative stress further aggravate endothelial dysfunction and promote hypercoagulation. These pathological mechanisms form the basis for the development of deep vein thrombosis and pulmonary embolism in the postoperative period.

Venous thromboembolism remains one of the leading non-obstetric causes of maternal mortality worldwide. Pulmonary embolism is particularly dangerous due to its sudden onset and high lethality. Even in cases of successful treatment, thrombotic complications often lead to long-term consequences such as post-thrombotic syndrome, chronic venous insufficiency, and reduced working capacity. Therefore, the prevention of thrombotic events is one of the most important tasks of modern obstetrics, especially in high-risk patients.

Despite the availability of effective preventive methods, thrombotic complications continue to be registered in clinical practice. This is often associated with underestimation of individual risk, delayed initiation of thromboprophylaxis, fear of hemorrhagic complications, and insufficient compliance with clinical guidelines. In obese women, these problems are aggravated by technical difficulties of surgical intervention, longer operation time, higher frequency of infectious complications, and delayed postoperative activation.

Modern principles of thrombosis prevention are based on a comprehensive approach that includes early identification of risk factors, risk stratification, and the rational use of mechanical and pharmacological methods. Mechanical prevention includes elastic compression, intermittent pneumatic compression, and early mobilization. Pharmacological prevention is mainly based on the use of low molecular weight heparins, which have proven efficacy and safety in obstetric practice.

Taking into account the high prevalence of obesity, the growing rate of cesarean delivery, and the serious consequences of thrombotic complications, further study of prevention strategies in this group of patients remains highly relevant. The aim of this research is to study the main mechanisms of thrombosis development in obese women after cesarean delivery and to evaluate the effectiveness of modern thromboprophylaxis principles in reducing postoperative thrombotic complications.

MATERIALS AND METHODS

The present study was conducted at the Department of Obstetrics and Gynecology of Tashkent State Medical University between 2022 and 2024. A total of 190 pregnant women who underwent cesarean delivery were included in the study. The main group consisted of 126 obese women with a body mass index (BMI) of 30 kg/m² or higher. The control group included 64 women with normal body weight (BMI 18.5–24.9 kg/m²) who also delivered by cesarean section. All participants were between 20 and 38 years of age and had singleton pregnancies.

The inclusion criteria for the main group were obesity diagnosed before pregnancy or in the early gestational period, cesarean delivery at term or near term, and informed consent to participate in the study. Exclusion criteria included hereditary thrombophilia, severe coagulation disorders, malignant neoplasms, chronic liver diseases, decompensated cardiovascular pathology, autoimmune diseases, and refusal to participate in the study. Women receiving long-term anticoagulant therapy before pregnancy were also excluded.

All patients underwent a comprehensive clinical examination, including detailed analysis of obstetric and gynecological history, parity, presence of extragenital diseases, pregnancy complications, and indications for cesarean delivery. Special attention was paid to such risk factors as arterial hypertension, gestational diabetes, varicose vein disease, prolonged bed rest during pregnancy, and a history of thrombotic events.

Vol. 3 No. 12 (2025)
ISSN: 2995-5483

Laboratory investigations included complete blood count, biochemical blood analysis, and a detailed coagulation profile. The hemostatic system was assessed using the following parameters: prothrombin index, international normalized ratio, activated partial thromboplastin time, fibrinogen concentration, D-dimer level, and platelet aggregation activity. These indicators were evaluated preoperatively and on days 1, 3, and 7 after surgery in order to assess the dynamics of coagulation changes in the postpartum period.

Instrumental diagnostics consisted of Doppler ultrasonography of the deep veins of the lower extremities. The examination was performed on postoperative days 3–5 or earlier in the presence of clinical signs of venous thrombosis such as pain, swelling, hyperemia, or increased local temperature of the lower limbs. The ultrasound study allowed visualization of venous patency, detection of intraluminal thrombi, and assessment of venous blood flow velocity.

Thromboprophylaxis was carried out based on individual thrombotic risk assessment. All patients received non-pharmacological preventive measures, including elastic compression of the lower extremities using medical compression stockings and early postoperative mobilization. Patients were encouraged to begin passive movements in bed within the first 6 hours after surgery and active walking within 12–24 hours, provided there were no contraindications.

Pharmacological thromboprophylaxis was performed using low molecular weight heparins administered subcutaneously in prophylactic doses. The first injection was given 6–12 hours after cesarean delivery, depending on the volume of blood loss and the stability of hemostasis. Anticoagulant therapy was continued for 7–10 days in women with moderate risk and up to 14 days in patients with high thrombotic risk. Dosage was adjusted according to body weight and laboratory parameters of coagulation.

The safety of anticoagulant therapy was evaluated based on clinical signs of bleeding, postoperative hemoglobin levels, the presence of hematomas at the injection site, uterine involution dynamics, and the amount of lochia. The effectiveness of thromboprophylaxis was assessed by the frequency of clinically confirmed cases of deep vein thrombosis and pulmonary embolism, as well as by laboratory indicators of hypercoagulation.

Statistical analysis of the obtained data was performed using standard methods of biomedical statistics. Quantitative indicators were expressed as mean values and standard deviation. Comparative analysis between groups was carried out using Student's t-test and nonparametric methods where appropriate. Differences were considered statistically significant at $p < 0.05$.

RESULTS AND DISCUSSION

The analysis of the obtained clinical and laboratory data revealed significant differences in the state of the hemostatic system between obese women and patients with normal body weight undergoing cesarean delivery. Preoperative laboratory evaluation demonstrated that obese women had significantly higher fibrinogen levels and D-dimer concentrations compared to the control group, indicating a pronounced hypercoagulable state even before surgical intervention. Platelet aggregation activity was also increased, reflecting enhanced platelet reactivity and a higher tendency toward thrombus formation.

In the early postoperative period, dynamic observation of coagulation parameters showed that women in the main group without adequate pharmacological prevention exhibited a progressive increase in hypercoagulation markers during the first three days after cesarean delivery. These changes were accompanied by clinical manifestations of venous stasis, including swelling of the lower extremities, pain along the course of deep veins, and a sensation of heaviness in the legs. Doppler ultrasound examination in this subgroup revealed impaired venous blood flow and isolated cases of intraluminal thrombus formation.

In contrast, obese women who received a full комплекс of thromboprophylactic measures, including mechanical compression, early mobilization, and low molecular weight heparins, demonstrated

significantly more favorable laboratory and clinical outcomes. Fibrinogen and D-dimer levels showed a gradual decrease by postoperative days 5–7, approaching reference values. Platelet aggregation activity also normalized more rapidly, indicating stabilization of the hemostatic balance.

The incidence of deep vein thrombosis in obese women who did not receive adequate pharmacological prophylaxis was significantly higher compared to the control group. At the same time, among patients who underwent combined mechanical and pharmacological prevention, the frequency of thrombotic complications was minimal. No cases of pulmonary embolism were registered in this group throughout the observation period. These findings clearly demonstrate the high effectiveness of комплекс thromboprophylaxis in preventing life-threatening thromboembolic events.

Special attention was given to the safety of anticoagulant therapy. During the study, no cases of massive postpartum hemorrhage, uterine atony associated with anticoagulant use, or clinically significant bleeding complications were recorded. A slight decrease in hemoglobin levels in the early postoperative period corresponded to physiological blood loss during surgery and did not require additional interventions. Minor local hematomas at injection sites were observed in isolated cases and resolved spontaneously without complications.

The obtained results confirm that obesity significantly intensifies the prothrombotic potential of pregnancy and cesarean delivery. From a pathogenetic standpoint, this is associated with chronic inflammation, insulin resistance, increased synthesis of procoagulant factors, and suppression of fibrinolytic activity. Surgical trauma and postoperative immobilization further enhance these processes. Therefore, thromboprophylaxis in obese women should not be limited to a single preventive method but must be based on a комплекс and individualized approach.

The findings of the present study are consistent with international research data indicating that low molecular weight heparins, combined with mechanical prevention and early mobilization, represent the gold standard of thrombosis prevention in high-risk obstetric patients. Individual risk assessment, taking into account body mass index, presence of comorbidities, obstetric complications, and duration of surgery, plays a decisive role in choosing the optimal prevention strategy.

CONCLUSION

Obesity is an independent and powerful risk factor for the development of thrombotic and thromboembolic complications in women undergoing cesarean delivery. The combination of pregnancy-related hypercoagulation, surgical trauma, endothelial dysfunction, venous stasis, and postoperative immobility creates extremely favorable conditions for venous thromboembolism.

The results of this study demonstrate that a comprehensive approach to thromboprophylaxis, including early mobilization, elastic compression of the lower extremities, and rational pharmacological prevention with low molecular weight heparins, significantly reduces the incidence of postoperative thrombotic complications without increasing the risk of hemorrhagic events.

Individual assessment of thrombotic risk, timely initiation of preventive measures, and strict adherence to clinical guidelines should be considered mandatory components of obstetric care in obese women. The implementation of standardized thromboprophylaxis protocols in obstetric practice will contribute to the reduction of maternal morbidity and mortality and improve the overall outcomes of cesarean delivery in high-risk patients.

BIBLIOGRAPHY

1. James A.H. Venous thromboembolism in pregnancy. New England Journal of Medicine, 2008; 359:
2. Greer I.A., Nelson-Piercy C. Low molecular weight heparins for thromboprophylaxis and treatment of venous thromboembolism in pregnancy. Blood, 2005; 106: 401–407.

Vol. 3 No. 12 (2025)
ISSN: 2995-5483

3. Sultan A.A., West J., Grainge M.J., Riley R.D., Tata L.J., Fleming K.M., et al. Risk of first venous thromboembolism in and around pregnancy. British Medical Journal, 2012; 345: e2635.
4. Ageno W., Becattini C., Brighton T., Selby R., Kamphuisen P.W. Cardiovascular risk factors and venous thromboembolism. Circulation, 2008; 117: 93–102.
5. Royal College of Obstetricians and Gynaecologists. Reducing the Risk of Venous Thromboembolism during Pregnancy and the Puerperium. Green-top Guideline No. 37a, London, 2015.
6. Bates S.M., Middeldorp S., Rodger M., James A.H., Greer I.A. Guidance for the treatment and prevention of obstetric-associated venous thromboembolism. Journal of Thrombosis and Thrombolysis, 2016; 41: 92–128.
7. Heit J.A. Epidemiology of venous thromboembolism. Nature Reviews Cardiology, 2015; 12: 464–474.