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Successful thrombolysis for pulmonary embolism during pregnancy

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ABSTRACT

Pulmonary embolism is a serious and potentially life-threatening condition, particularly during pregnancy, and is one of the leading causes of maternal mortality.

A 40-year-old female patient at 27–28 weeks of pregnancy was admitted to the hospital with complaints of shortness of breath at rest, dizziness, and loss of consciousness. Three days before admission, she suddenly felt nagging pain in the groin area, which was aggravated by walking. Contrast-enhanced computed tomography (CT) of the chest revealed CT signs of massive thromboembolism of the pulmonary artery. The Qanadli index was 67.5%. Duplex scanning of the veins of the lower extremities revealed thrombosis of the left common femoral vein with a flotation of 6 cm. Following a multidisciplinary consultation, systemic thrombolysis with Alteplase at a dose of 100 mg once was initiated according to vital indications. Improvement was immediately noted in the first hours after thrombolytic therapy. The efficiency of the therapy and satisfactory condition of the mother and fetus extended the pregnancy to 38 weeks. At full term, the patient underwent a successful cesarean section. The postpartum period proceeded without thromboembolic complications during anticoagulant therapy.

This clinical case demonstrates that timely systemic thrombolysis can prolong pregnancy to full term and preserve the life and health of the mother and fetus.

Keywords: pregnancy; massive thromboembolism of the pulmonary artery; deep vein thrombosis; systemic thrombolysis.

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Успешный опыт проведения тромболизиса при тромбоэмболии лёгочной артерии во время беременности

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АННОТАЦИЯ

Тромбоэмболия лёгочной артерии — серьёзное и потенциально угрожающее жизни состояние, особенно во время беременности, оно относится к одной из главных причин материнской смертности.

Пациентка 40 лет доставлена в стационар на сроке беременности 27–28 недель с жалобами на одышку в покое, головокружение и потерю сознания. За 3 дня до поступления внезапно появились тянущие боли в паховой области, усиливающиеся при ходьбе. По данным компьютерной томографии (КТ) органов грудной клетки с контрастированием выявлены КТ-признаки массивной тромбоэмболии лёгочной артерии. Индекс Qanadli 67,5%. При дуплексном сканировании вен нижних конечностей выявлен тромбоз левой общей бедренной вены с флотацией 6 см. По результатам мультидисциплинарного консилиума принято решение о проведении по жизненным показаниям системного тромболизиса препаратом Алтеплаза в дозе 100 мг однократно. В первые часы после тромболитической терапии сразу отметилась положительная динамика. Эффективность терапии и удовлетворительное состояние матери и плода позволили пролонгировать беременность до 38 недель. В доношенном сроке беременности пациентке успешно выполнена операция кесарева сечения. Послеродовой период протекал без тромбоэмболических осложнений на фоне антикоагулянтной терапии.

Данный клинический случай демонстрирует, что своевременно проведённый системный тромболизис позволил пролонгировать беременность до доношенного срока и сохранить жизнь и здоровье матери и ребёнка.

Ключевые слова: беременность; массивная тромбоэмболия лёгочной артерии; тромбоз глубоких вен; системный тромболизис.

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INTRODUCTION

Pregnant women experience 10–14 venous thromboembolic events (VTEs) per 10,000 deliveries [1]. Approximately one-third of obstetric-related VTEs manifest as pulmonary embolism (PE), with 2% of fatal cases. During pregnancy, deep vein thrombosis (DVT) and PE account for 75–80% and 20–25% of VTEs, respectively. Pregnancy and the postpartum period are associated with a 4- to 5-fold increased risk of VTEs compared to non-pregnant women of similar age [2]. The increased risk of VTEs in pregnancy is attributed to factors that contribute to thrombosis, also known as Virchow's triad: stasis, hypercoagulability, and endothelial injury. The pathophysiology of pulmonary embolism, dictated by mechanical obstruction and pulmonary vasoconstriction caused by the release of vasoactive mediators, results in increased afterload on the right ventricle (RV) [3]. Prolongation of RV contraction time to early diastole in the left ventricle results in a leftward shift of the interventricular septum, impaired left ventricular filling, and reduced cardiac output. This leads to systemic hypotension and hemodynamic instability. A thrombus can enter the systemic circulation through an atrial septal defect, resulting in an embolic stroke [4]. The clinical signs of PE are similar to those seen in non-pregnant women and include shortness of breath, chest pain, cough, hemoptysis, syncope, and, less commonly, arterial hypotension and shock. Symptoms of DVT, such as unilateral leg pain and swelling, may also be observed.

Diagnosing PE during pregnancy has its peculiarities. The diagnostic significance of D-dimer levels is equivocal. Both normal and high-risk pregnancies are associated with a progressive increase in D-dimer levels, which almost completely negates its diagnostic utility. If PE is suspected, electrocardiography, echocardiography, and duplex/triplex venous ultrasonography may be advised. Radiographic signs cannot be used as a criterion to confirm or rule out PE because they are not specific and are absent in many patients. Multiplanar and three-dimensional contrast-enhanced chest computed tomography (CT) may be recommended [2]. The estimated fetal exposure is 0.24–0.66 mSv. Conventional pulmonary angiography is associated with significantly higher fetal exposures (2.2–3.7 mSv) and should be avoided during pregnancy. Fetal radiation doses from all radiologic procedures should be well below the danger threshold of 50 mSv [4].

Low-molecular-weight heparins are used as first-line therapy in hemodynamically stable, low-risk patients.

In hemodynamically unstable PE, a multidisciplinary team should consider thrombolysis, since the risk of PE-related maternal mortality is higher than that associated with complications of systemic thrombolysis [5]. A review of published literature reporting the use of thrombolysis for massive PE during pregnancy and in the postpartum period demonstrated high maternal and fetal survival rates [6].

Surgical embolectomy is an option for patients with high-risk pregnancy-associated PE, where thrombolysis is contraindicated or ineffective [5].

The treatment of thromboembolic events during pregnancy remains a significant clinical concern. Therefore, it is of interest to present the clinical case of a 40-year-old female patient.

CASE REPORT

Patient K. was a 40-year-old, primigravida female, unmarried, residing in Moscow and employed as a confectioner. The majority of her working day (lasting 12 hours) was spent in a standing position. She denied any unhealthy habits, including smoking. The patient had been followed up in the Women's Clinic of Vinogradov Municipal Clinical Hospital since 9 weeks of singlet pregnancy, which was her first. The patient was referred from the Women's Clinic to the Maternity Hospital of Yudin Municipal Clinical Hospital for preparation for delivery. The diagnosis at admission was as follows: 38 weeks of pregnancy; cranial presentation; gestational diabetes mellitus; diet therapy; low extremity deep vein thrombosis; non-occlusive non-floating thrombosis of the left common femoral vein; massive pulmonary embolism; Qanadli 67.5%, PESI 129 (very high risk of 30-day mortality). Intravenous thrombolysis with alteplase was performed on April 21, 2023.

Case history: The patient had reported having symptoms since April 18, 2023. On that day, she suddenly experienced a nagging pelvic pain that became severe with walking. In the morning of April 21, after a meal, the patient developed chest tightness, shortness of breath at rest, and dizziness. The patient subsequently lost consciousness and required emergency medical attention. An emergency team reported blood pressure (BP) 60/40 mmHg, heart rate (HR) 100 bpm, respiratory rate (RR) 18, and blood glucose 8 mmol/L. At admission, the patient's condition was moderately severe, with BP 82/60 mmHg, HR 105 bpm, and RR 18. Laboratory test showed prothrombin time 18.8 s; INR 1.49; D-dimer 5566 ng/mL; blood glucose 7 mmol/L; pCO₂ 25.4 mmHg; pO₂ 128 mmHg.

Contrast-enhanced chest CT (4.1 mSV) revealed massive PE (Qanadli 67.5%). No signs of intracranial hematoma or ischemic changes were visualized on brain CT (2.9 mSV). Duplex ultrasonography (DUS) of the lower extremities revealed thrombosis of the left common femoral vein with a floating thrombus up to 6 cm.

Echocardiographic findings were suggestive of grade I mitral regurgitation, grade I–II tricuspid regurgitation, and grade I–II pulmonary regurgitation. The pulmonary artery systolic pressure (PASP) was 45 mmHg.

The multidisciplinary team decided to initiate systemic thrombolytic therapy, and on April 21, the patient received alteplase 100 mg once and intravenous heparin 25,000 IU once. To achieve the target values of activated partial thromboplastin time, therapeutic anticoagulation with enoxaparin 6,000 IU/0.6 mL subcutaneously twice daily was initiated. The patient stayed in the intensive care unit under the supervision of an obstetrician.

Within the first hours after thrombolytic therapy, the patient's condition improved significantly: the blood pressure and saturation returned to normal, and shortness of breath decreased substantially. Echocardiography showed a decrease in PASP from 45 mmHg to 24 mmHg, while venous ultrasonography revealed a reduction in the size of the floating thrombus in the deep vein system to 1 cm. Overload of the right heart improved, according to follow-up examinations.

On April 28, the patient was discharged for outpatient follow-up by an obstetrician, endocrinologist, and surgeon. She was advised to continue enoxaparin 6,000 IU subcutaneously twice daily, and compression therapy (class 2). During the third trimester of pregnancy, the patient was followed up by obstetricians, cardiologists, and vascular surgeons. This approach enabled the pregnancy to be prolonged to full term. The patient was admitted at 38 weeks of gestation to determine the most appropriate strategy for pregnancy and delivery management.

At admission, the patient's condition was satisfactory. Clinical and laboratory parameters were normal. The fetal health was deemed satisfactory. Echocardiography revealed grade I mitral regurgitation, grade I–II tricuspid regurgitation, grade I–II pulmonary regurgitation, and PASP 35.0 mmHg. Venous ultrasonography of the lower extremities demonstrated deep and subcutaneous vein patency, and varicose veins of the lower extremities.

Given the full-term, complicated pregnancy in the 40-year-old primigravida, the multidisciplinary team determined that cesarean delivery at 38 weeks of pregnancy was the optimal course of action. The patient delivered a live full-term boy with no visible injuries and malformations (body weight 3,200 g, body length 51 cm, 1-minute Apgar 8, and 2-minute Apgar 9). The postoperative period was uneventful. The patient was discharged on Day 4 post-surgery for follow-up care at the local women's clinic. Anticoagulation therapy was continued for 6 weeks following the delivery. No signs of thrombosis were identified by a follow-up DUS.

CONCLUSION

This case report describes a rare case of a woman with a diagnosis of massive PE with severe clinical symptoms and hemodynamic instability at the beginning of her third trimester of pregnancy. Acute cerebrovascular accidents or intracranial hematoma were ruled out by examinations.

Systemic thrombolysis is associated with an increased risk of hemorrhagic complications, which can pose a particular threat during pregnancy. However, the benefits of thrombolytic therapy for life-threatening thrombotic complications outweigh the potential risks for both the mother and the fetus.

In light of the patient's severe PE and very high risk of 30-day mortality (as indicated by the PESI score), the multidisciplinary team elected to proceed with systemic thrombolysis with alteplase, which resulted in a notable improvement. No hemorrhagic complications were observed. The timely systemic thrombolysis contributed to the prolongation of pregnancy to 38 weeks, thereby preserving the life and health of both the mother and the child.

ADDITIONAL INFO

Authors' contribution. All authors made a substantial contribution to the conception of the work, acquisition, analysis, interpretation of data for the work, drafting and revising the work, final approval of the version to be published and agree to be accountable for all aspects of the work.

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Competing interests. The authors declares that there are no obvious and potential conflicts of interest associated with the publication of this article.

Consent for publication. The patient who participated in the study signed an informed consent to participate in the study and publish medical data.

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Вклад авторов. Все авторы внесли существенный вклад в разработку концепции, проведение исследования и подготовку статьи, прочли и одобрили финальную версию перед публикацией.

Финансирование. Авторы заявляют об отсутствии внешнего финансирования при проведении исследования.

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

Информированное согласие на публикацию. Пациентка, участвовавшая в исследовании, подписала информированное согласие на участие в исследовании и публикацию медицинских данных.

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