

Successful catheter-directed thrombolysis for high-risk submassive pulmonary embolism in a pregnant patient post-large ovarian cystectomy: a case report and multidisciplinary approach

Abstract

Background: High-risk submassive pulmonary embolism (PE) during pregnancy especially 3rd trimester, presents a significant challenge, with the physiological changes of pregnancy increasing the risk of venous thromboembolism (VTE) and PE being a leading cause of maternal mortality. Catheter-directed thrombolysis (CDT) offers a targeted thrombolytic approach, potentially minimizing systemic bleeding risks compared to systemic thrombolysis, making it a viable option in select pregnant patients with high-risk submassive PE.^{1,2}

Case report: We present a case of a 29-year-old pregnant woman at 27 weeks gestation who developed acute bilateral PE two days after undergoing a laparotomy for a large ovarian mass excision. A multidisciplinary Pulmonary Embolism Response Team (PERT) evaluation recommended ultrasound-assisted CDT using a tissue plasminogen activator (tPA). The patient showed significant post-procedure improvement, delivered a healthy infant via Cesarean section at term, and had no long-term complications.

Conclusion: This case emphasizes the efficacy and safety of CDT for managing high-risk submassive PE during pregnancy, particularly after recent major surgery. The multidisciplinary approach, especially a dedicated PERT, in optimizing maternal and fetal outcomes in such complex scenarios proved effective in ensuring both maternal and fetal safety, leading to favorable outcomes.^{3,4}

Keywords: Pregnancy, pulmonary embolism, catheter-directed thrombolysis, tissue plasminogen activator, multidisciplinary team, PERT, submassive PE, case report

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Khaled Sewify,¹ Ahmad Elsayed,¹ Nawaf Aldughaylibi,¹ Abdelaziz Alshaer,¹ Abeer Alasiry,² Wael Alanazi,² Hazem Amer,³ Khalid Al Faraidy,³ Wael Nazzal,⁴ Sara Alshubat,⁴ Mozon Alotaibi⁴

¹Critical Care Department, KFMC, Kingdom of Saudi Arabia

²Cardiology Department, KFMC, Kingdom of Saudi Arabia

³Genitourinary Department, King Fahad Medical City (KFMC), Kingdom of Saudi Arabia

⁴Obstetric and Gynecology Department, Kingdom of Saudi Arabia

Correspondence: Khaled Sewify, Critical Care Department, KFMC, Dhahran, Kingdom of Saudi Arabia

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Introduction

Pulmonary embolism (PE) complicates 1 in 1,000–3,000 pregnancies, representing a leading cause of maternal mortality.⁵ Pregnancy-associated hypercoagulability, venous stasis from the gravid uterus, and decreased natural anticoagulant levels increase VTE risk.⁶ While systemic thrombolysis is standard for massive PE with hemodynamic instability, bleeding risks limit its use in pregnancy.⁷ Catheter-directed thrombolysis (CDT) provides localized thrombolytic delivery, potentially minimizing systemic exposure and bleeding risks.⁸ We report successful ultrasound-assisted CDT use in a 27-week pregnant patient with high-risk submassive PE post-ovarian cystectomy, emphasizing the importance of a multidisciplinary PERT approach in high-risk obstetric cases.⁹

Case presentation

Patient information: A 29-year-old gravida 4, para 3, at 27 weeks gestation with three prior uncomplicated Cesarean sections, presented to obstetrics with a large right ovarian mass causing significant compressive symptoms (Figure 1). A surgical excision was planned.

Clinical course: Two days post-laparotomy, she developed acute dyspnea, hypoxemia (SpO₂ 95% on 4 L/min O₂), tachycardia (115 bpm), and left calf swelling.

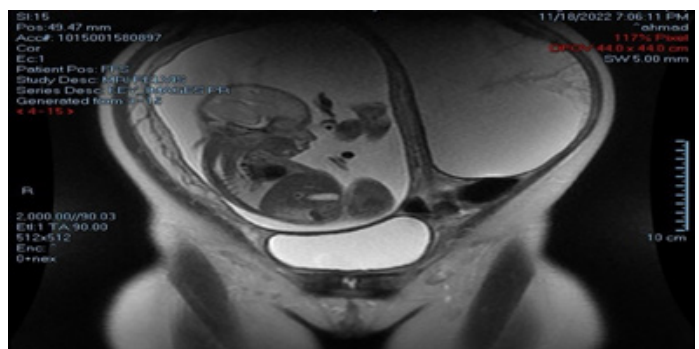


Figure 1 The pelvic US showing a large ovarian cyst.

Investigations

- Electrocardiogram (ECG):** Showed sinus tachycardia and T-wave inversions in V2–V3.
- Cardiac Troponin:** Elevated (1 ng/mL), suggesting myocardial injury.

CT Pulmonary Angiography (CTPA): Demonstrated high-burden bilateral PE with right ventricular (RV) strain (Figure 2).

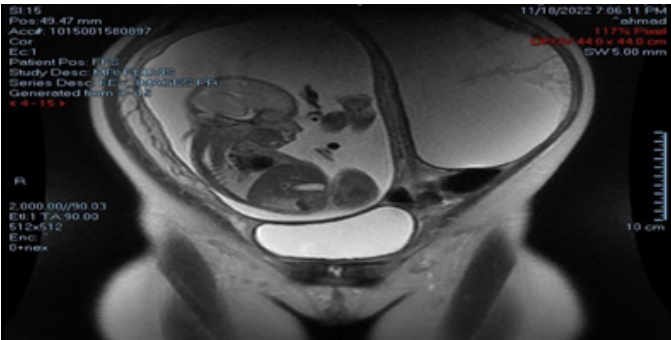


Figure 2 CT pulmonary angiogram showing bilateral pulmonary emboli (arrows).

Echocardiography: Revealed dilated RV, moderate tricuspid regurgitation, and elevated RV/LV ratio (>1), indicating RV dysfunction (Figure 3).

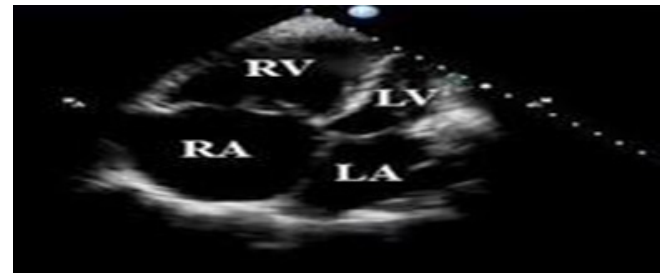


Figure 3 Echocardiogram showing Dilated RV.

Treatment

A multidisciplinary PERT (obstetrics, cardiology, interventional radiology, critical care) was activated. Given the high-risk submassive PE, recent surgery, and pregnancy, ultrasound-assisted CDT using the EkoSonic® system was recommended based on a high BOVA score of 5 (Table 1).¹⁰

Table 1 BOVA Score

Risk Modifiers	Score
Systolic BP 90 – 100 mmHg	2p
Elevated Cardiac Troponin	2p
RV Dysfunction	2p
On TTE: RV/LV ratio >0.9, sPAP >30, RV end-diastoli) diameter >30mm, RV dilation, or free wall hypokinesis.	
On CT: RV/LV ratio >1 (short axis)	
Pulse >= 110bpm	1p

rtPA infusion (1mg/h for 5 hours, then 0.5 mg/h for 15 hours) was initiated. Repeat echocardiography at 15 hours showed minimal improvement in RV function, prompting extended thrombolysis (Figure 4).

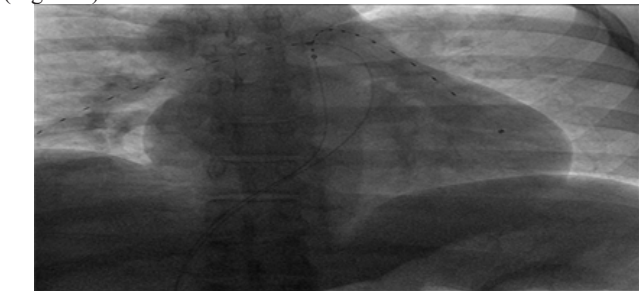


Figure 4 Angiogram demonstrating catheter placement for CDT.

Outcome and follow-up:

Post-CDT, the patient’s respiratory status improved, and oxygen requirements decreased. Repeat echocardiography showed resolved RV strain with normalized RV/LV ratio (0.8). She delivered a healthy infant via Cesarean section at term. Postpartum anticoagulation with LMWH was initiated and continued. Both mother and infant were discharged in stable condition.¹¹

Discussion

Managing PE during pregnancy requires balancing maternal and fetal safety.¹² Systemic thrombolysis, while effective, carries bleeding risks (placental abruption, fetal intracranial hemorrhage).¹³ CDT’s localized tPA delivery potentially reduces these risks.¹⁴ The ULTIMA trial demonstrated ultrasound-assisted CDT safety and efficacy in intermediate-risk PE.¹⁵

This case illustrates successful CDT use in a pregnant patient with high-risk submassive PE after recent surgery. The PERT’s collaborative approach was crucial, considering the patient’s gestational age, surgical history, and instability. Extending thrombolysis based on echocardiographic findings underscores the importance of continuous monitoring and individualized treatment.

While CDT has risks, this case and others demonstrate its potential safety and efficacy in select pregnant patients with PE, especially when systemic thrombolysis is contraindicated or high-risk. Ultrasound-assisted CDT may enhance safety through more precise thrombolytic delivery.

Conclusion

Catheter-directed thrombolysis is a viable and potentially life-saving intervention for high-risk submassive PE in pregnancy, especially when systemic thrombolysis is contraindicated or high-risk. A multidisciplinary PERT approach is crucial for optimizing maternal and fetal outcomes.

Learning points

- a) Consider CDT for high-risk submassive PE in pregnancy to minimize systemic thrombolysis-associated bleeding risks.
- b) Multidisciplinary PERTs enhance decision-making in complex obstetric PE cases.

Timely imaging and hemodynamic assessments guide therapy.

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