

# A Pregnant Woman with Acute Massive Pulmonary Embolism

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A 30-year-old pregnant woman who suffered from massive pulmonary embolism presented in an unstable hemodynamic status. Angiojet catheter embolectomy and extracorporeal membrane oxygenation (ECMO) were performed, which caused the patient's condition to improve. Use of ECMO was continued during the weaning program, but the patient died of intracranial hemorrhage, a complication of ECMO.

**Key Words:** Angiojet • Extracorporeal membrane oxygenation (ECMO) • Pregnancy • Pulmonary embolism • Thromboectomy

## INTRODUCTION

It is difficult to make a diagnosis of acute pulmonary embolism in medical patients, with a reported average time to diagnosis of  $6.95 \pm 8.5$  days.<sup>1</sup> Here we presented a 30-year-old pregnant woman who suffered from massive pulmonary embolism presented in an unstable hemodynamic status.

## CASE REPORT

A 30-year-old pregnant woman (G<sub>4</sub>P<sub>1</sub>AA<sub>0</sub>SA<sub>2</sub>) had a history of syncope during her first pregnancy. Because the condition had not reoccurred, she was not overly concerned during her current pregnancy. At 36 weeks and 5 days, she experienced chest pain, although the pain resolved spontaneously. However, 6 hours later she complained of chest tightness with dyspnea and was

brought to our emergency department where electrocardiography (ECG) showed sinus tachycardia and S1Q3T3 pattern (Figure 1). She denied a family history of cardiac events, smoking, or other chronic diseases. Neither chest X-ray nor chest computed tomography (CT) was performed due to concerns over exposing the infant to radiation. Besides, the patient's echocardiography showed right ventricular dilatation (33 mm) with interventricular septum paradoxical motion and mild tricuspid regurgitation, with a trans-tricuspid valve pressure gradient of 38 mmHg. However, arterial blood gas analysis revealed no hypoxia. Under the preliminary diagnosis of pulmonary embolism, the patient was admitted for further treatment.

On the way to the acute care unit, the patient complained of shortness of breath and her consciousness suddenly changed. A subsequent ECG showed pulseless electrical activity and cardiac massage was performed. A thrombolytic agent was injected (tissue plasminogen activator; Actilyse) within 10 minutes and emergency pulmonary angiography was done via the right femoral vein. The image revealed a massive pulmonary embolism over the left main trunk of the pulmonary artery (Figure 2A). After discussing options with the family, it was decided the patient would receive intervention for pulmonary embolism. An Angiojet system (POSSIS; MEDRAD, DVX; vessel diameter: 6-12 mm; 6 Fr; catheter

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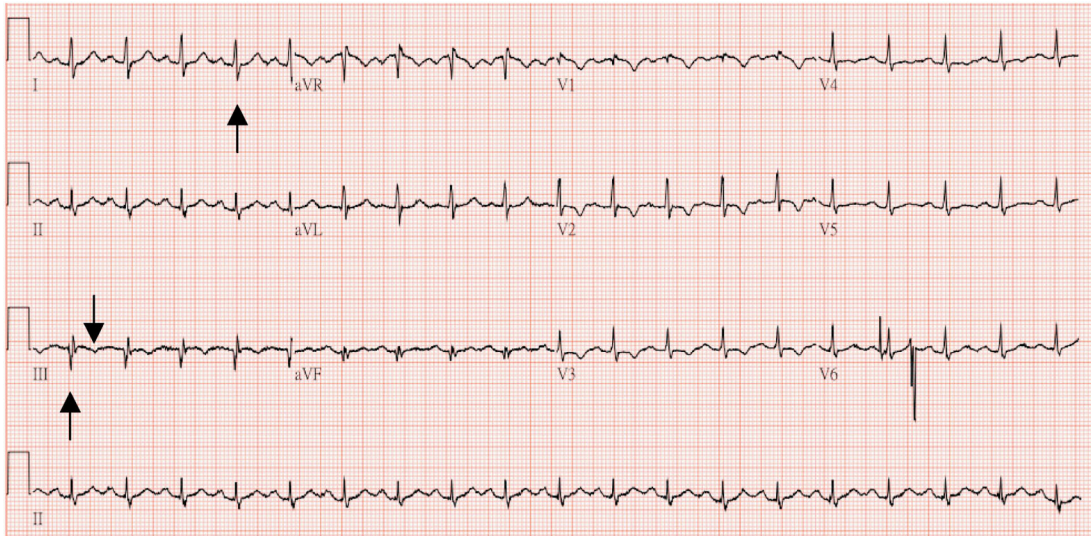


Figure 1. Initial ECG revealed sinus tachycardia and S1Q3T3 pattern (black arrow).

length: 90 cm; flow rate: 60 mL/min) was used to perform thrombectomy (Figure 2B). The final image was clear, with good flow in the pulmonary arteries (Figure 2C). Extracorporeal membrane oxygenation was used because of her unstable hemodynamic status, and disseminated intravascular coagulation was noted under stress. A blood transfusion for coagulopathy and thrombocytopenia was then performed, after which her laboratory data and vital signs improved. An emergency caesarean section delivery was performed and the fetus survived. Subsequent echography revealed a normal size heart without pulmonary hypertension. The patient was then weaned from the extracorporeal membrane oxygenation. On the seventh day after admission, the patient's pupils were observed to be asymmetrical, and emergency brain CT revealed intracranial hemorrhage located over both the right frontal lobe and the intraventricular area. The neurosurgeon explained the poor prognosis of such a development due to the midline shift and dilated pupils. After fully considering the likelihood of surgical success and also the potential economic consequences, the family gave up aggressive treatment. Unfortunately, the patient expired later that same day.

## DISCUSSION

The overall incidence of acute pulmonary embolism

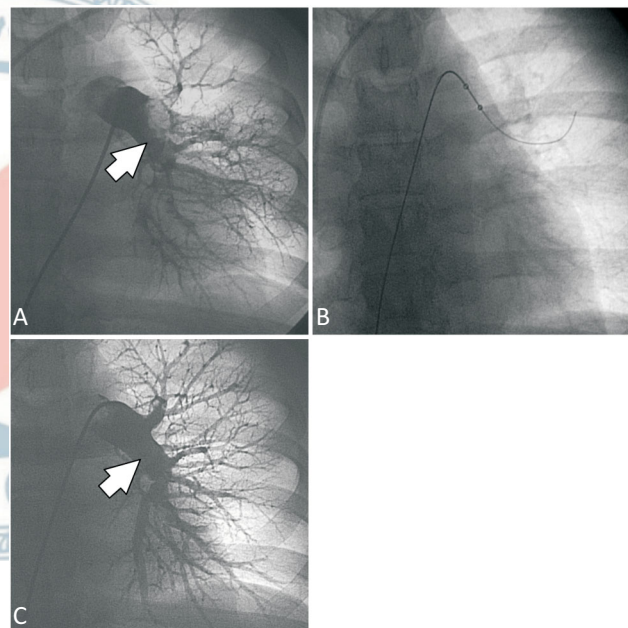


Figure 2. (A) Pulmonary angiography showed massive thrombus (White arrow) in left pulmonary main trunk. (B) Angiojet was used for embolectomy. (C) Pulmonary angiography after catheter embolectomy. The amount of thrombus decreased and distal flow improved.

is 0.004% per year, and the reported incidence has increased with the use of spiral computed tomography. The most common etiology of acute pulmonary embolism is deep vein thrombosis (DVT). Approximately 79% of pulmonary embolism patients have a history of DVT, and 50% of patients with DVT are diagnosed with pulmonary embolism. During pregnancy, the incidence of



venous thromboembolism has been reported to be 5 to 12 per 10,000 pregnancies, which is 7 to 10 times the incidence found in females of the same age who are not pregnant.<sup>2</sup> The incidence of DVT in each of the three trimesters is similar. Among post-partum women, the incidence of venous thromboembolism is approximately 3 to 7 every 10,000 deliveries, which is 15 to 35 times that of females of the same age who are not pregnant.<sup>3</sup> DVT is most commonly distributed in the left side.<sup>4</sup>

The possible mechanisms of DVT in pregnancy are: (1) venous stasis; (2) vascular damage; and (3) hypercoagulability, such as decreased levels of protein S, increased protein C resistance and higher concentrations of fibrinogen and Factor V, IX, X, and VIII. These mechanisms are known as Virchow's triad.

In making a diagnosis of acute pulmonary embolism in pregnancy, laboratory data and imaging should be considered. Laboratory data show hypoxia and elevation of D-dimer, troponin-I (the level of heart injury), and NT-pro BNP (a biomarker of heart failure).<sup>5</sup> However, the cut-off point of D-dimer is not clear in pregnancy, because the concentration of D-dimer in pregnancy is higher than the usual cut-off point (500 ng/mL).<sup>6</sup> Imaging methods include heart echography, pulmonary angiography, perfusion lung scan and chest CT. However, care should be taken to avoid exposing the infant to radiation. Before CT or nuclear medicine examination, heart echography is the first recommend examination.<sup>6</sup> The estimated radiation absorbed by a fetus during a chest CT is about 0.03 to 0.13 mSV, equal to 2 to 13 chest X-rays,<sup>8</sup> and about 2.2 to 3.7 mSV in pulmonary angiography, equal to 220 to 370 chest X-rays.<sup>7</sup> However, there is no definite evidence of radiation injury to the fetus, although contrast may cause hypothyroidism. Therefore, routine survey of the thyroid function of the fetus in the first week is suggested.<sup>9</sup>

For the treatment of massive pulmonary embolism in patients with unstable hemodynamic status, thrombolytic agents, surgery and catheter embolectomy are suggested.<sup>5</sup> However, anticoagulant medications or thrombolytic agents such as warfarin, heparin, low molecular weight heparin, and tissue plasminogen activator are not all suitable for pregnancy. For these reasons, surgical intervention or catheter embolectomy should be considered in pregnancies with massive PE.

Some studies have reported high success and sur-

vival rates with the use of catheter embolectomy.<sup>10</sup> However, there were no data on the number of admission days, ICU (intensive care unit) days, recurrence rate, quality of daily life, and total motility rate in those studies. Because ECMO can cause complication, such as ICH, it is necessary to monitor the patient's neurogenic symptoms/signs, and the device should be removed as soon as possible. As advances continue to be made in interventional catheter techniques, catheter embolectomy may be a good choice of treatment in pregnancies with massive pulmonary embolism.

## CONCLUSIONS

It is difficult to diagnose pulmonary embolism in the emergency department, especially massive pulmonary embolism. Pregnancy is a risk factor, although pregnant status limits the choice of tools that can be used to make a diagnosis due to concerns about fetal exposure to radiation, and the choice of medications that can be given to pregnant women. Clinicians should keep a diagnosis of pulmonary embolism in mind, especially in pregnant women with dyspnea or chest tightness. As improvements are made in vascular intervention techniques, non-invasive modalities may become the treatment of choice.

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