



## Acute High-Risk Pulmonary Embolism after Clavicle Fracture

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### Abstract

Pulmonary embolism refers to the obstruction of the main pulmonary artery or its branches by thrombus from the venous system, resulting in the disturbance of pulmonary circulation and respiratory function. Fatal pulmonary embolism from upper extremity venous thrombosis is rare, and the axillary and subclavian veins are the most common sites of upper extremity deep venous thrombosis. The following is a report of a successful rescue case of acute pulmonary embolism caused by subclavian vein thrombosis after clavicle fracture surgery in Changsha Central Hospital.

### Clinical Data

A 60-year-old male patient was admitted to the Department of Thoracic Surgery of our hospital due to "right chest and back pain caused by a fall 2 h ago". On admission, there was no abnormality in the heart, lungs and abdomen, the electrocardiogram was normal, and the coagulation function was normal. The admission diagnosis was: 1. Right clavicle fracture 2. Right multiple rib fractures 3. Lung contusion 4. Multiple soft tissue contusions. After completing the preoperative examination, the patient underwent open reduction and internal fixation of the right clavicle fracture under general anesthesia with a plate and screw. The fracture was reduced during the operation, and an 8-hole bone plate was used for fixation. On the 2<sup>nd</sup> day after the operation, the patient developed right upper limb swelling, platelet count was  $73.00 \times 10^9/L$ , prothrombin and fibrinogen were normal, and the right upper limb was suspended and immobilized. On the 3<sup>rd</sup> day after the operation, the patient had a cough with a small amount of yellow and white sputum. Color Doppler ultrasonography showed: Thrombosis in the middle of the right subclavian vein, and no obvious abnormality in the color Doppler ultrasonography of both lower extremities (Figure 1a). Warfarin anticoagulation therapy was given. After 3 days of anticoagulation therapy, the patient developed dyspnea, shortness of breath, and pale complexion. Physical examination: Hr 133 times/min, 33 times/min, Bp 133/95 mmHg, SPO<sub>2</sub> 78%, auscultation of the right lung with low breath sounds, regular heart rhythm, and hyperactivity of P<sub>2</sub>. Immediate blood gas analysis was: PH 7.45 PCO<sub>2</sub> 26.9 mmHg, PO<sub>2</sub> 47.0 mmHg, SO<sub>2</sub> 86.5% and emergency pulmonary artery CTA showed: The main pulmonary artery, left and right pulmonary artery and various branches of extensive embolism (Figure 1b, 1c). Immediately, he was sent to the intervention room for pulmonary angiography + drug thrombolysis (Figure 1d). Intraoperative intubation of the pulmonary trunk angiography showed a huge filling defect of the left pulmonary artery, and no development of the left lower pulmonary artery. Postoperative blood gas analysis was: PH: 7.50 PCO<sub>2</sub>: 34 mmHg, PO<sub>2</sub>: 80 mmHg, SPO<sub>2</sub>: 97%; Lac: 0.9 mmol/l platelets  $110 \times 10^9/L$ . After surgery, he was transferred to ICU. His coagulation function was monitored and anticoagulation, heart rate; blood pressure management and routine supportive treatment were given. He was taken off the ventilator 48 h after surgery. One week after the operation, chest CT showed that the absorption of the infected lesion in the right lower lung decreased and the pleura was slightly thickened on both sides. Pulmonary embolism was significantly reduced. After discharge, oral anticoagulant therapy was given at home for 3 months and then the drug was stopped. After 2 years of follow-up, there were no complications such as recurrent thrombosis and organ bleeding.

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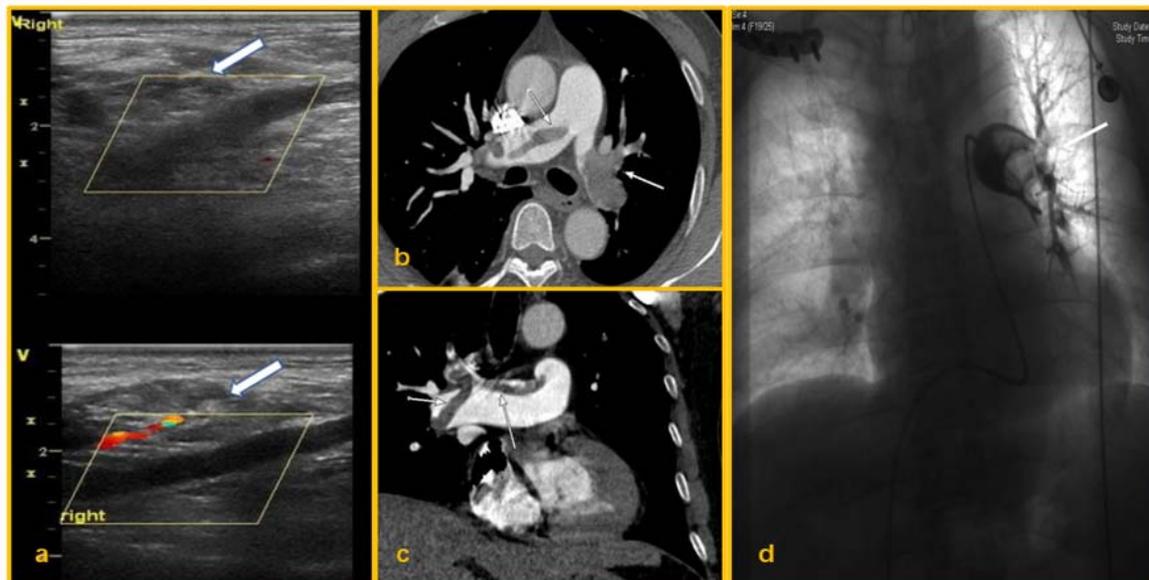
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**Figure 1:** a) Vascular ultrasonography shows thrombosis in the left subclavian vein; b, c) Tomography shows thrombosis in pulmonary artery; d) Angiography showing pulmonary artery filling defect.

## Discussion

Thrombosis in upper extremity veins accounts for 2% to 20% of deep vein thrombosis [1,2]. The industry believes that the circumference of the subclavian vein is smaller than the diameter of the main pulmonary artery, and it is unlikely that pulmonary embolism, respiratory failure, or cardiac arrest will occur if the upper extremity venous thrombosis falls off. In the past 20 years, the incidence of upper extremity venous thrombosis has been on the rise. Secondary upper extremity venous thrombosis caused by trauma or perioperative period has an acute and insidious onset, which can be easily overlooked by clinicians, thus causing delayed diagnosis and treatment. Therefore, its true incidence may be higher and the thrombosis of the upper extremity vein should also receive due attention like the thrombosis of the superior vena cava of the lower extremity [3]. In 1986, Hoffman and Greenfield successfully performed the first case of superior vena cava filter insertion. In recent years, scholars at home and abroad have performed superior vena cava filter placement through the femoral vein, which has achieved good results in preventing the occurrence of fatal pulmonary embolism in upper extremity vein thrombosis, but attention should also be paid to the possibility of vascular perforation caused by the filter. Generally, the diameter of the superior vena cava is within the applicable range of the inferior vena cava filter, so the inferior vena cava filter is mainly placed in reverse. The grasp of surgical indications is basically the same as that of inferior vena cava filter placement, and regular and sufficient anticoagulation and thrombolytic therapy are given during the course of treatment. The patient with right clavicle fracture was found to have subclavian venous thrombosis and was treated with anticoagulation. On the 3<sup>rd</sup> day after the operation, he had sudden dyspnea, shortness of breath, pale complexion, and decreased oxygen

saturation. The pulmonary artery CT and pulmonary angiography were diagnosed as pulmonary artery in this case embolization, decisive thrombolysis, although the rescue was successful, initially when the right upper limb was swollen, the swelling did not subside significantly after anticoagulation. The anticoagulation effect and coagulation function were not monitored, and the vascular ultrasound and the circumference of the upper limb should be reviewed every day to understand the increase or decrease of thrombus. Whether the thrombus is floating and the risk of attaching to the wall or falling off, the treatment experience is not good, to which clinicians should pay attention [4].

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