

## Removal of pulmonary artery emboli under cardiopulmonary bypass using deep hypothermic circulatory arrest

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### ABSTRACT

The operative removal of thrombo-emboli from the pulmonary arteries in acute pulmonary embolism is an accepted method of treatment. Under deep hypothermic circulatory arrest for 35 minutes without any neurological insult is not a common surgery and is always associated with life threatening risk. The removal of thrombi that have been present for many months has been attempted and resulted in dramatic clinical improvement. A plea is made for a more radical approach to thrombo-embolic pulmonary hypertension when a local obstruction can be demonstrated.

**Keywords:** pulmonary artery embolism, deep hypothermic circulatory arrest, pulmonary CT angiography

### INTRODUCTION

Pulmonary artery embolism presents as an acute emergency with all the vitals deranged. The causes leading to it are deep vein thrombosis, air, etc.<sup>1-3</sup> Diagnosis is made mainly by pulmonary CT angiography. It is a rare medical anomaly with long history, and is having high mortality rate of 50% in current scenario.<sup>2</sup> Cardio-pulmonary bypass with deep hypothermia and cardiac arrest (DHCA) recently established as useful instrument in surgical removal of pulmonary artery embolism.<sup>1-3</sup> This requires clear collaboration of anesthesiologists, CT surgeons, perfusionist using cardiopulmonary bypass on heart lung machine adequately.

### CASE REPORT

A 26yr old man was admitted with complaint of cough and breathlessness. Clinical examination revealed a pulse rate of 110 and 30/minute and BP of 107/60. There was decreased bilateral air entry, more on the right side. Blood investigations revealed Hb-13.9gm/dl, TLC-4.26, platelet count-0.92 lac, total bilirubin-2.0mg/dl, SGOT and SGPT as 79 and 86 respectively. Coagulation profile showed PT-14.75 sec, BT -2.5 sec, CT-5 sec. The international normalized ratio was 1.34. X-ray chest showed moderate right sided pleural effusion.

Elective surgery was planned. Pulse oximetry revealed an oxygen saturation of 89%. 100% oxygen was administered to make the saturation 96%.

Diazepam 5mg, Inj Rocuronium 50mg were given intravenously. Inj Fentanyl 500µg (10mg/kg) was given slowly after dilution. Bispectral index monitor was applied on the forehead, and after induction the reading was noted as 50. He was maintained on vecuronium, fentanyl, and isoflurane. Inj Heparin 4mg/kg was administered. Heart was cannulated and the patient was taken on CPB. Pt was given mannitol 0.5gm/kg body weight. The patient was gradually cooled and the temperature was brought down to 20 degree Celsius and the circulation was arrested. Inj methyl prednisolone 1gm iv was given, Inj Thiopentone 1gm iv was put in the pump just before the circulatory arrest.

First the right pulmonary artery was opened and a big thrombus with 7-10 branches (Fig.1) was taken out. Then on the left side another big size thrombus was removed after pulmonary artery embolectomy. The total time was 2 hrs and 38 minutes, and the total circulatory arrest time was 35 minutes.

Fig 1. Thrombus from right pulmonary artery



The patient was rewarmed gradually and the temperature was brought back to 37 degree celsius. By decreasing the flows gradually the patient was off bypass. The systolic blood pressure was 70mmHg. Dopamine 15 micro drops/minutes was started in a syringe pump. Inj milrinone was started in another syringe pump with 8-10 micro drops/minute. The rationale for starting milrinone was to support dilated and hypokinetic right ventricle. The BP came to 110/70 and inj protamine 300 mg after double dilution was started. Haemostasis was done and sternum was closed after the ACT read 90 sec.

## DISCUSSION

Pulmonary artery embolism is a blockage of the main artery or its branches by an embolus which has come mainly from deep vein thrombosis of the lower extremities. The thrombus breaks and lodges in the arteries. Other causes of embolisation are air, fat or amniotic fluid. Because of obstruction of blood flow in the lungs there is a back pressure on the right ventricle and right atrium of the heart that leads to chest pain, difficulty in breathing, cough etc. Clinical signs include a decrease in oxygen saturation, cyanosis, increased respiratory rate and an increase in heart rate.<sup>1,2</sup>

The basis of diagnosis is clinical findings, laboratory

tests, imaging tests like CT Pulmonary angiography. Treatment includes starting of anticoagulants like warfarin and heparin, thrombolytic drugs such as tissue plasminogen activator and also surgical intervention like in this case via pulmonary thromboembolectomy using cardiopulmonary bypass.<sup>2,3</sup> Deep hypothermic circulatory arrest is done usually in surgeries of the aortic arch or brain, but in this case, it was done to have a clear field.

## CONCLUSION

We conclude that pulmonary thromboembolectomy using deep hypothermic circulatory arrest is a rare surgery. In this case, careful rewarming with close monitoring of cerebral activities, deep anaesthesia and haemodynamic stability are decisive of a favourable outcome.

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