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EKOS™
Endovascular System

Massive Pulmonary Emboli Salvaged with Ultrasound-Assisted Catheter Directed Thrombolysis

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Patient History

The patient was admitted to the Emergency Department (ED) with constipation. Whilst in the ED, he had a pulseless electrical activity (PEA) cardiac arrest.

- He underwent four cycles of cardiopulmonary resuscitation (CPR) and one dose of adrenaline; subsequent return of spontaneous circulation (ROSC) was achieved.
- The ECG post arrest showed left bundle branch block (LBBB) and echocardiography demonstrated right ventricular strain.
- CTPA demonstrated bilateral central pulmonary emboli and right heart strain **(A)**.
- CT brain was also performed but did not show acute intracranial pathology.
- The patient was transferred to Intensive Care, where he was intubated and commenced on a metaraminol infusion (20mg/hr) to maintain blood pressure.

Treatment Plan

The CTPA had revealed rib fractures (presumably from the chest compressions during CPR) and a possible small liver laceration (B), hence the plan was to treat with ultrasound-accelerated catheter-directed thrombolysis.

Treatment

- US-guided right CFV puncture was performed and a 12F, haemostasis triple-lumen introducer sheath was placed.
- 5F multi-purpose catheter and angled hydrophilic wire were used to access the main pulmonary trunk. At this stage, the patient decompensated and lost cardiac output. Hence 10mg of rtPA were administered into the main pulmonary trunk and CPR commenced.
- After one cycle of CPR lasting three minutes, good pulses and output were established.
- The procedure was resumed and EKOS catheters (12cm working length) were placed into both pulmonary arteries and thrombolysis treatment commenced **(C)**.
- The procedure time was 31 minutes (including the CPR).

"Patient had an excellent outcome, with complete resolution of the PE, despite multiple cardiac arrests and need for prolonged CPR."

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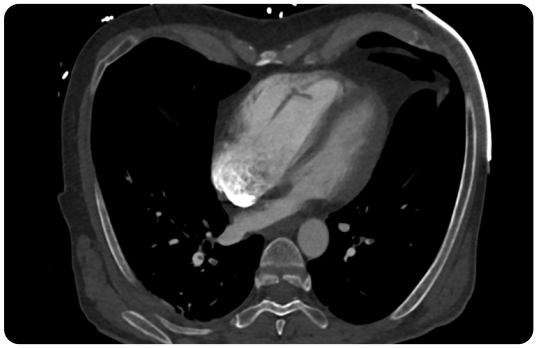
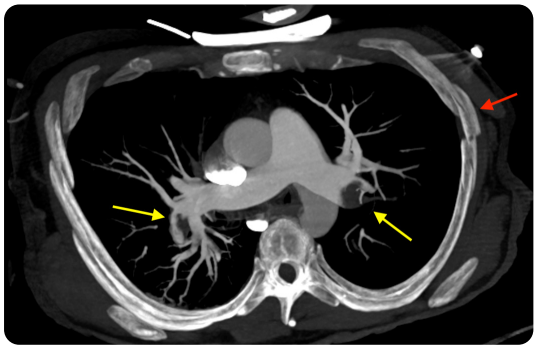
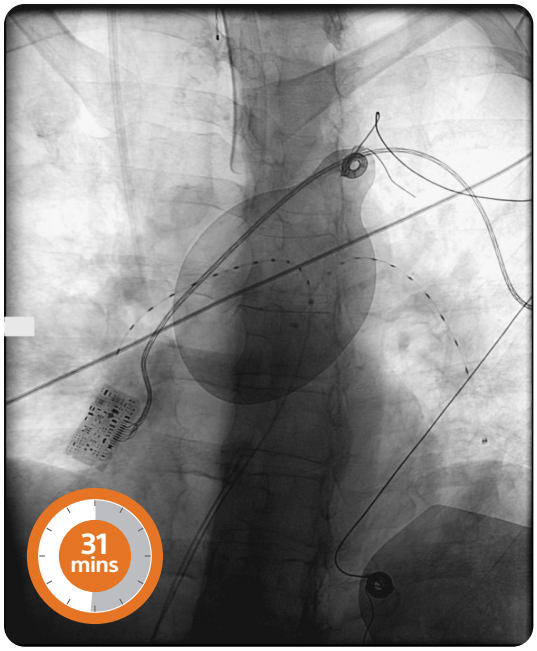


(A) Pre-Procedure: 'Four chamber' view of the heart demonstrating elevated RV/LV ratio in keeping with marked right heart strain.



(B) Pre-Procedure: CTPA demonstrating bilateral pulmonary emboli (yellow arrows) and rib fractures (red arrow) from CPR.

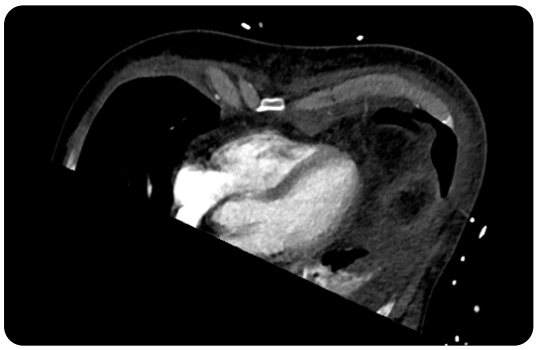


(C) EKOS Procedure: Procedural image after EKOS catheters have been placed in both pulmonary arteries. The CPR pads are projected over the chest and the patient is intubated.

CASE STUDY: PULMONARY EMBOLISM

Results

- Thrombolysis was stopped after 15 hours and the patient was commenced on unfractionated heparin.
- Within 48 hours, the patient was self-ventilating with 2L/minute oxygen via nasal cannula and SpO2 94-98%. At this stage he was stepped down from intensive care.
- The CTPA performed four days later showed resolution of thrombus and reversal of right heart strain **(D & E)**.
- Given the need for prolonged CPR, CT brain and EEG were performed. These did not show any evidence of hypoxic ischaemic encephalopathy.
- He was discharged home nine days after treatment on rivaroxaban. His next of kin reported that he is doing well.



(D) Post Procedure: 'Four chamber' view of the heart demonstrates normalisation of right heart strain.

(E) Post Procedure: CTPA performed four days later demonstrates resolution of the pulmonary emboli

Conclusion

- Despite the multiple cardiac arrests and cycles of CPR, complete resolution of this patient's massive pulmonary emboli was achieved using ultrasound-assisted catheter-directed thrombolysis.

Abbreviations

ECG: Electrocardiogram
EEG: Electroencephalogram
CFV: Common femoral vein
CPR: Cardiopulmonary resuscitation
CT: Computed tomography
CTPA: Computed tomography pulmonary angiogram
LBBB: Left bundle branch block
PEA: Pulseless electrical activity
ROSC: Return of spontaneous circulation
rtPA: Recombinant tissue plasminogen activator
RV/LV: Right ventricular/left ventricular

Product availability varies by country. Indications: Prior to use, please refer to the applicable Instructions for Use (IFU) for complete product indications, contraindications, warnings, and precautions. Caution: Federal (USA) law restricts this device to sale by or on the order of a physician.

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