Pulmonary Embolism (PE)

How to thrombolyse if thrombolysis is contraindicated...???

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Disclosure

Speaker name: Jan Beyer-Westendorf

I have the following potential conflicts of interest to report:

- Consulting: speakers honorary for EKOS Ltd.
- Employment in industry
- Stockholder of a healthcare company
- Owner of a healthcare company
- Other(s)
Relevance of pulmonary embolism
Fatal PE in a 25 year old girl, just on the steps of our ER...
Mortality risk reduction from thrombolysis (RRR 47%; NNT 59) is counterbalanced by major bleeding (NNH 18) and intracranial bleeding (NNH 78).

Meta-analysis (16 RCT, 2115 patients)
High bleeding risk is a contraindication for systemic thrombolysis.
Case 1:
- male, 59 y; underwent hemihepatectomy for singular liver metastasis of neuroendocrine tumor
- 2 days post surgery on ICU shock, acute respiratory failure, catecholamines, intubation
- Diagnosis of massive PE (RV diameter 56 mm)
Ultrasound accelerated thrombolysis?

EKOS EkoSonic® Mach 4e Endovascular System

- Infusion side-hole catheter with a multi-element ultrasound core
- 12 cm nominal treatment zone length typically used for PE therapy
EKOS in PE: the ULTIMA trial

- 59 intermediate-risk PE pts. with relevant RV dysfunction randomized for „EKOS thrombolysis + heparin“ vs. „heparin alone“

- Primary endpoint: reduction in RV diameter after 24 hours

Kucher et al.; Circulation. 2014 Jan 28;129(4):479-86
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- **EKOS**: mean RV/LV ratio **reduced** from $1.28\pm0.19$ at baseline to $0.99\pm0.17$ at 24 hours ($p<0.001$)

- **Heparin alone**: mean RV/LV ratio **not reduced** at 24 hours ($1.20\pm0.14$ and $1.17\pm0.20$; $p=0.31$).

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- EKOS: mean rt-PA dosage 10 mg/10 hours in unilateral and 20 mg/10 hours in bilateral EKOS treatment

- EKOS: no major bleeding, all patients alive at day 90

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- 2 days post surgery on ICU shock, acute respiratory failure, catecholamines, intubation
- Diagnosis of massive PE (RV diameter 56 mm)
- Local EKOS thrombolysis over 14 hours (5 mg rt-PA bolus, 1 mg/h) = 19 mg total
- Drainage: 300 ml old blood (normal)
- Extubation 2 days later
- Discharge from hospital 14 days post surgery
- Now 2 years later well-being
Case 2:
- male, 32 years, underwent pancreatectomy for neuroendocrine malignancy
- MEN 1-syndrome, multiple gastric ulcers Forrest IIc
- 5 days post surgery on normal ward acute respiratory deterioration, tachycardia, catecholamines
- Diagnosis of massive PE (RV diameter 55 mm, RVEF 20%, RVESP 55 mm Hg)
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- male, 32 years, underwent pancreatectomy for neuroendocrine malignancy
- MEN 1-syndrome, multiple gastric ulcers Forrest IIc
- 5 days post surgery on normal ward acute respiratory deterioration, tachycardia, catecholamines
- Diagnosis of massive PE (RV diameter 55 mm, RVEF 20%, RVESP 55 mm Hg)

- Local EKOS thrombolysis (5 mg rt-PA bolus left and 5 mg bolus right PA) followed by rt-PA 1 mg/h over 24 hours = 32 mg total
- No relevant bleeding
- 30 hours later RV moderately dilated, RVEF 40% RVESP 35 mm Hg; transfer to surgical ward
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- No relevant bleeding
- 30 hours later RV moderately dilated, RVEF 40% RVESP 35 mm Hg; transfer to surgical ward
- 3 days later massive bleeding from splenic artery (unrelated to thrombolysis; bleeding due to arterial rupture due to local infection post surgery)
- Death due to hemorrhagic shock
Case 3:
- female pt.; 38 years, progressive dyspnoe for 4 days
- arrives in ER after collapse, syncope (app. 5 min) and blunt head trauma
- forehead with large bruise
- blood pressure normal but heart rate 160 bpm, troponin markedly increased
- echo: massive right heart dilatation, RVESP app. 70 mm Hg
Case 3:
Case 3:
- EKOS thrombolysis: 12 mg alteplase (rt-PA)/10 hours
- drastic improvement of symptoms and RV dysfunction within 10 hours
- no bleeding, no increase of forehead hematoma
- discharge day 8
- 3 years later well-being

Acute PE

6 months FU
conclusion:

- most PE patients do not require thrombolytic therapy

- if thrombolysis is required, systemic thrombolysis still is the standard of care but bleeding risk is high

- if thrombolysis is indicated but not feasible due to high bleeding risk, CDT (preferably with ultrasound acceleration) could be an option, if catheter system and expertise is available

- further studies are needed to evaluate different CDT systems and thrombolysis regimens in patients with high-risk PE and high bleeding risk
Thank you!

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