

The Newcastle upon Tyne Hospitals NHS Foundation Trust

Administration of Thrombolysis for Massive Pulmonary Embolism (PE)

1 Introduction

The need to use thrombolysis in “massive” pulmonary embolism is rare but there is some evidence to suggest that in patients who have a pulmonary embolism large enough to cause cardiovascular compromise or cardiac arrest then thrombolysis confers a survival benefit¹ and should be instigated as soon as possible².

2 Guideline scope

This guideline is for the emergency management of patients with “massive” pulmonary embolism who either have cardiovascular compromised or in cardiac arrest.

3 Main Body of the guideline

Massive PE is defined³ as:

- Cardiac arrest – either actual or imminent “peri-arrest”
- Systolic blood pressure <90mmHg for at least 15 minutes with no other identifiable cause or hypotension requiring inotropic or vasopressor support
- Bradycardia <40 bpm with signs of instability as per ALS guidelines (syncope, chest pain/ischaemia, heart failure)

Alteplase (rt-PA (tissue type-plasminogen activator)) is the treatment of choice to thrombolysate massive pulmonary embolism. It should be reconstituted in water for injection or 0.9% saline. It is **not** compatible with 5% dextrose.

In cardiac arrest

A single 50mg vial of alteplase should be made up in 50ml of water for injection or 0.9% saline and administered as a “push” bolus over 1-2 minutes.

This should be followed by a loading dose of heparin (75units/kg) followed by a heparin infusion using factor Xa levels to monitor as per the heparin guideline.

Non-cardiac arrest

Two 50mg vials of alteplase should be made up in 50mls of water for injection or 0.9% saline.

A bolus dose of 10mg (5mls) should be administered over 1-2 minutes.

An infusion of the remaining 90mg (45mls) should be administered via a syringe driver over 2 hours.

NB for patients who weigh less than 65kg a dose of 1.5mg/kg should be used – giving 10% as a bolus followed by 90% as an infusion over 2 hours as above.

This should be followed by a therapeutic dose of low molecular weight heparin e.g. 175units/kg.

Contraindications to thrombolysis

Below is a standard list of contraindications – it is thought that the risk vs benefit of thrombolysis in massive PE tends towards thrombolysis – especially if the patient is in cardiac arrest but these should be considered on a case by case basis.

Relative:

- Prior anticoagulant use
- Active peptic ulcer disease
- Advanced liver disease
- Pregnancy

Absolute:

- Current bleeding – intracranial, internal, external
- Stroke – ischaemic within last 6 months or haemorrhagic at any time
- Recent spinal surgery or lumbar puncture
- Known cerebral tumours or metastasis
- Known bleeding disorder

Side effects of alteplase

- Hypotension
- Hypertension
- Anaphylaxis
- Severe bleeding
- Arrhythmias – usually heart block or bradycardia

4 Training, Implementation, Resource Implications

This guideline is intended as an aide-memoir in an emergency to remind clinical and nursing staff of the doses and administration of thrombolysis in the emergency management of massive pulmonary embolism.

5 Monitoring Section

Monitoring will be by the use of this guideline in the rare event of needing to thrombolyse a massive pulmonary embolism.

6 Evidence Review and Evaluation

Evidence from the British Thoracic society guidelines⁴ and NICE clinical knowledge summary⁵.

7 References

1. Thabut G, Thabut D, Myers R, et al. Thrombolytic therapy of pulmonary embolism: a meta-analysis. *J Am Coll Cardiol* 2002;40:1660–7.
2. Daniels LB, Parker JA, Patel SR, et al. Relation of duration of symptoms with response to thrombolytic therapy in pulmonary embolism. *Am J Cardiol* 1997;80:184–8.

3. Jaff M. Management of Massive and Submassive Pulmonary Embolism, Iliofemoral Deep Vein Thrombosis, and Chronic Thromboembolic Pulmonary Hypertension. A Scientific Statement From the American Heart Association. 2011.
4. British Thoracic Society guidelines for the management of suspected acute pulmonary embolism British Thoracic Society Standards of Care Committee Pulmonary Embolism Guideline Development Group Thorax 2003;58:470–484
5. NICE clinical knowledge summary – accessed from <https://cks.nice.org.uk/pulmonary-embolism>