Guideline: Thrombolysis for Pulmonary Embolism (PE)

Purpose

This guideline is designed to provide guidance with the use of thrombolysis in the management of patients with pulmonary embolism (PE). Although the benefit of thrombolysis is established in massive PE, the benefits of thrombolysis remain unclear in the submassive group and the decision to thrombolyse needs to be made on a case by case basis.

Scope of Use

All ED and General Medical staff.

Guideline

Indications

Massive PE

- Haemodynamic instability
  - Systolic BP <90mmHg for >15min
  - BP fall by >40mmHg
- Cardiogenic shock
- Cardiac arrest secondary to PE

Submassive PE

Normotensive patients with **extensive clot burden** on CT (saddle embolus or involving main pulmonary artery) *consider* on case by case basis if also one or more of the following – eg RV strain plus troponin rise – RV strain on CTPA alone is probably insufficient:

- Acute RV strain on CTPA (marked enlargement of RV with flattening of the interventricular septum) without evidence of chronic pulmonary hypertension and organised clot
- Severe acute RV dysfunction on echocardiogram (echocardiogram not essential if other indications for thrombolysis already present)
- Elevated troponin
- Elevated BNP
- Significant hypoxaemia and large A-a gradient
- Free floating RA or RV thrombus
- Patients with a PFO

The decision to thrombolyse a PE is to be made following discussion with a Consultant (ICU, and ED and/or Respiratory).

Placement:

Thrombolysis should be initiated as soon as possible within the golden hour (ie. in ED). In certain cases, thrombolysis may be considered up to 24 hours after positive CTPA or beyond but this warrants a case by case discussion with Respiratory.

Symptoms may have been present for up to 72 hours before presentation.

Patients should be admitted to HDU for monitoring.

Regimen

- Enoxaparin prior to CTPA/echocardiogram

  If there is a strong clinical suspicion for PE and no contraindication, enoxaparin should be administered as early as possible. It should not be delayed until after CTPA.
- Dose is 1mg/kg subcutaneous (SC)

Once a decision for thrombolysis has been made, follow this pathway:

(i) **If S/C enoxaparin has not been given,** give IV bolus of unfractionated heparin as per guideline "Commencing IV heparin for treatment of VTE"

otherwise, skip this step and proceed to (ii), below

(ii) Tenecteplase (TNK)

TNK should be administered on the basis of body weight, with a maximum dose of 50 mg (10,000 Units). The volume required to administer the correct dose can be calculated as per the table below:

Patients body weight category	Tenecteplase (units)	Tenecteplase (mg)	Volume of reconstituted fluid
<60Kg	6000 U	30 mg	6 mL
≥60 to <70Kg	7000 U	35 mg	7 mL
≥70 to <80Kg	8000 U	40 mg	8 mL

≥80 to <90kg	9000 U	45 mg	9 mL
≥90kg	10,000 U	50 mg	10 mL

The required dose should be administered as a single intravenous bolus over 5 to 10 seconds.
(For details of tenecteplase preparation, refer below)

(IV) IV infusion of unfractionated heparin

- Start IV infusion of UFH after tenecteplase. **(If SC enoxaparin given, delay UFH infusion by 12 hours – and do not give UFH bolus)**
- APTT monitoring and rate as per guideline "Commencing IV heparin for treatment if VTE"
- Continue for 48 hours until change over to SC enoxaparin.
- SC enoxaparin is 1mg/kg **BD** if Crcl > 30ml/min and **OD** if Crcl < 30ml/min

(V) Warfarin

- Warfarin can be started on Day 2
- Enoxaparin will overlap with warfarin until INR theraupeutic for 48 hours.

Regimen for cardiac arrest

Same as above

Contraindications

These are all relative in a patient who has a life-threatening PE. Each case should be considered on a case by case basis.

- In case of **submassive PE**, there is no proven benefit in patients aged > 75 (above this age risk of bleeding is high, including ICH). For patients with **massive PE**, however, thrombolysis may still be appropriate.
- Patient is for palliative care only (irrespective of diagnosis)
- Significant hypertension (SBP> 180 mm Hg or DBP > 110 mmHg)
- History of recent head injury within 4 weeks,
- History of recent GI haemorrhage within 4 weeks.
- Other major bleeding risk (e.g. major surgery within 2 months, pregnancy, childbirth within previous 30 days, bleeding tendency, active peptic ulcer disease, therapeutic doses of blood-thinning medications).

- Previous intracranial haemorrhage or known structural cerebral vascular lesion
- IVC filter or thrombectomy within last 4 days

References

None

Definitions

Terms and abbreviations used in this document are described below:

Term/Abbreviation	Description
CTPA	Computed tomography pulmonary angiogram
ED	Emergency Department
HDU	High Dependency Unit
ICU	Intensive Care Unit
IVC	Internal vena cava
PE	Pulmonary embolism
PFO	Patent foramen ovale
RA	Right atrium
RV	Right ventricle
SC	Subcutaneous
TNK	Tenecteplase
UFH	Unfractionated heparin

Associated Documents

Other documents relevant to this guideline are listed below:

NZ Legislation	
CMDHB Clinical Board Policies	
NZ Standards	
Organisational Procedures or Policies	Unfractionated heparin guidelines
Other related documents	