British Society of Interventional Radiology
The Royal College of Radiologists
63 Lincoln's Inn Fields
London WC2A 3JW

Pulmonary Embolus Thrombectomy

Credit: Dr Sajal Patel, Dr Nazia Khan

First published in February 2025. Content reviewed in October 2026.

This content is for informational or educational purposes only, and does not constitute professional medical advice or represent a substitute for your own medical judgement. BSIR and the authors accept no liability for any harm, loss or damage occurring as a result of reliance on this information.

Acute pulmonary embolism (PE) can present in a variety of ways, from an incidental asymptomatic pick up on imaging, to a huge saddle embolus presenting an imminent threat to life.

Risk stratification of acute PE can help guide treatment and takes into considering haemodynamic status, imaging and biochemical markers of right heart strain and comorbidities.

Treatment options broadly vary between systemic and locoregional options:

- Systemic anticoagulation can be provided, on an outpatient basis, in stable patients while systemic thrombolysis will require close monitoring in an HDU/ITU setting.
- Locoregional therapies include catheter-directed thrombolysis (CDT) and thrombectomy. CDT delivers a smaller dose of lytic agent directly to the pulmonary vascular bed and requires HDU/ITU support. Thrombectomy provides a valuable treatment option in patients in whom anticoagulation is strictly contraindicated. Thrombectomy may be required as a rescue therapy in an unstable patient and can provide immediate relief of right heart strain.

Operator Considerations

Indications: Intermediate-high or high-risk PE and/or contraindication to anticoagulation or thrombolysis.

Planning: Clinical risk stratification. CTPA to determine clot distribution. Review prior imaging (US or CT), if available, to determine whether groin access is feasible. Rule out ipsilateral iliofemoral DVT.

Preparation: Thrombectomy catheters can vary in size reaching up to 24 Fr and there is a risk of cardiac injury in traversing the right heart. Full anticoagulation is required when using the large bore aspiration catheters.

Duration: 45-90 minutes.

Position: Supine.

Access: Common femoral vein. The smaller thrombectomy catheters may permit the use of the right internal jugular vein but this increases procedural difficulty due to the additional bend the catheter must take traversing the right heart.

Technique: Percutaneous access, traverse the right heart with catheter and guidewire, perform pulmonary angiograms. Cross target thrombus with the wire, position the thrombectomy catheter against the thrombus and aspirate. Repeat until improvement in haemodynamic status or diminishing yield.

Complications: Cardiac injury, pulmonary artery injury, bleeding from access site. Due to the underlying haemodynamic instability of this group of patients, acute deterioration to the point of arrest should be anticipated and prepared for.

Post-procedure instructions: 2-4 hours flat (as tolerated) bed rest depending on the size of groin access sheath and use of closure device.

Anaesthetic Considerations

Preop

- The main aim of preoperative assessment in these patients is to understand their risk profile, taking into account both medical factors and the potential for acute deterioration.

PESI Score

- The 'simplified pulmonary embolism severity index' (sPESI) is a useful way to stratify the severity of a PE and medical therapy should be guided by it.
- Medical history: BMI, IHD, hypertension, history of thromboembolism and cancer.
- Examination: oxygen requirement, NEWS2 score, GCS/AVPU score.
- The higher the score, the higher the risk of mortality.

Right Heart Strain

- RHS is when 70% or more of the pulmonary circulation is obstructed, meaning that the right ventricle has to generate SBP > 50mmHg and MPAP > 40mmHg to maintain perfusion.
- Biochemical markers: Raised NT pro-BNP > 600pg/ml.
- CTPA: right ventricle to left ventricle size ratio >1.

Table 1. Simplified PESI

Low risk	**(≤ 65 class I, 66-85 class II)** **Mortality 1.9%**
Intermediate risk	**(86-105 class III, 106-125 class IV)** **Mortality 18.4%**
High risk	**(>125 class V)** **Mortality 25%**

Intraop

Aim

- Maintain haemodynamic and respiratory stability.

Objectives

Monitoring and IV access

- Basic monitoring as per AAGBI.
- Invasive monitoring, for BP and blood gas analysis.
- Central venous access may be need but should not delay starting the case, also IR may be using neck access.
- A pulmonary artery catheter is not routinely used or recommended and risks arrhythmias.
- Risk of arrhythmia when initially placing the catheter.

Respiratory support

- Avoid hypoxia, hypercarbia or acidosis.
- Supplemental oxygen is usually needed to provide respiratory support in the supine position.

- Avoid positive ventilatory pressure as this will reduce RV preload, increase afterload, and cause hypotension.

Haemodynamic support and IV fluids

- Maintain heart rate (patient will likely be tachycardic and this should be maintained).
- Maintain preload with fluids, aim for euvolaemia but not hypervolaemia.
- Maintain afterload.
- Prevent increase in pulmonary vascular resistance.
- Mechanical aspiration of clot will also aspirate blood.

Anaesthetic technique

1. Local anaesthetic with supportive treatment is the technique of choice unless clinically indicated otherwise. Analgesia will be via local anaesthesia to the skin and simple analgesics e.g., paracetamol.
2. Sedation may be indicated if the patient is struggling to lie flat or experiencing chest pain. Bolus techniques, with alfentanil or fentanyl and midazolam, are preferable to infusion techniques. Opioids may cause bradycardia, in particular a Remifentanil infusion, which will impact cardiac output and cause haemodynamic instability.
3. General anaesthesia should be avoided, if possible. Patients with either haemodynamic or respiratory instability will likely be intubated and ventilated or placed on ECMO prior to coming to theatre.

Postop

- In successfully treated patients, you will see an improvement in respiratory rate and heart rate.
- They should continue to be monitored in a high dependency unit.
- Standard postoperative instructions for groin access, 2 hours supine and 2 hours semi-recumbent, must be followed.
- Check Haemoglobin level if a large volume of blood was aspirated at the time of clot retrieval.

Key points

- These are high-risk patients who are at risk of deterioration at any point during the procedure.
- Risk of arrhythmia throughout the procedure.
- The anaesthetic technique of choice is local anaesthesia with supportive measures.