Aims

- To outline indications for transfer of patients with cardiogenic pulmonary oedema.
- To outline treatment regimens for patients with cardiogenic pulmonary oedema.

Application

EMRS Team members
SAS Paramedics

Patients appropriate for retrieval team activation

Patients with left ventricular failure not responsive to simple measures and who are appropriate for more aggressive treatment.

Advice to GP prior to team arrival

High flow oxygen
Establish I.V. access
Use cardiac monitoring and continuous pulse oximetry if available.
ECG and CXR if resource available.
Treatment with sublingual or buccal nitrates
Furosemide 50mg I.V. or higher dose if already on diuretics. May need to repeat after 30-60 mins (double original dose)
Catheterise
Medical management on scene

Treatment should be escalated in a step-wise manner.
Elevate the head of the bed.
Patients may be most comfortable in a sitting position with their legs dangling over the side of the bed. This allows for reduced venous return and decreased preload.

Consider thrombolytic therapy / PCI if evidence of Acute MI. Discuss with Cardiology at GJNH or ARI.

1. I.V. boluses of GTN 3mg if the patient is haemodynamically stable. His can be repeated every 5-10 minutes. In the compromised patient, GTN boluses may precipitate cardiovascular collapse. Aim for SBP > 100.

Alternatively a GTN infusion – 50mg in 50 ml start at 1 ml/hr, titrate upwards to keep SBP>100

Caution should be exercised if the patient has a fixed cardiac output i.e. aortic stenosis or an undiagnosed ejection systolic murmur

2. Furosemide 50 mg I.V. bolus (if not already given)

3. Consider the use of opiates (titrated iv morphine) for respiratory distress not relieved by nitrates

4. If no improvement, consider assisted ventilation.

Patients with LVF will often benefit from a short (<12hours) period of assisted ventilation. CPAP / BIPAP (see non-invasive ventilation SOP) may be used to increase oxygenation while medical management is optimised. Ventilatory strategies should use PEEP of at least 5-10mmHg, as tolerated by blood pressure.

Monitoring

Monitoring should include continuous ECG and SpO₂ monitoring. Invasive arterial blood pressure (IABP) monitoring should be considered for all patients. IABP monitoring should be instituted prior to RSI as this often precipitates a period of profound cardiovascular instability.
If inserting an arterial cannula, avoid the right radial artery if there is a possibility the patient will need either PCI or a balloon pump inserted.
**RSI**

Pre-RSI consider:

- Fluid bolus 500ml crystalloid
- Stopping nitrate infusion 5 minutes prior to induction

The induction agent of choice is Ketamine or Etomidate +/- Alfentanil. Patients who are hypotensive (SBP<90) should be considered for inotropic support, prior to induction. However hypotensive patients in LVF have a very poor prognosis. Further information regarding co-morbidities and patient wishes should be sought before the decision is made to transfer the patient. This should include consultation with the ITU where the patient is going to be transferred to.

**References**

Cotter G et al. Lancet 1998; 351:389-393 (Bolus nitrates)