

Refractory Hypoxaemia in COVID19

Aim To provide a stepwise strategy for the management of refractory hypoxaemia critical care patients

Scope All adult patients with refractory hypoxaemia due to parenchymal lung disease, thus excluding those with predominately bronchospasm or pulmonary embolism

Step 1 ARDS Net lung protective ventilation

ARDS Net Goals

- PaO₂ ~8kPa or P/F ratio >13.3 (may tolerate lower PaO₂ if not acidaemic)
- Pplat < 30 cmH₂O
- Vt 6-8ml/kg IBW
- Accept high pCO₂ if pH > 7.2

| FiO ₂ | 0.3 | 0.4 | 0.4 | 0.5 | 0.5 | 0.6 | 0.7 | 0.7 | 0.7 | 0.8 | 0.9 | 0.9 | 0.9 | 1.0 |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| PEEP | 5 | 5 | 8 | 8 | 10 | 10 | 10 | 12 | 14 | 14 | 14 | 16 | 18 | 18-24 |

Step 2 Additional measures

In order to achieve the above goals consider:

- Paralysis
- Conservative fluid management
- Prone positioning for 16hrs
- Recruitment manoeuvres

Consider tracking the Murray Score at all stages

| Points | 0 | 1 | 2 | 3 | 4 |
|------------------------------------|-----|---------|------------|------------|-------|
| P/F ratio (kPa) | ≥40 | 30-39.9 | 23.3- 29.9 | 13.3- 23.2 | <13.3 |
| PEEP (cmH ₂ O) | ≤5 | 6-8 | 9-11 | 11-14 | ≥15 |
| Compliance (ml/cmH ₂ O) | ≥80 | 60-79 | 40-59 | 20-39 | ≤19 |
| CXR quadrants infiltrated | 0 | 1 | 2 | 3 | 4 |

Murray Score = Total Points / 4

Compliance = Vt(ml) ÷ (Pplat – PEEP)

Step 3 PRONING

If unable to achieve ARDS Net goals, consider prone ventilation if:

- <36hrs
- P:F < 21
- FiO₂ > 0.6
- PEEP > 5

Step 4 Other Measures

If hypoxia remains refractory consider:

- APRV
- ECMO (see referral guideline)
- Inhaled prostacylin
- High Frequency Oscillation Ventilation
- ECCO₂R

Notes

This document describes a standard strategy only and is not prescriptive. It is the clinical judgement of the treating physician to decide which strategy to employ and when.

Conservative fluid management¹

This can be achieved using diuretics/ fluid restriction/ haemofiltration/ SCUF aiming for at least neutral balance and ideally negative fluid balance if tolerated.

Paralysis²

An NMDA bolus followed by an infusion should be considered with the goal of reducing the 'Train of Four' on peripheral nerve stimulation to 2/4.

Recruitment manoeuvres³

In patients with 'recruitable' alveoli, this can be a lifesaving procedure if tolerated. Beware causing cardiovascular collapse, particularly in hypovolaemia. E.g. 30cmH₂O for 30 seconds (**30 for 30**)

Prone Positioning⁴ This has been shown to improve oxygenation and can possibly improve mortality in severe ARDS. It is labour intensive requiring at least five staff members to perform. Patients should remain prone for 16+ hours if stable and returned to supine when staffing allows this to be done safely. See prone positioning guidance.

Bronchoscopy

Caution should be exercised, particularly in severe hypoxaemia. Bronchoscopy can treat bronchial plugging but can also worsen infiltrates and cause de-recruitment from suctioning. **Aerosol generating procedure.**

ECMO⁵

The strength of evidence for ECMO is disputed and senior consensus discussion is recommended. See Referral for ECMO guideline.

Novalung iLA

This venous-venous CO₂ removal device may be beneficial in selected patients. The evidence base is weak and senior consensus discussion is recommended.

Prostacyclin⁶

May improve oxygenation but lacks quality evidence in severe ARDS and has mostly been used in patients with increased pulmonary artery pressures and hypoxia.

High Frequency Oscillator Ventilation (HFOV)^{7,8}

In light of the OSCAR and OSCILLATE trials, HFOV's role in ARDS has been downgraded. Some still favour as a rescue therapy.

References

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