

Open Lung Concept for Treating ARF/ARDS With BCV

Optimizing lung volume by recruiting and stabilizing unstable airways and lung units with negative lung inflation, never allowing alveoli to collapse.

- Continuous Negative may be used alternating with proning sessions to maximize lung recruitment.
- Extra-thoracic High-Frequency Chest Wall Oscillation can be added to dislodge retained secretions. (See Airway Clearance strategy for COVID-ARDS)
- Patient-generated aerosols while using BCV should be treated the same as for spontaneous breathing patient.
- BCV can be used to maintain SpO₂ during intubation and reduce need for PEEP during PPV.
- BCV can decrease post-extubation alveolar collapse, maintain recruitment and provide non-invasive support post-extubation.
- Consider alternative means of support for patients at very high risk for embolic events.

To improve P/F Ratio make Mean Cuirass Pressure (MCP) more negative.

- Improving oxygenation in control mode with BCV is best achieved by adjustment to produce a more negative MCP.
- Make MCP more negative by inverse I:E ratios (safe due to active exhalation) i.e. 3:1 I:E ratio will create a more negative MCP than 1:1 due to the duration of negative pressure is a greater part of the respiratory cycle.
- Increasing +/- pressure ratio (i.e. 3:1 to 4:1 i.e. 21/7 to 28/7 will make MCP more negative).
- Adjust pressures by utilizing same span but increased inspiratory pressure and decreased expiratory pressure. (i.e. -21/+7 to -25/+3 the same Δp , but balanced more toward negative pressures will make MCP more negative)

Airway Clearance Strategies for COVID-ARDS

- Option 1: Follow standard secretion clearance setting recommendations from treatment guidelines. Use Secretion Clearance treatment mode up to q1h x 5-20 minute sessions between periods of CNEP. Timed secretion clearance treatment will cycle through a minimum of 1 minute of Cough each cycle. If mobilization, but no cough cycle is desired use option 2.
- Option 2: Adjust Control Mode to 800 cpm at -25. May utilize up to q1h x 5-20 minute sessions between periods of CNEP.
- Sputum mobilization is enhanced by use of BCV. All necessary precautions for infection control are recommended.
- Suction equipment should be available if the patient is unable to clear their airway.
- These techniques may also be applied during PPV use and posteriorly during proning.
- Secretion Clearance/Vibration will produce a significantly less negative mean cuirass pressure which may result in decreased O₂ sat. Adjust supplemental O₂ as needed to meet requirements during treatment period.

Patients Symptomatic for SARS - COVID 19

PaO₂/FiO₂ <300
or
SpO₂/FiO₂ <235
or
SpO₂ < 90% on RA
or
Increased Signs of Respiratory Distress

Initiate Oxygen Support & Continuous Negative Mode

Apply Supplemental Oxygen as needed
Apply CNEP at -15 and titrate aggressively up to -30 if Hypoxemia persists

Assess Response To Initial Settings

Worsening

Improving/No Change

Initiate Control Mode

Continue CNEP

Inspiratory: -30
Expiratory: +10
I:E Ratio: 2:1 or Greater
Frequency: 40, 50, 60cpm up to 120cpm depending on patient to ensure adequate VE. Rates > 60 balance Insp & Exp pressures.

Reassess Frequently. Titrate CNEP per clinical response. Consider standby trials when symptoms return to pre-illness baseline on -4 to -8.

Mean cuirass pressure should always be kept more negative than -4	Keep negative to positive pressure ratios at 3:1 i.e. -24/8 at f < 60
At rates >60 Insp & Exp pressures should balance i.e. -15/+15	Hypoxemia: Lower MCP Hypercarbia: Higher VE

Δp should exceed 10 cmH₂O
Patients that are persistently asynchronous with Control Mode may get superior results with moderate conscious sedation.

Assess Response

Worsening

Improving/No Change

BCV may be continued with additional aggressive interventions

Initiation of BCV will not produce additional aerosols into the environment; it would be comparable to the patient breathing spontaneously. Adhere to hospital's PPE Protocol.

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