Paediatric ARDS (PARDS) & Acute Lung Injury

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Clinical Signs

- Cyanosis
- Hypoxaemia & no response to O_2 :
- ↓ Compliance
- ↑ Physiological dead space
- Bilateral opacities CXR
- Initial degree gas exchange impairment does NOT predict outcome (unless $PaO_2/FiO_2 < 50$)
- PARDS lower mortality than Adult ARDS

Definition

Acute Lung Injury (ALI): PaO_2/FiO_2 <300

ARDS: PaO_2/FiO_2 <200

Oxygenation Index (OI)
Mean Airway Pressure
OI = FiO_2 x MAP x 100
Alveolar-arterial gradient: A-aO_2 = PAO_2 - PaO_2 [use mmHg]
= [(Pbar-Pwater) x FiO_2) - ($PaCO_2$/0.8) – PaO_2
= (716 x FiO_2) – ($PaCO_2$/0.8) – PaO_2
Child = < 10mmHg, Adult = <15, elderly = < 40

Severe:

- PaO_2/FiO_2 < 100
- PEEP > 5

- Pulmonary oedema (Bilateral infiltrates)
- Air bronchograms

Paediatric ARDS: Strategies (1) Ventilation

Start with

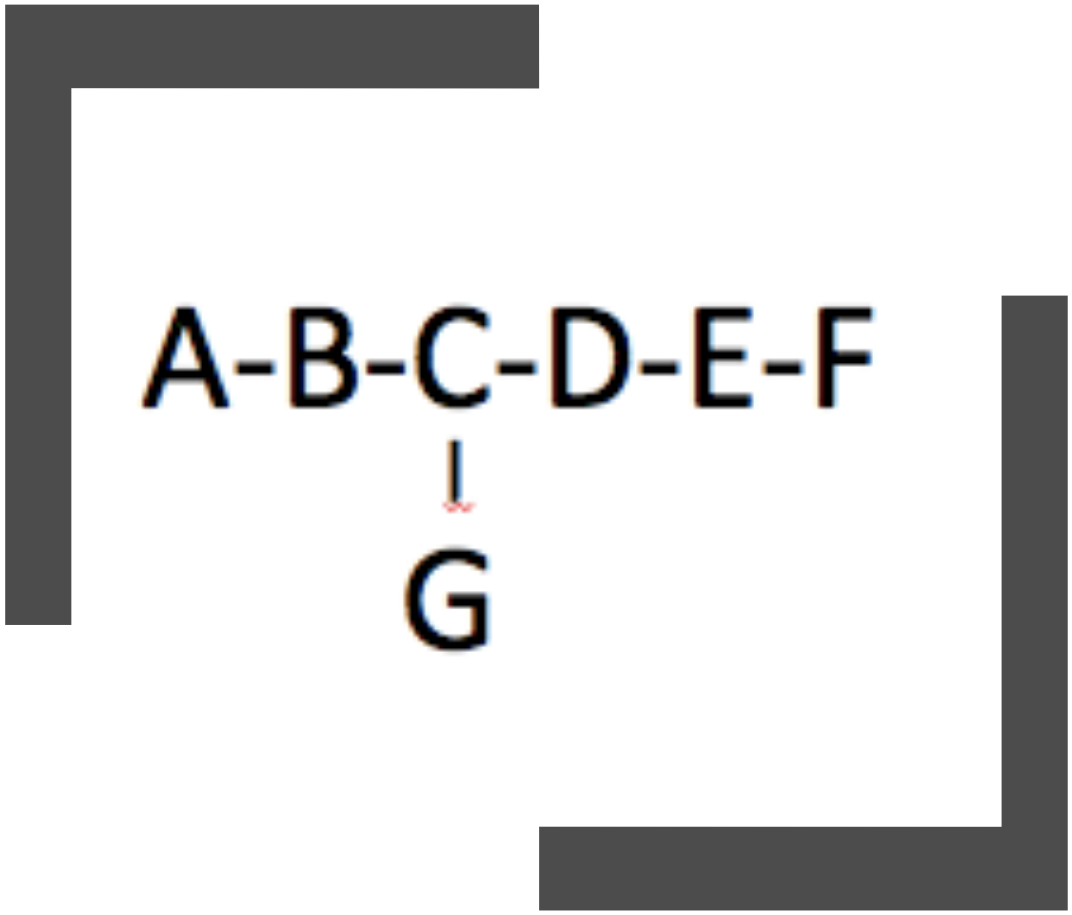
- Low tidal volume ($V_{T)}$: 6-8 ml/kg of est.* body weight
- PEEP: 8-10cm
- PIP: limit to 30; reduce V_T to 3-5ml if Peak > 30
- FiO_2 < 0.5
- Permissive hypercapnia PCO_2 8-11 kPa (60-80mmHg)
- O_2 sats 80-85%

Paediatric ARDS Strategies (2)

1. Recruit collapsed alveoli: 15-30 second inhalation at 5-10cm above PEEP, clamp ETT when reconnecting to ventilator
2. Sedate morphine & midazolam or diazepam
3. Try patient-triggered ventilation first
4. Paralyse if ABGs poor and use Pressure-Controlled Vent
5. Broncho-alveolar lavage
6. Antibiotics
7. Inotropes (adrenaline)
8. Give enteric feeds (nasogastric) or TPN
9. Restrict IV fluids → decreased duration ventilation

- Steroids, surfactant & prone position NOT routinely indicated

BAL Equipment set up:



A. Rounded off end-hole suction catheter
B. Male-male connector
C. Standard 3-way tap (2 female 1 male)
D. Suction connector
E. Suction/ mucus trap
F. Suction
G. 0.9% Saline 1ml/kg (max 10 ml) in 10ml syringe

Broncho-Alveolar Lavage: Procedure

- Pre-oxygenate patient
- Turn head to left: catheter → right lung
- Head to right: catheter might → left lung
- Advance suction catheter +/- twisting, till wedged.
- Inject 1m/kg (max 10ml) rapidly (1-3 secs)
- Immediately turn tap to allow suction

Turn tap to stop suction BEFORE withdrawing catheter (because if you don't you get tracheal aspirate, NOT BAL)

- Reinsert and repeat with second 1ml/kg
- Time: ~ 60 seconds

Complications

- Pneumothorax & Pneumomediastinum
- Reduced Cardiac output:

  sepsis and trauma→ intolerance of high airway pressures for oxygenation
- GI: gastric ulcers,

  pancreatitis: glucose intolerance

Wean

- When $FiO_2 < 0.5$ (50%)
- PEEP < 8cm
- Triggered ventilation/ pressure-support
- Extubate when breathing spontaneously

- Survivors: reduced lung function
- Reactive airways / asthma
- Muscle wasting & weakness