DEPARTMENT OF ANAESTHESIA
& PERIOPERATIVE MEDICINE
UNIVERSITY OF CAPE TOWN

Mechanical ventilation in COVID-19 ARDS

The GSH experience

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COVID ECHO webinar

June 2021

The New England Journal of Medicine

VOLUME 342 MAY 4, 2000 NUMBER 18

VENTILATION WITH LOWER TIDAL VOLUMES AS COMPARED WITH TRADITIONAL TIDAL VOLUMES FOR ACUTE LUNG INJURY AND THE ACUTE RESPIRATORY DISTRESS SYNDROME

THE ACUTE RESPIRATORY DISTRESS SYNDROME NETWORK*

Lung protective ventilation

Lung protective ventilation

- V_T < 6ml/kg PBW
- P_{plat} ≤ 30cmH_20
- RR < 35/min
- PEEP titration
- Permissive hypercapnoea

- Permissive hypoxaemia
- Driving pressure
- Compliance
- Power of ventilation
- Proning

Amato M et al. N Engl J Med 2015; 372:747-55
Guérin C et al. N Engl J Med 2013; 368(23):2159-2168

Papazian L et al. N Engl J Med 2010; 363(12):1107-1
Gattinoni L et al. Int Care Med. 2016; 42(10):1567-1575

Lung protective ventilation…and beyond

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….and beyond

Driving pressure

- $\Delta P = V_T / C_{RS}$
  - Ratio of V_T to static compliance of respiratory system
- At the bedside
  - $\Delta P = P_{plat} – PEEP$
  - Aim for < 20 (ideally < 14)
- Critical target for LPVS

Amato M et al. N Engl J Med 2015; 372:747-55

Power

- Energy delivered by vent / time
  - Indicator of VILI
  - Software inbuilt into ventilator
- E-smart web calculator
  - Composite of
    - VT
    - RR
    - P_{peak} / P_{plat} / PEEP
- Aim < 18 J /min

Gattinoni L et al. Int Care Med. 2016; 42(10):1567-1575
E-smart2021.org/lobby/e-smart2021.org/qformulas/

How we did it

- Sedation
  - Infusions
    - Analgosedation with morphine
    - Propofol
  - Enteral
    - Clonidine
    - Diazepam

- Continuous infusion of NMBA
  - Reduce P-SILI
    - Minimise stress and injurious mechanical power
    - Anti-inflammatory effect
  - Cisatracurium
    - Boli recommended
      - Staffing limitations
    - Discontinued once feasible
      - PF ratio > 150
- Early proning
  - Refractory hypoxaemia

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Fighting a losing battle

- Combination of :
  - Refractory hypoxaemia
  - Refractory hypercapnoea with acidaemia (pH <7.2)

,

- Mutually incompatible ventilatory strategy
  - Consider ECMO

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Our experience

5th April 2020 – 3rd June 2021

- Invasive mechanical ventilation exclusively
  - "Intubated and ventilated"
- 475 admissions to Covid ICU
  - Mostly those who failed HFNO
  - 26 patients with primary diagnosis other than Covid
  - "All-comer mortality" 64.2%
- 386 patients with confirmed SARS-CoV-2 and ARDS
  - Median P_aO_2 / F_iO_2 ratio 98
    - Severe ARDS

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Our results

- 386 patients with confirmed SARS-CoV-2 and ARDS
  - Mortality 69.1%
  - Median age 51 years
  - Median ICU LOS 11 days

- How we differ from the international literature
  - Patients requiring IMV only
  - Much lower PF ratios

What we've learned

- (LPVS at all costs)
- Utility of mechanical power calculation
  - Pressure based modes used more commonly than pre-COVID
  - Simplifies calculation of P_{plat}, ΔP and power
  - Possible trigger to institute ECMO
- Stop NMBA asap
  - That we sometimes still require benzos
- Consider earlier transitioning from HFNO to IMV


In honour of all the COVID ICU
staff whose selfless dedication
impacted so many lives