COVID ARDS : Mechanisms of Hypoxemia

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“This Is Not ARDS (TINA)"

People are saying this without appreciating Berlin definition

NYC hospitals presented different phenotypes locally
a) Vascular clot (giving heparin and lytics)
b) Mucus hypersecretion – bronching
c) Capillary leak – unclear
d) Alveolar flooding with high surface tension- recruitment
e) CHF from myocarditis

Take Home: Covid is variable as in typical ARDS
Abnormalities in gas exchange, control and mechanics
Causes of Hypoxemia in General

1. Low PiO2
2. Low V/Q
3. Shunt
4. Hypoventilation
5. Low mixed venous oxygen
Causes of Hypoxemia in COVID

1. Low PiO2
2. Low V/Q
3. Shunt
4. Hypoventilation
5. Low mixed venous oxygen
Low venous oxygen can lead to arterial hypoxemia when there is shunt.

Overventilating one lung unit does not make up for underventilating another due to oxyHb curve.
Gattinoni et al. AJRCCM 2020 COVID not typical ARDS?

Note n’s are different
Values not that different from other studies of early ARDS
Fair amount of shunt? Amenable to PEEP or recruitment

Figure 1. (A) Distributions of the observations of the compliance values observed in our cohort of patients. (B) Distributions of the observations of the right-to-left shunt values observed in our cohort of patients.
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Respiratory Pathophysiology of Mechanically Ventilated Patients with COVID-19: A Cohort Study

To the Editor:

COVID physiology looks like typical ARDS
Early intubation practices may make COVID look less sick

Ziehr et al. AJRCCM 2020
What can we do about Hypoxemia in COVID?

1. Adequate PEEP (watch CO, mixed venous O2, deadspace)
2. Recruitment maneuver
3. Prone positioning
4. ECMO?
5. Inhaled NO or prostacyclin
6. Tolerate Hypoxemia ?? (no NEJM 2020)
Emphasize traditional physiology
Blunted ventilator drive may yield severe hypoxemia

High Respiratory Drive and Excessive Respiratory Efforts Predict Relapse of Respiratory Failure in Critically Ill Patients with COVID-19

Running title $P_{0.1}$ and $\Delta P_{occ}$ in COVID-19

Authors: 1. Pierre Esnault*1, MD, MSc

Unpublished: Ludovico Messineo and Scotty Sands
Breathhold studies suggest high drive may be protective
Summary:

1. Hypoxemia is characteristic of COVID ARDS likely from V/Q and shunt primarily
2. Profound hypoxemia can sometimes surprise patient/docs
3. Whether high ventilatory drive is good or bad is not entirely clear
4. Hypoxemia needs to be treated: PEEP and prone primarily