**COVID-19 Type 1 Respiratory failure**

Causes: Either Acute respiratory distress syndrome OR Pulmonary Edema

Management in ICU

**First line:**

***HFOT/NIV***

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| --- | --- |
| Indications | Contraindications |
| Type I Respiratory Failure (HFOT/CPAP) | Hypotension |
| Type II respiratory Failure (NIV) | Tachycardia (HR>140-150/min) |
|  | Altered Sensorium |
|  | Upper airway Obstruction |

**HFOT:**

Start with Ramp 2 minutes/Flow 60 litres per minute/ FiO2 100%

Target Saturation of 92-94%, start tapering FiO2 first followed by flow

Persistent high FiO2 of more 60% can be detrimental in long term due to oxygen toxicity and hence at that moment NIV should be considered.

HFOT does not provided significant PEEP which can be helpful in pulmonary edema hence if Pulmonary edema is a suspicion, it is preferable to change to CPAP or NIV

Pulmonary edema should be suspected if either of the following are present

1. Myocarditis (tachycardia, hypotension, diffuse and non specific ST/T changes in ECG)
2. Chest x ray showing bilateral peri-hilar infiltrates
3. Echo (if available) showing reduced ejections fraction

**NIV:**

Switching over to NIV from HFOT should be prompt and err should be made towards NIV instead of prolonged HFOT

On NIV high PEEP of more than 9-10 CM of H2O should be avoided

Minimum difference between pressure support/IPAP and EPAP should of 4 cm of H2O of more

IPAP of more than 20 cm of H2O OR pressure support of more than 15 cm above PEEP should be avoided

High pressure decrease tolerance and increases leak leading to asynchrony and poor hemodynamics. This also becomes an indication of intubation

**IMV in ARDS**

Intubation should be elective instead of crash intubation. That means that failure of NIV or HFOT should be promptly identified

**Steps of management**

Mode: VCV

Tidal Volume: start with 6 ml per kg of IBW and decrease it to 4 ml/Kg

IBW: Males: 50kg + 2.3 x (height in inches -60)

Females: 45.5 kg + 2.3 x (height in inches -60)

PEEP: start with 8-10 cm of H2O and on sedation and paralysis increase to FiO­2/5

PEEP of more than 14-16 cm of H2O can be detrimental

FiO2:100% to begin with but decrease till the target saturation is 90-94%

Rate: 24/ minute to begin with.

I:E ratio should be between 1:1 to 1:2

**Indications of changes in setting:**

pH <7.25 -> increase rate upto 35/minute (considering that on wave forms there is no air trapping)

if pH <7.25 with maximum rate and I:E appropriate conider infusion of bicarbonate

HCO3 (meq): 0.5 x weight x (24- serum HCO3) 84mg=1meq

Administration: 50-150 meq SodaBicarb diluted in 500-1000 ml of D5, IV at rate of 1-1.5 lt/hour.

**Never to cross limits:**

Pplat<30 cm of H2O, decrease tidal volume from 6 to 4 ml/kg if Pplat is high

pH <7.25

MAP<70 mmHg

**Indications of Tocilizumab:**

1. Hypoxia (requiring any supplemental oxygen to maintain saturation)
2. Myocarditis
3. Elevated IL6/CRP/Ferritin

Contraindications of Tocilizumab:

1. Elevated Procalcitonin (<0.5 to 1 ng/ml) (relative C/I)
2. Known active bacterial infection like soft tissue/ VAP/ UTI
3. Negative Consent

Dose:

400 mg single infusion which needs to be repeated after 12-24 hours if no clinical improvement

Administration:

Dilute the 20ml injection of 400 mg in 100 ml NS and infuse over 1 hour

Caution:

Hypersensitivity reactions are common and needs to be looked out for, such reaction can occur immediately and upto 2-4 hours after infusion

**Steroids/Methyprednisolone**

Indications:

Refractory hypoxemia (FiO­2>60% with PEEP 5 or more) OR cytokine storm (elevated CRP>50-100 mg/ml with no other possible explanation like bacterial infection)

Absolute Contraindications

VAP (purulent secretions/new chest x ray opacities)

Elevated procalcitonin of more than 1 ng/ml

Active GI bleed

Bacterial infections except superficial thrombophlebitis

DOSE:

1mg/kg divided in 4 doses per day

Caution:

Should never be stopped abruptly, mortality increase if done so.

Tapering should be weekly in in manners of 0.75mg/Kg followed by 0.5mg/kg, 0.25mg/kg and 0.125mg/kg followed by cessation

Timing: ideal time is second week of respiratory illness

Must concomitant medications: stress ulcer prophylaxis, DVT prophylaxis and broad spectrum antibiotics.