

COVID-19

Clinical Case Management



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- ❖ Seventy One National and International publications



Ministry of Health & Family Welfare
Government of India



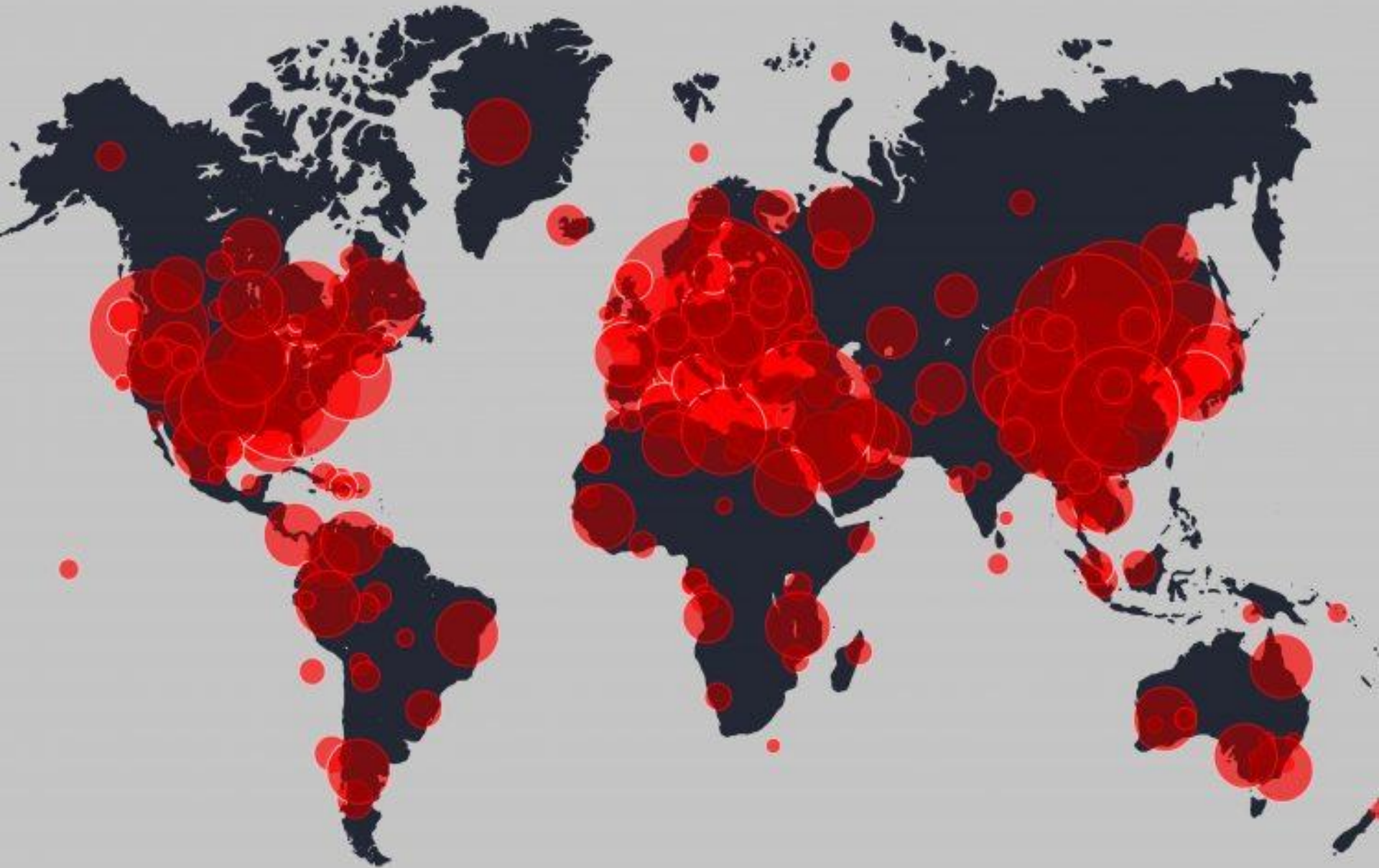
COVID-19 Hospital Training of Trainers

COVID-19

Clinical Case Management



COVID-19 World MAP



World Update

Coronavirus Cases: 33,08,901

Deaths: 2,34,139

Recovered: 10,42,995

India Update

Coronavirus Cases: 35,043

Deaths: 1154

Recovered: 9,068

Overview

- Presumed Pathophysiology
- Clinical Presentation
- Radiological findings
- Treatment protocol
- Oxygen therapy
- Immunotherapy
- ICU Indications

Presumed Pathophysiology



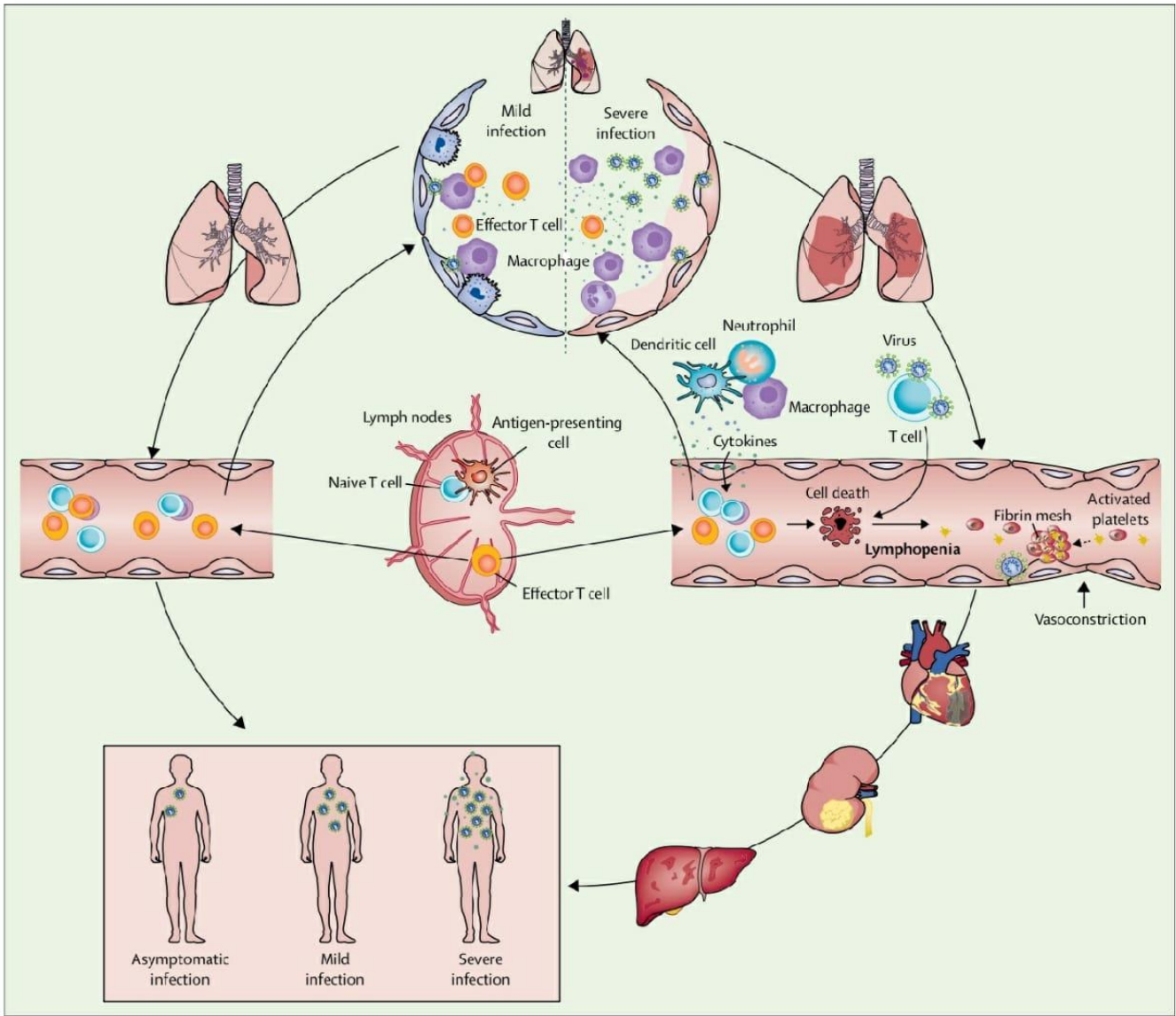
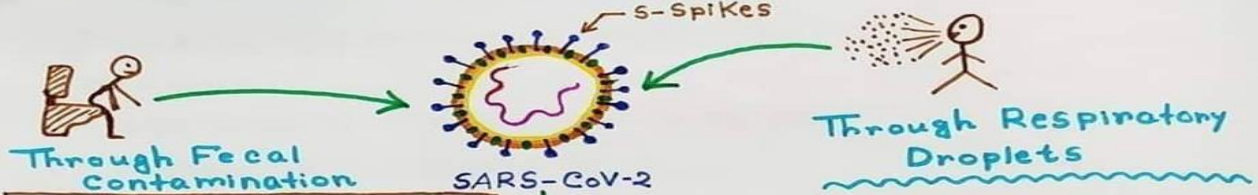


Figure: Occurrence and outcome of severe acute respiratory syndrome coronavirus 2 viral sepsis

- *Spike proteins
- *Binds to heme part of Hb
- *Hemolysis
- * Hypoxia
- *Acute kidney Injury
- *Myocarditis
- *Encephalopathy
- *Cytokine storm

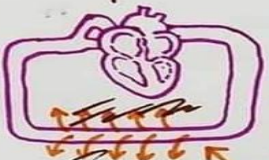


MultiSystem Organ Failure (MSOF)

↓ Perfusion

↓ Blood volume

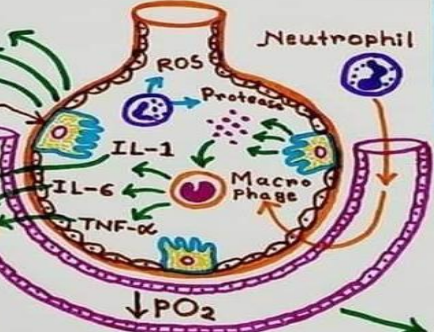
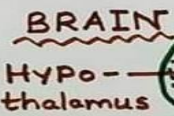
↓ Blood Pressure



SIRS

Type-2 pneumocyte cell

Vasodilation + Increase in Permeability



Hypoxemia

Chemoreceptor

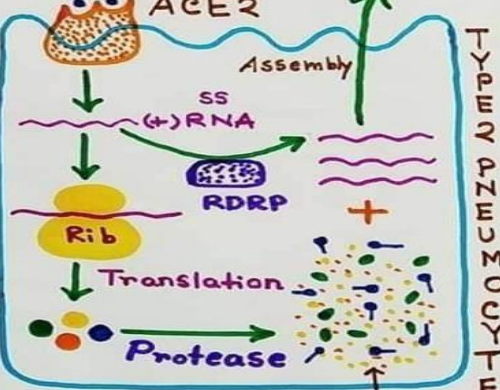
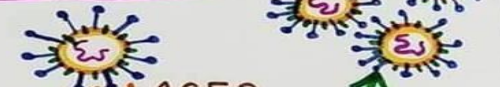
SNS

Increased HR

Fever

Increased RR

Entry Into Lungs



Life Cycle

Increased Work of Breathing due to fluid accumulation

Difficulty in breathing

L and H types Pneumonia

L Type

- Low elastance
- High compliance
- Low VQ ratio
- Low lung weight
- Low lung recruitability

H type

- High elastance
- Low compliance
- High Right to Left shunt
- High lung weight
- High lung recruitability

Transition from L to H type.....

Clinical presentation



Case Definition

When to suspect

All symptomatic individuals who have undertaken international travel in the last 14 days

or

All symptomatic contacts of laboratory confirmed cases

or

All symptomatic healthcare personnel (HCP)

or

All hospitalized patients with severe acute respiratory illness (SARI) (fever AND cough and/or shortness of breath)

or

Asymptomatic direct and high risk contacts of a confirmed case (should be tested once between day 5 and day 14 after contact)

Symptomatic refers to fever/cough/shortness of breath.

Direct and high-risk contacts include those who live in the same household with a confirmed case and HCP who examined a confirmed case.

Confirmed case

- A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms

Types of COVID dedicated facilities



COVID Care Center(CCC)



Dedicated COVID Health Center(DCHC)



Dedicated COVID Hospital (DCH)

- Suspect and confirmed cases should not be allowed to mix under any circumstances
- All these facilities will follow strict infection prevention and control practices

COVID Care Center (CCC) (For

Group 1 category of cases)

1. For cases clinically assigned as **mild / very mild cases / suspect cases**
2. Facilities can be setup in hostels, hotels, schools, stadiums, lodges etc.
(Functional Hospitals as last resort)
3. Separate areas for suspect and confirmed cases is mandatory
4. Attempt to be made to provide individual rooms for suspect cases
5. Every such Facility must be mapped to one or more Dedicated COVID Health Center (DCHC) or Dedicated COVID Hospital (DCH) for referral.
6. Basic Life Support Ambulance(BSLA) with sufficient oxygen support 24*7 to be available
7. HR may be roped-in from AYUSH doctors. (Training protocols and trained pool available)

Dedicated COVID Health Center (DCHC) (For Group

2 Category of cases)

1. For cases clinically assigned as **moderate**
2. Full hospital or a block of hospital
3. Private hospitals also can be designated
4. Hospital will have separate areas for suspect and confirmed cases
5. **Hospital to have beds with assured oxygen support**
6. Every such facility to be mapped with one or more Dedicated COVID Hospital (DCH)
7. Basic Life Support Ambulance(BLSA) with sufficient oxygen support for ensuring safe transport

Dedicated COVID Hospital (DCH)

(For Group 3 Category of cases)

1. For cases clinically assigned as **severe**
2. Full hospital or a separate block in hospital
3. Private hospitals also can be designated
4. **Hospitals to have ICUs, ventilator and beds with oxygen**
5. Hospitals will have separate areas for suspect and confirmed cases
6. These Facilities are referrals centers for CCCs and DCHCs

Categorization of Patients

1. Mild and very Mild Cases

2. Moderate Cases

3. Severe Cases

Mild and very Mild Cases (CCC)

1. Cases with Fever and upper respiratory tract illness
2. Patients will be accommodated in Dedicated COVID Care Centers (CCC)
3. Patients will be tested for COVID 19 and till that time, they remain in ***'suspected cases' section***
4. Patients tested positive will be moved to ***'confirmed cases' section***
5. If tests are negative, patient will be given symptomatic treatment and discharged with prescribed medication
6. If any patients qualifies as moderate or severe, will be sifted to Dedicated higher facility (DCHC or DCH)

Moderate Cases (DCHC)

1. Pneumonia with no signs of severe disease(SpO₂ 90-94%)
2. Cases with above symptoms to be referred directly and admitted in the Dedicated COVID Health Centers (DCHC)
3. Allopathic doctors in DCHCs will assess severity as per Protocols
4. Till test results are declared, suspect Cases will be kept in **'suspect case' section** of DCHCs
5. Patients tested positive will be shifted to **'confirmed cases' section**
6. Patients tested negative will be shifted to non COVID hospital for further management.
7. If any patient qualifies as severe, case will be shifted to Dedicated COVID Hospital (DCH)

Severe Cases (DCH)

1. Severe Pneumonia (respirator rate >30 /min and SpO₂ $< 90\%$) or ARDS or Septic shock
2. Cases with above symptoms to be referred directly and admitted in the Dedicated COVID Hospitals (DCH) till test results are obtained
3. Patients tested positive will remain in ICU and receive treatment as per standard treatment protocol

SIRS (Systemic Inflammatory Response Syndrome)

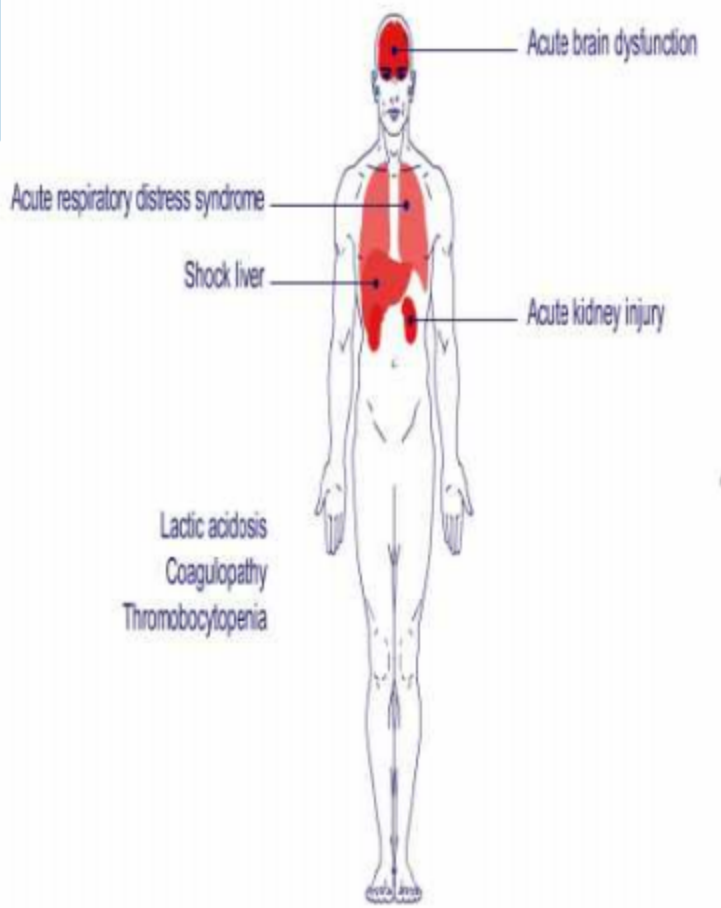
Two or more of:

Temperature $>38^{\circ}\text{C}$ or $<36^{\circ}\text{C}$

Heart rate $>90/\text{min}$

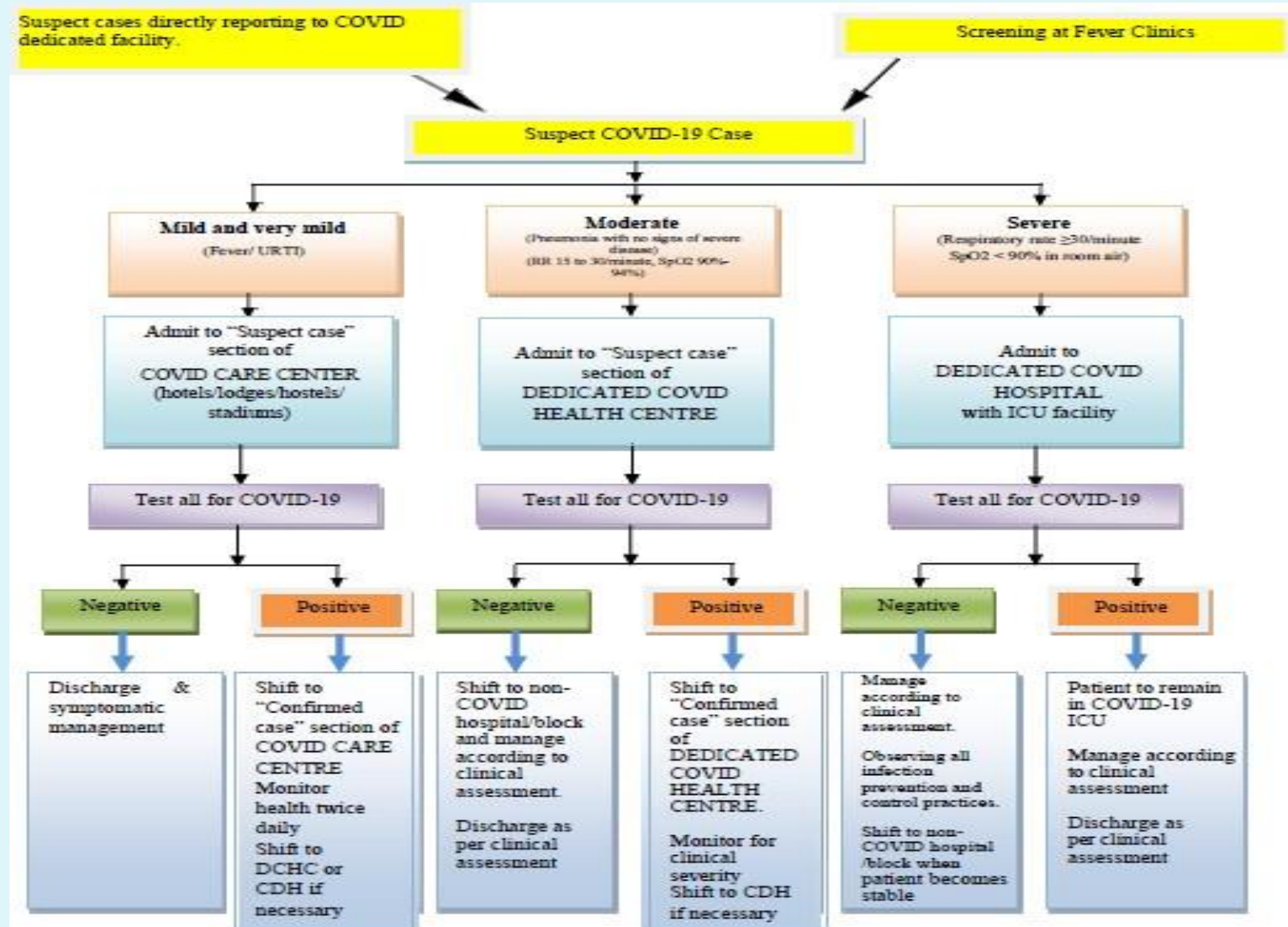
Respiratory rate $>20/\text{min}$ or $\text{Paco}_2 <32 \text{ mm Hg}$ (4.3 kPa)

White blood cell count $>12\,000/\text{mm}^3$ or $<4000/\text{mm}^3$ or $>10\%$ immature bands



- **Brain**
 - confusion, lethargy, coma
- **Lungs**
 - hypoxemia, acute respiratory distress syndrome
- **Cardiovascular**
 - hypotension, hypoperfusion, shock
- **Kidney**
 - oliguria, elevated creatinine, acute kidney injury
- **Liver**
 - transaminitis, elevated bilirubin
- **Gastrointestinal**
 - ileus
- **Hematologic**
 - coagulopathy, thrombocytopenia
- **Lactic acidosis**

Algorithm for Isolation of Cases



Radiological Findings

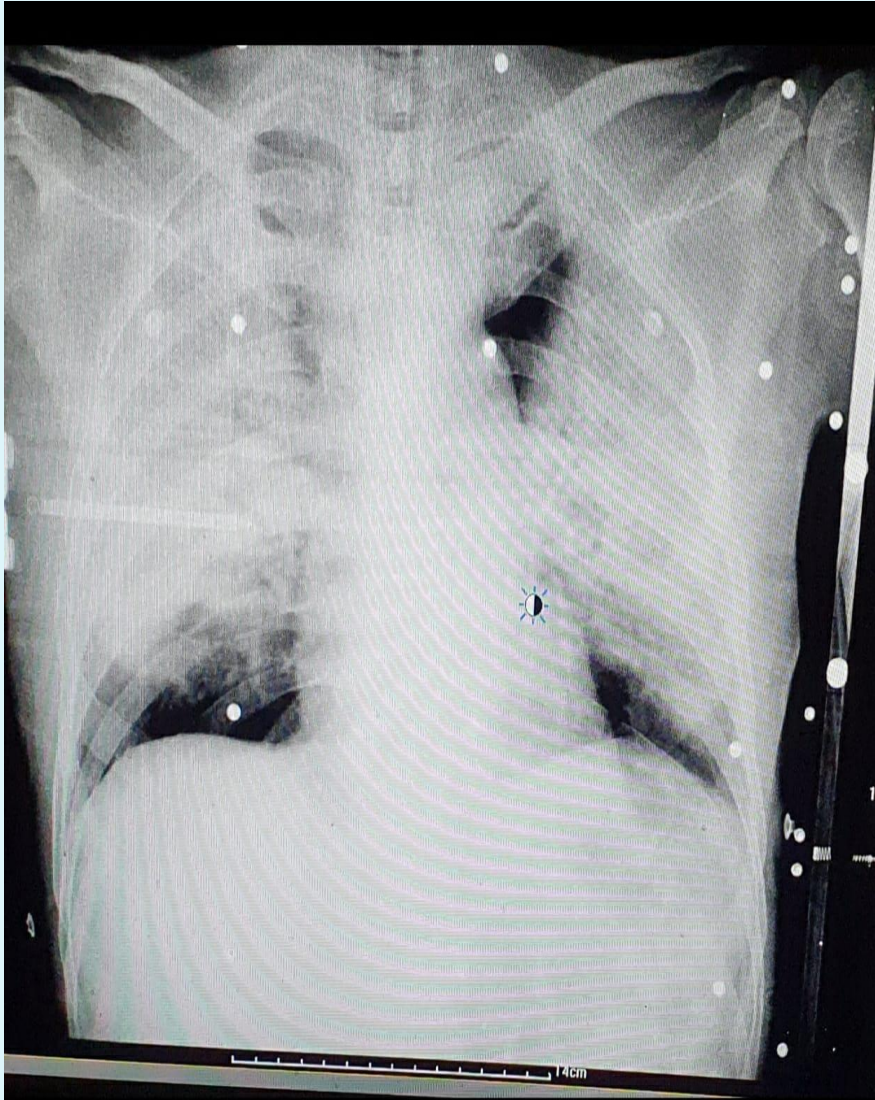


Ashwini Hospitals

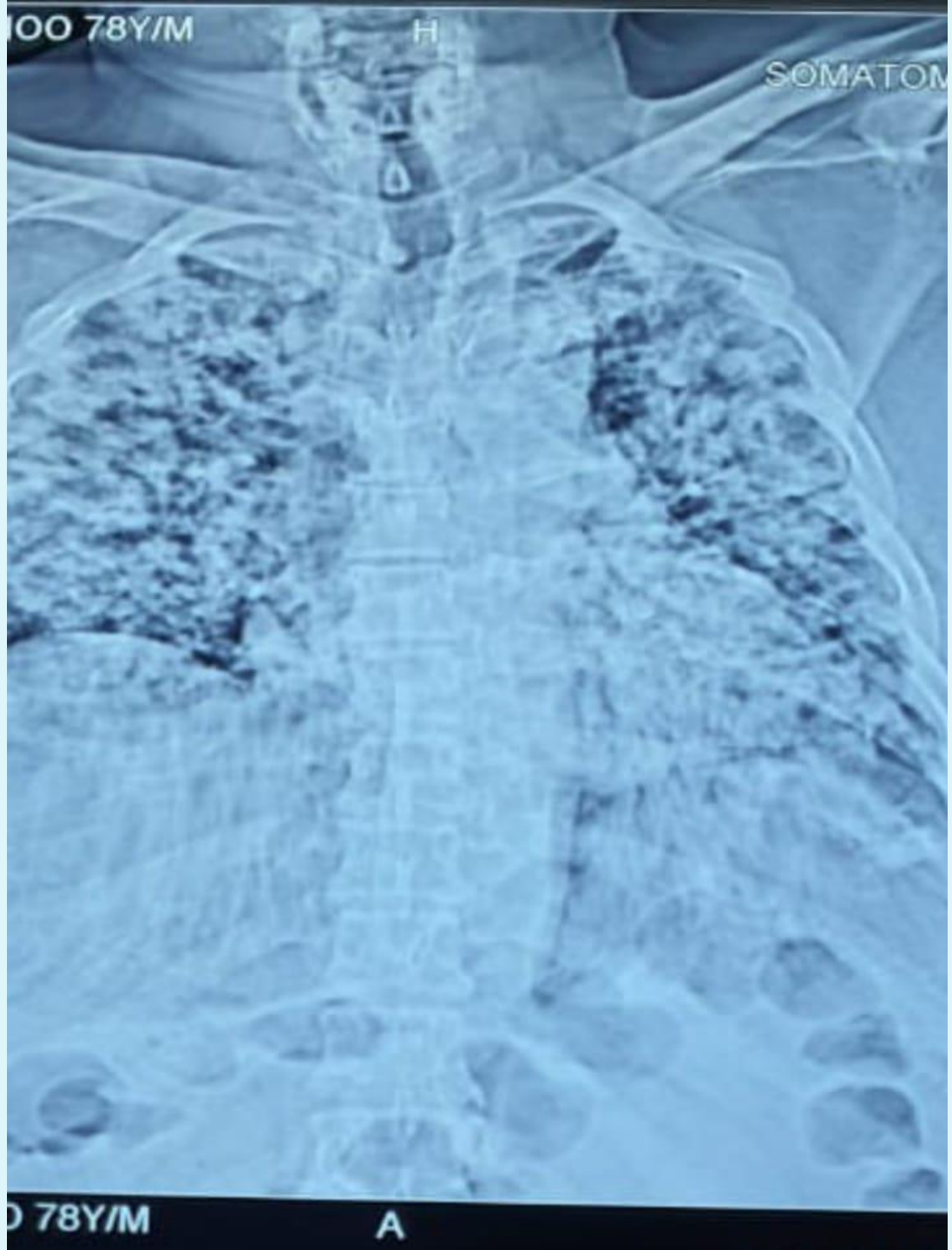
Day 1

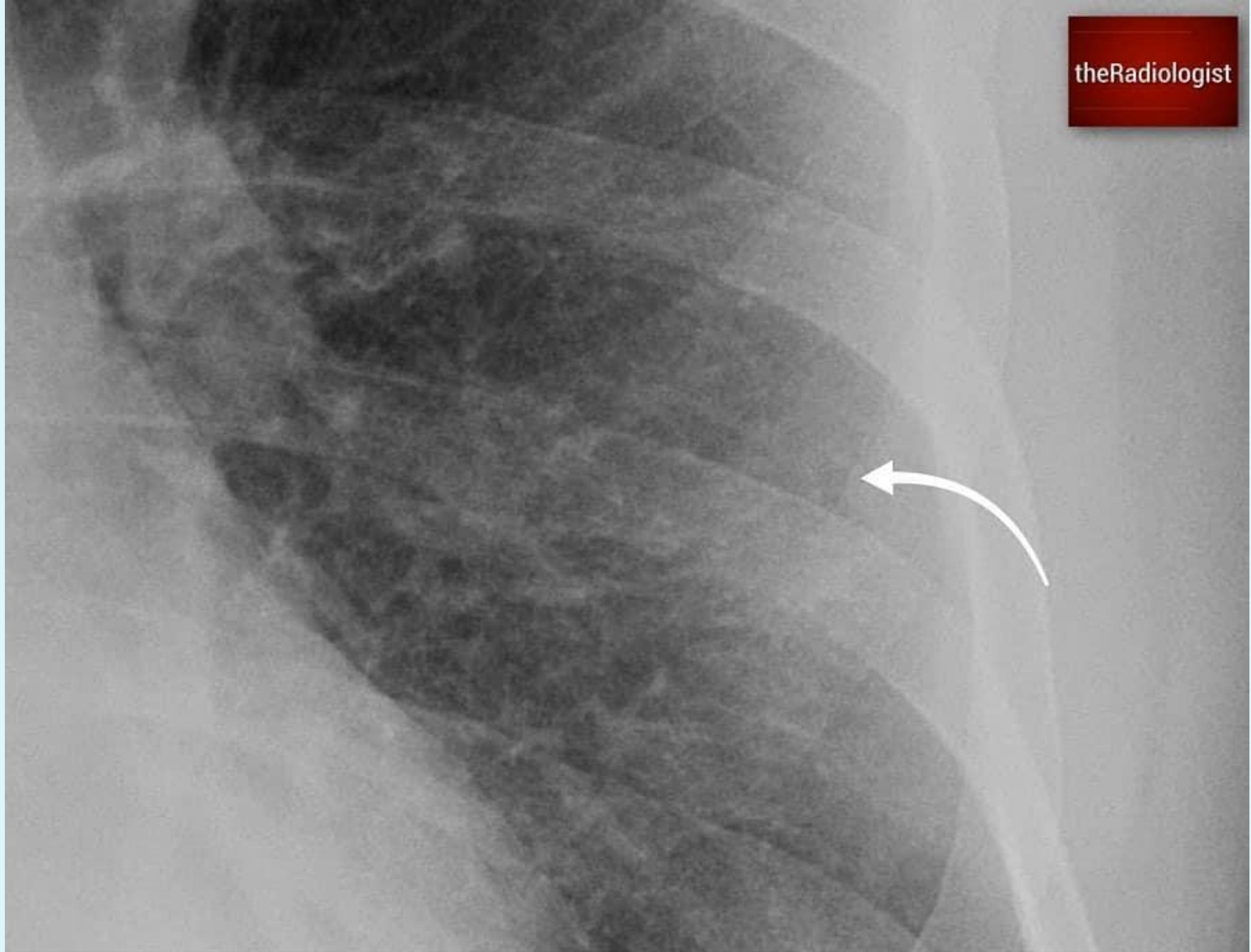
X-Ray of COVID-19 patient at Cuttack

Day 4

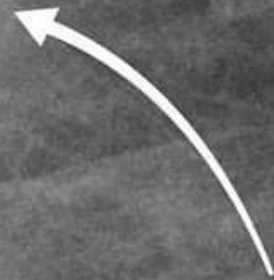


AIIMS BBSR





We can make out air bronchograms within this meaning this represents consolidation



There is similar opacity within the peripheral right mid zone

It is now more
important than
ever to review
the periphery
of the lung



Bilateral peripheral consolidation should make you consider COVID-19 infection



Look at these small lucencies within the opacification -
these are 'air bronchograms'

This means we can definitely call this consolidation

LEARNING POINTS

Carefully assess CXRs for peripheral consolidation during the COVID-19 pandemic

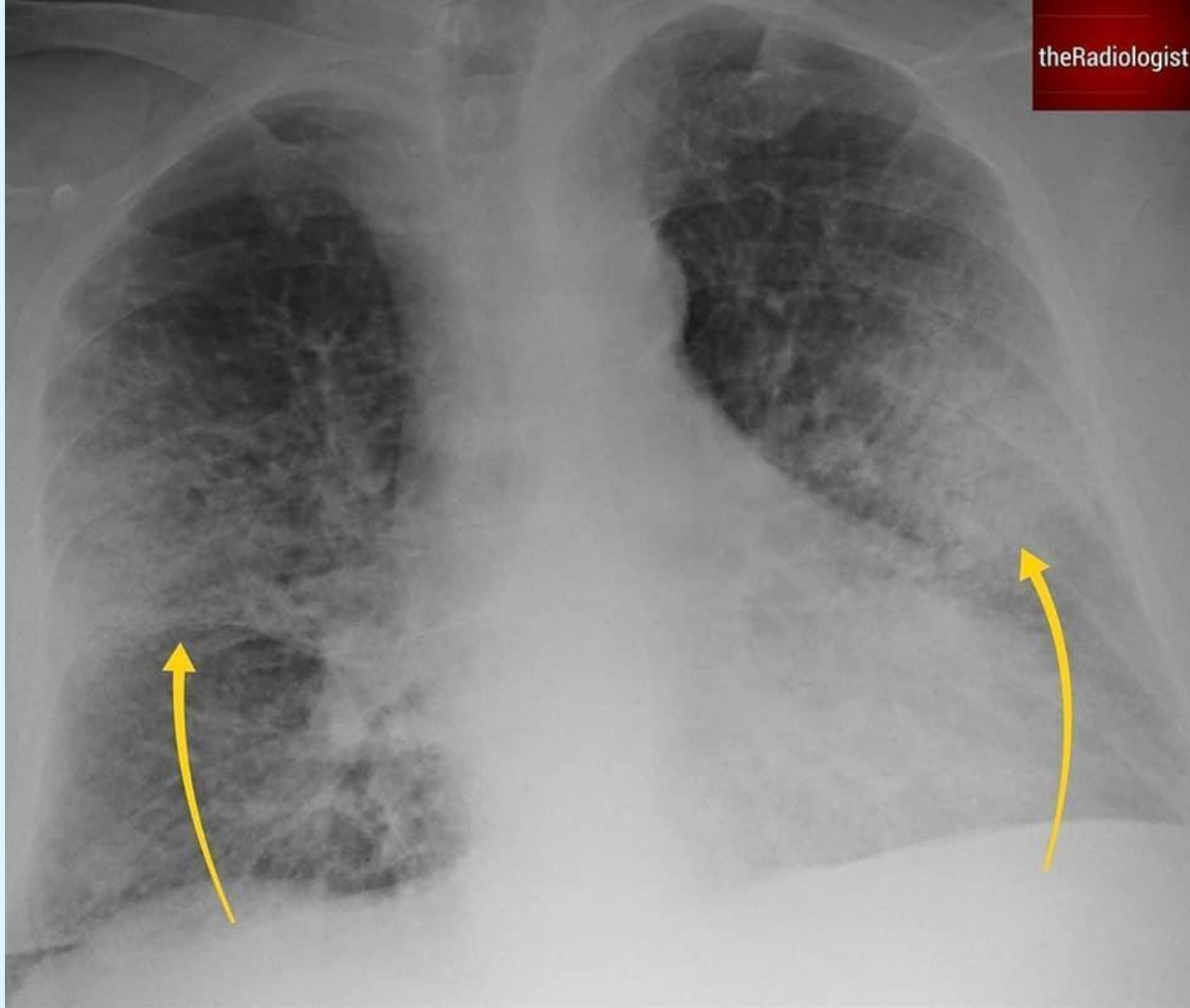
Remember COVID-19 can present as abdominal pain



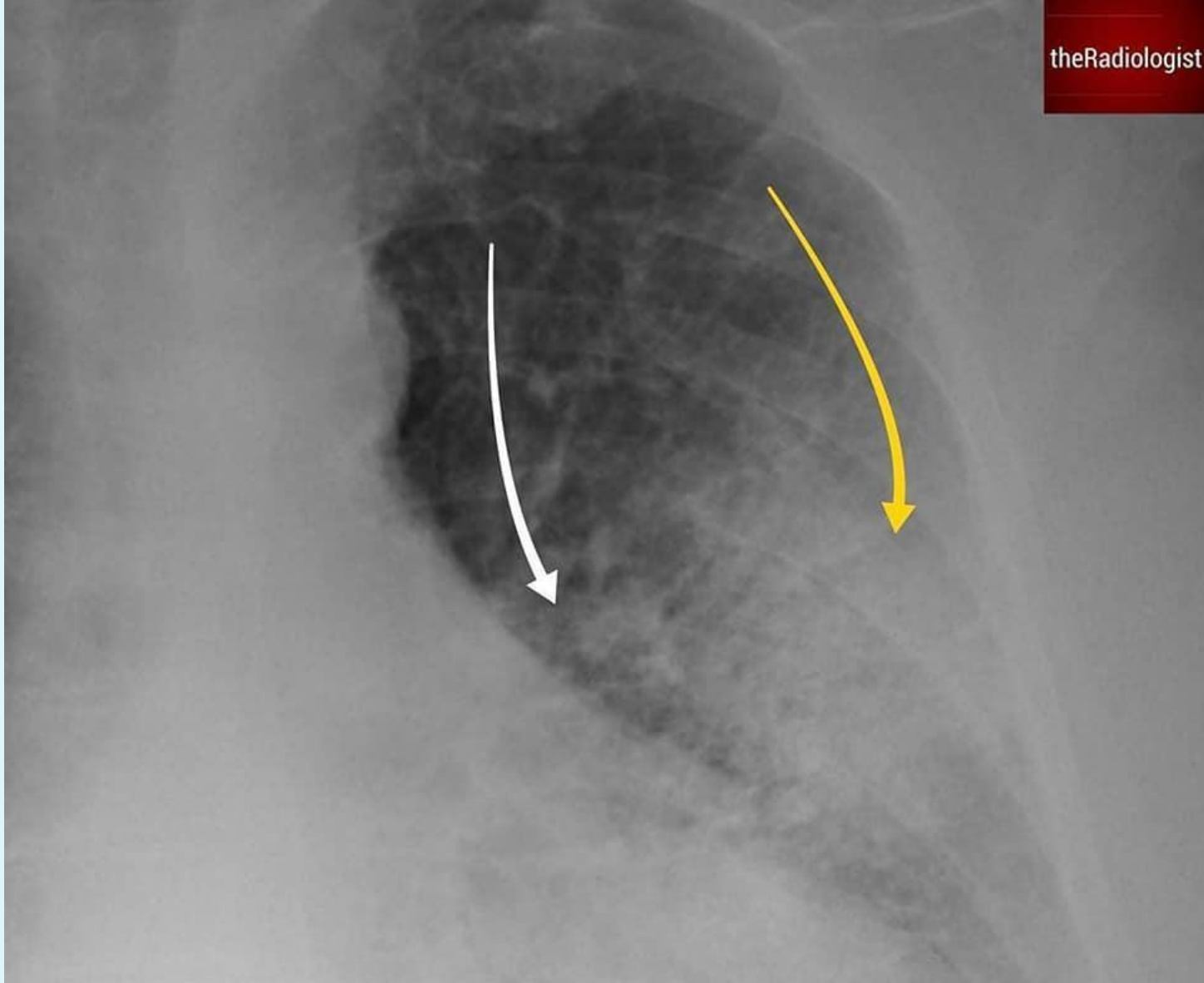
Cough and fever

Diagnosis?

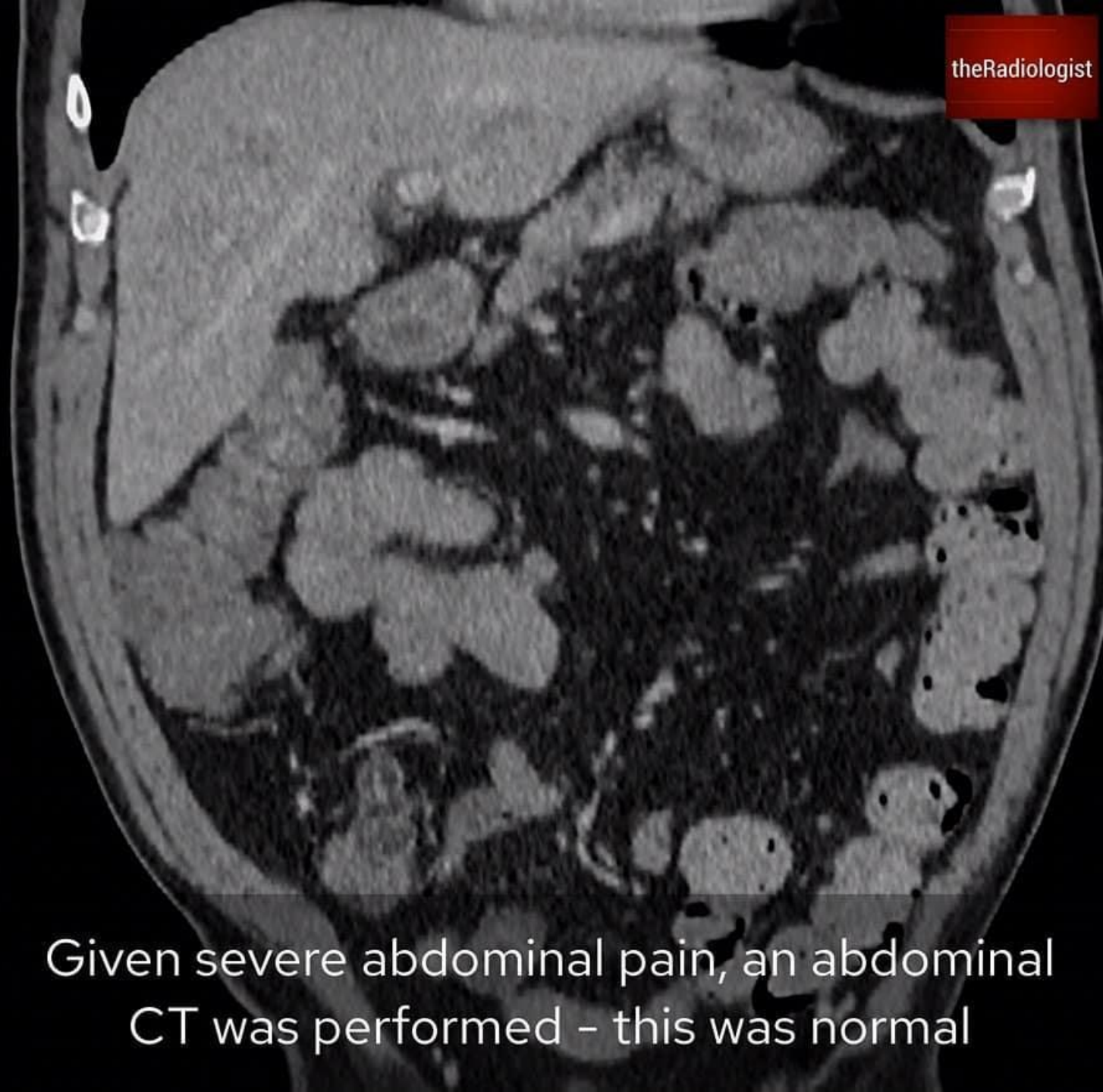
Swipe for explanation



There is bilateral peripheral opacification



Note the central lung is relatively spared (white arrow) compared with the outer lung (yellow arrow)



Given severe abdominal pain, an abdominal CT was performed - this was normal



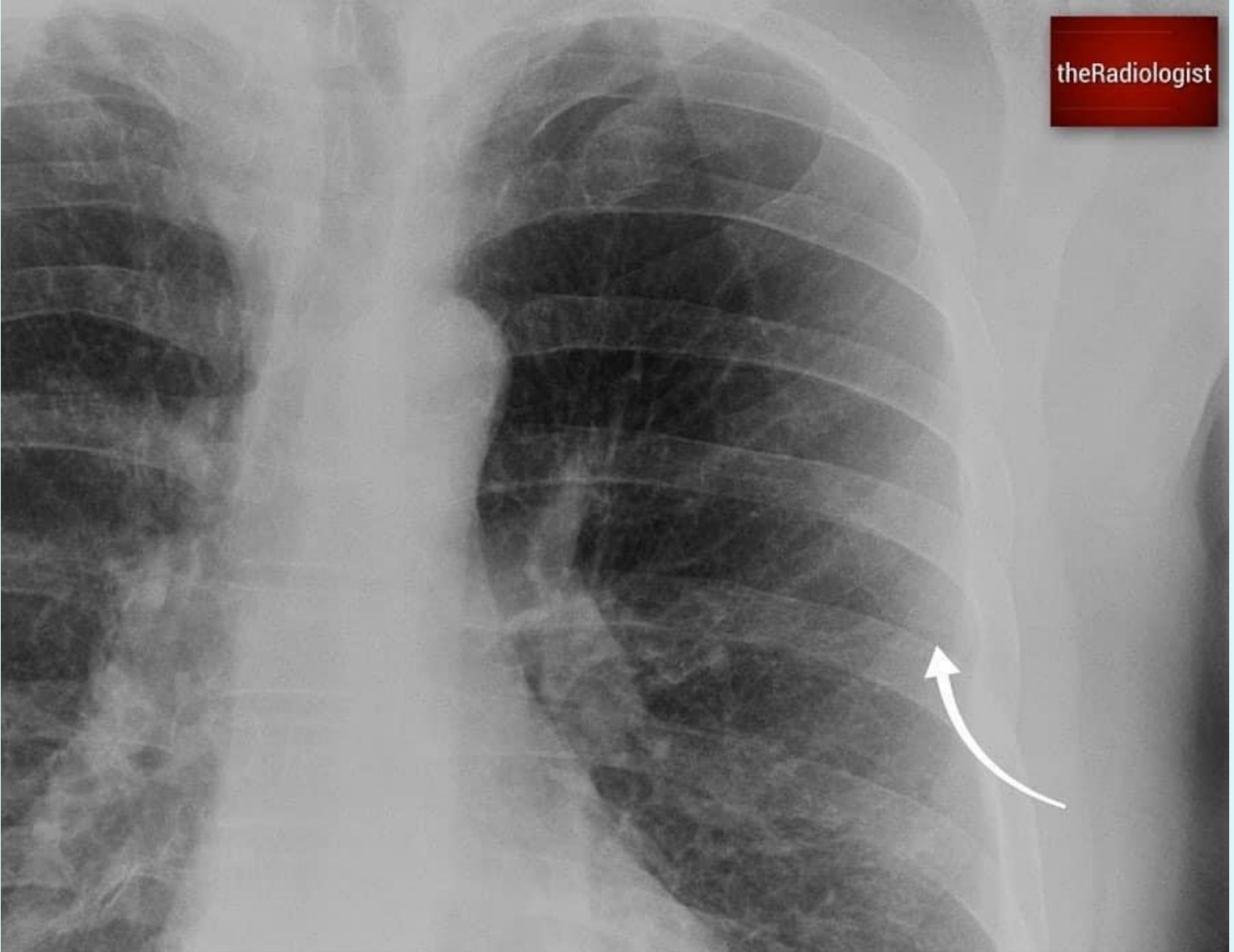
theRadiologist

Bilateral peripheral
consolidation should now
make you consider

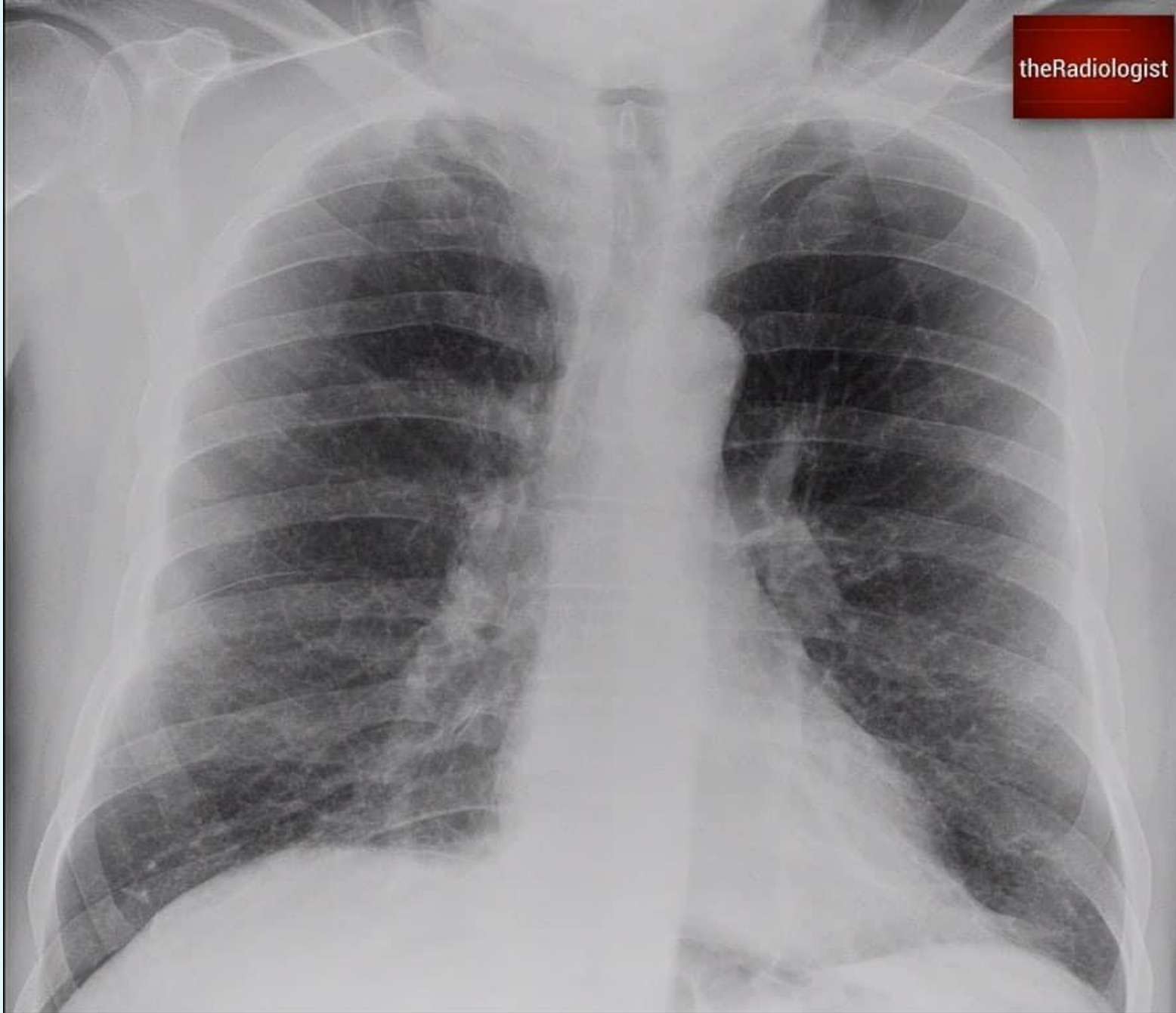
COVID-19



Chest CT confirms the Chest X-Ray abnormality - there is bilateral peripheral ground-glass opacity characteristic of COVID-19

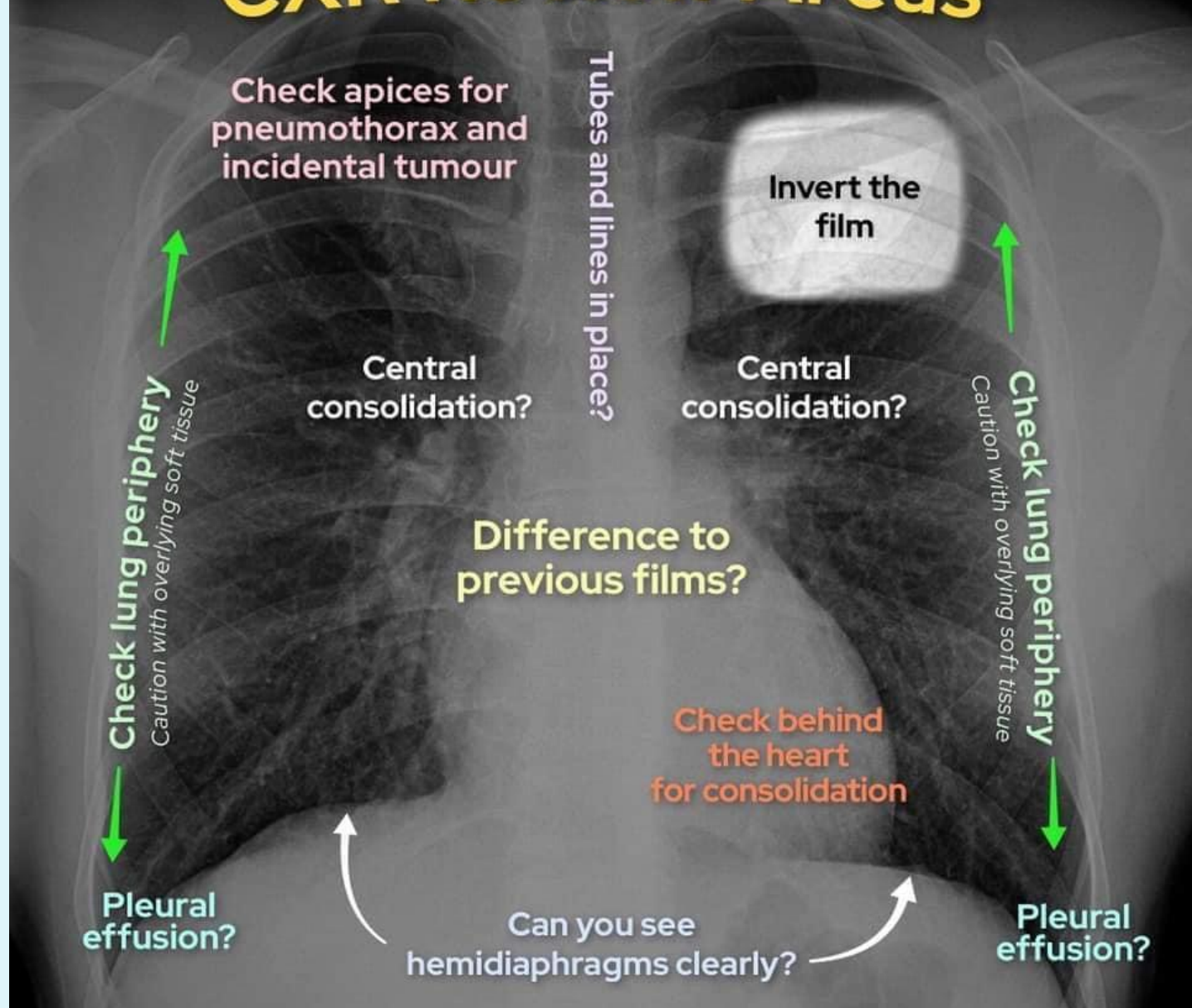


If we look at the periphery of the left lung we can see inferior border of the scapula here...



Severe abdominal pain Diagnosis? Swipe for explanation

COVID-19 CXR Review Areas



Check apices for pneumothorax and incidental tumour

Tubes and lines in place?

Invert the film

Central consolidation?

Central consolidation?

Check lung periphery
Caution with overlying soft tissue

Check lung periphery
Caution with overlying soft tissue

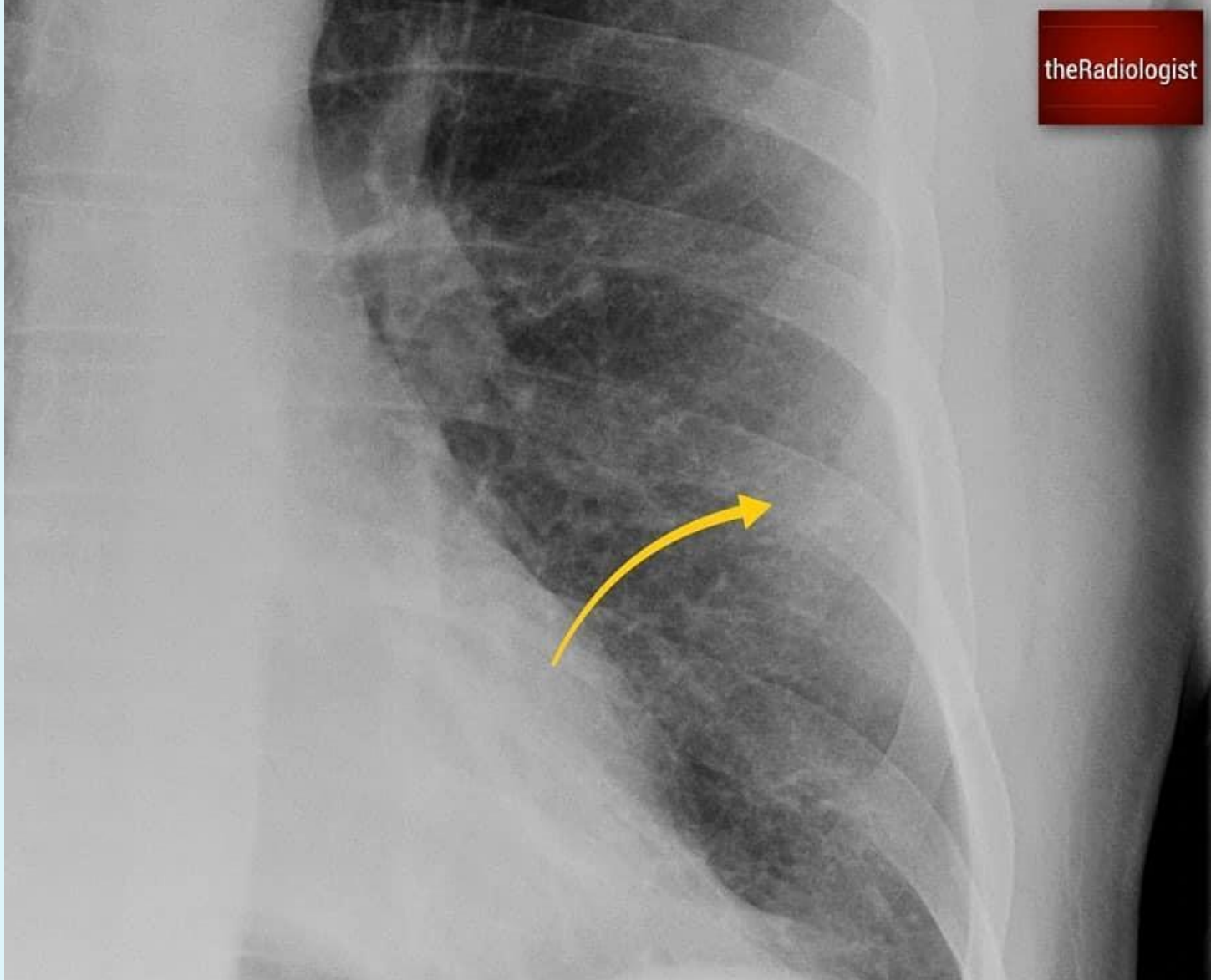
Difference to previous films?

Check behind the heart for consolidation

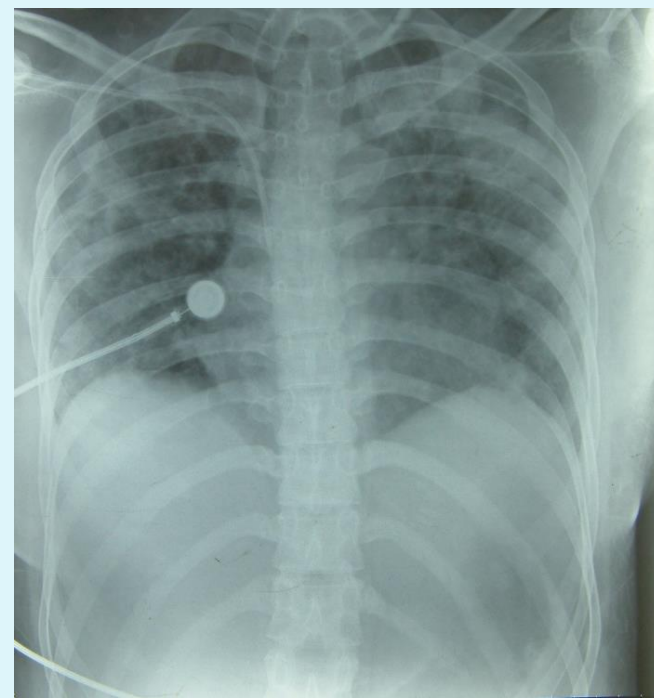
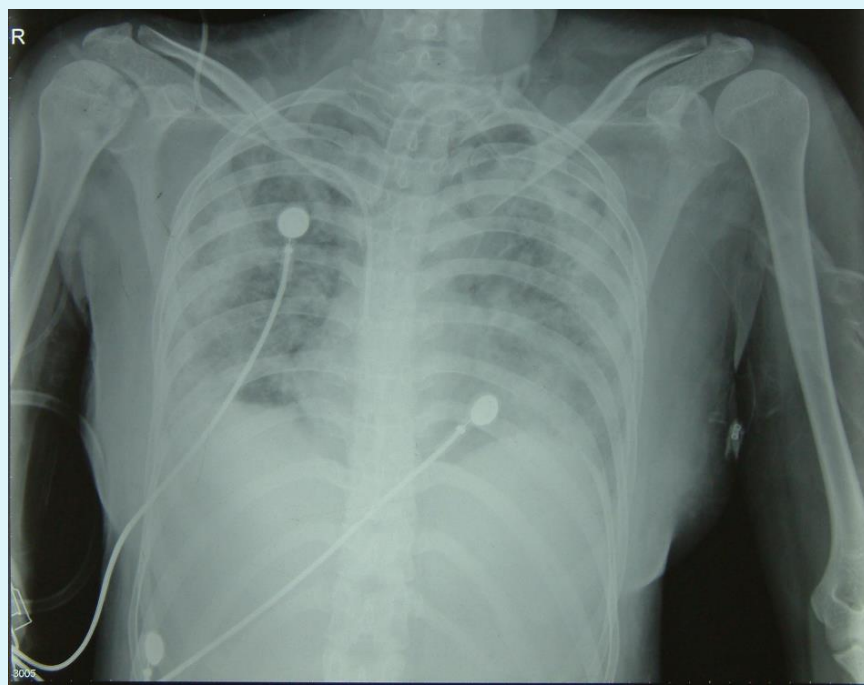
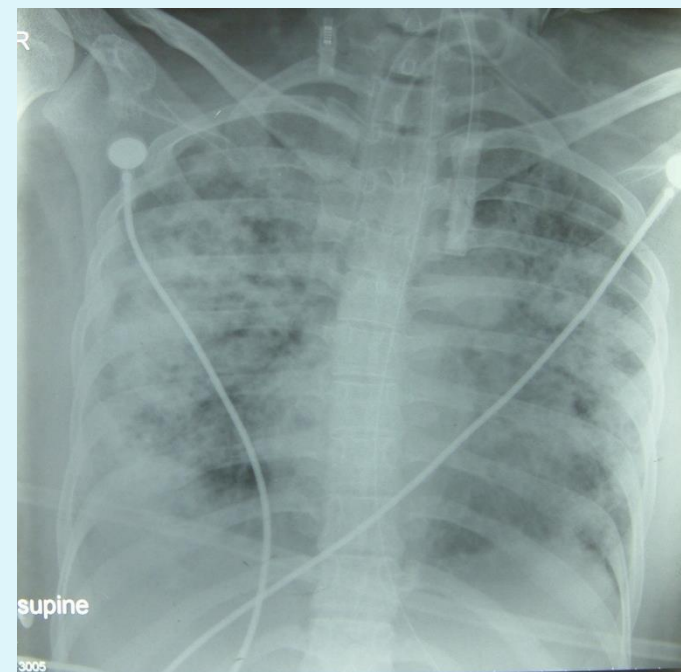
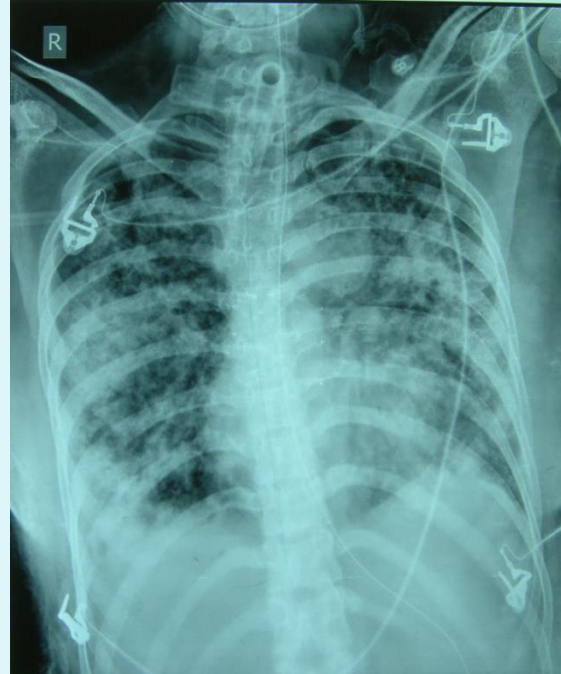
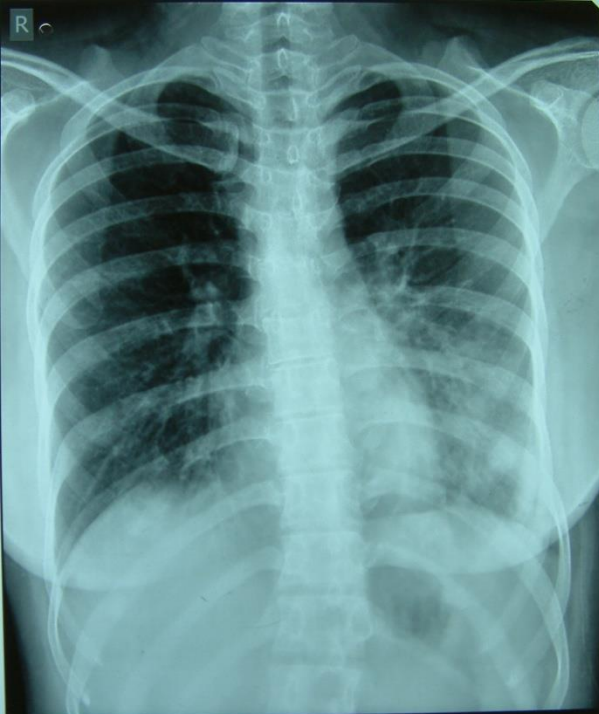
Pleural effusion?

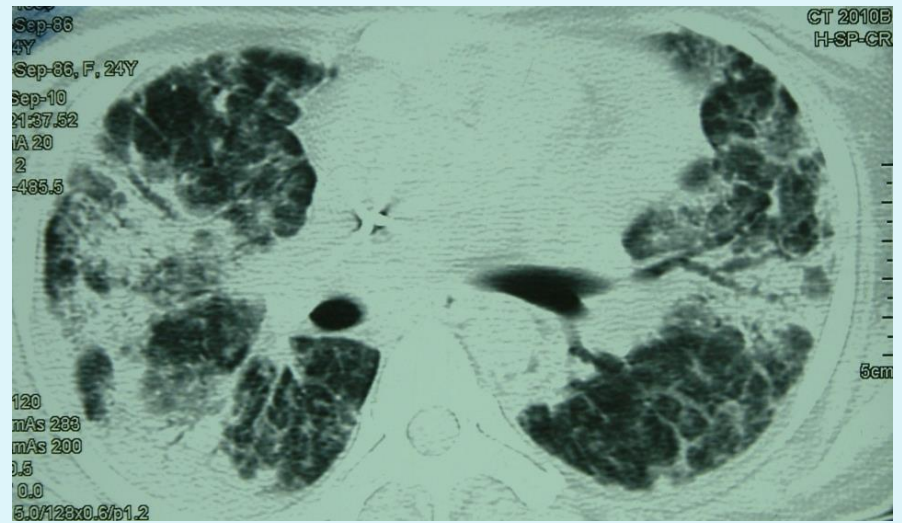
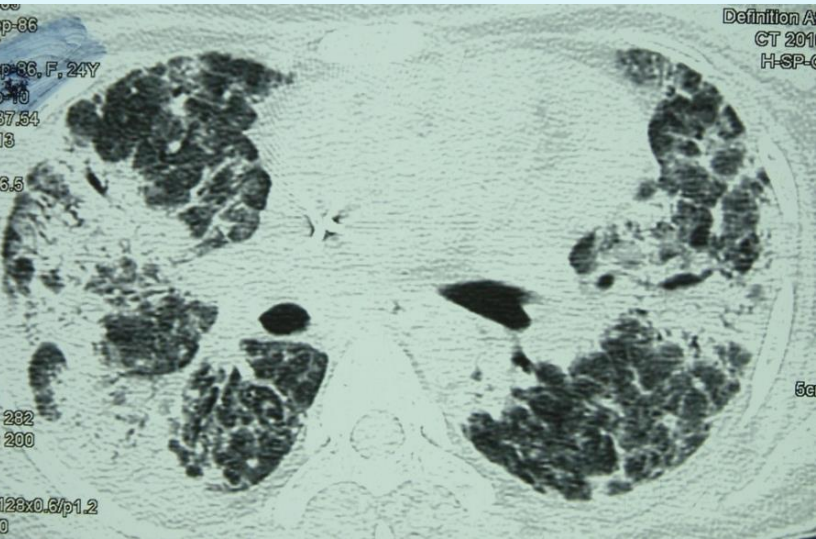
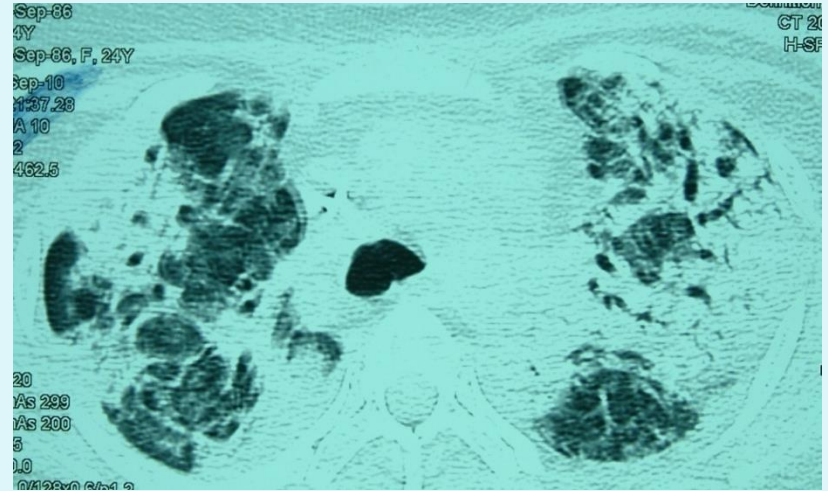
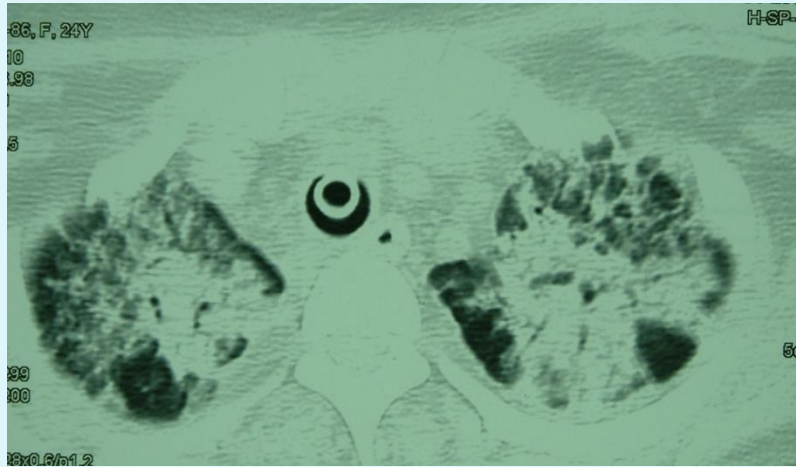
Pleural effusion?

Can you see hemidiaphragms clearly?

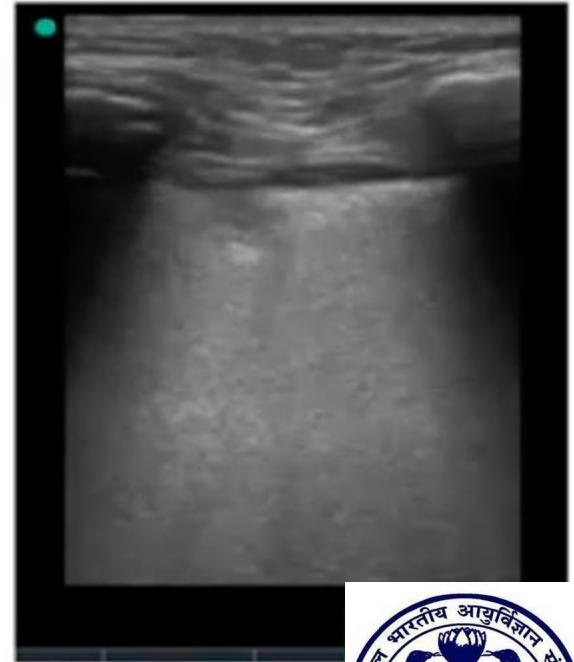


But below this there is increased opacity



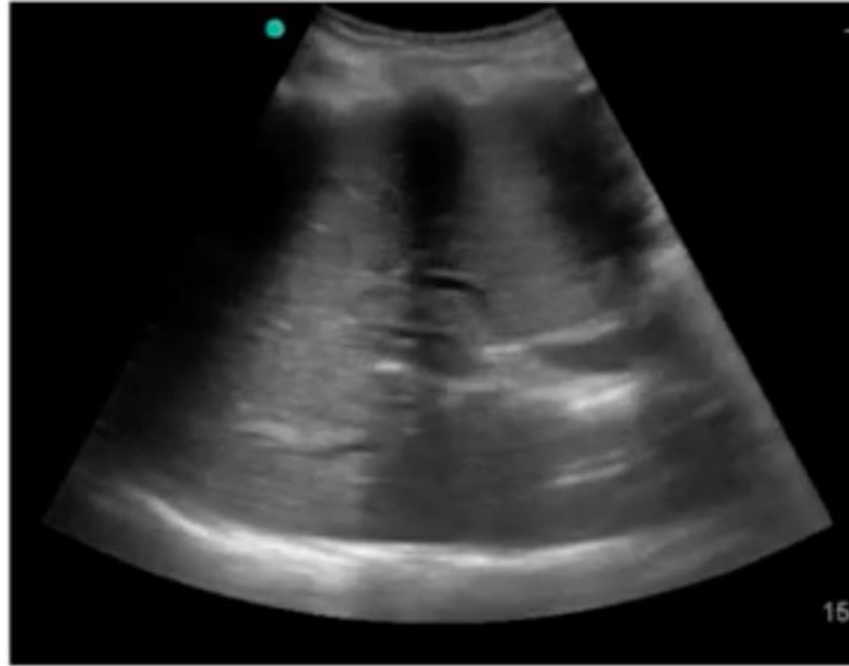


Lung USG



AIIMS, New Delhi





AIIMS, New Delhi



शरीरमाद्यं खलु धर्मसाधनम्

EDITORIAL

Open Access

COVID-19 pneumonia: ARDS or not?

Luciano Gattinoni^{1*}, Davide Chiumello² and Sandra Rossi³



Type 1



Type 2

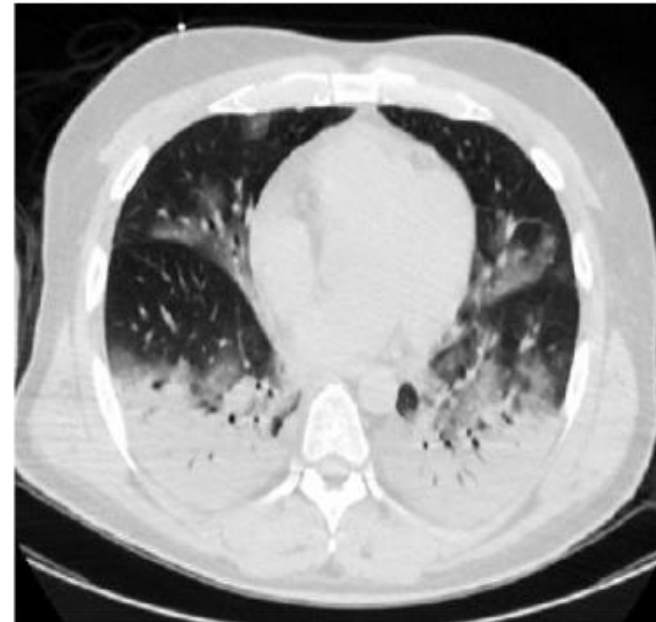


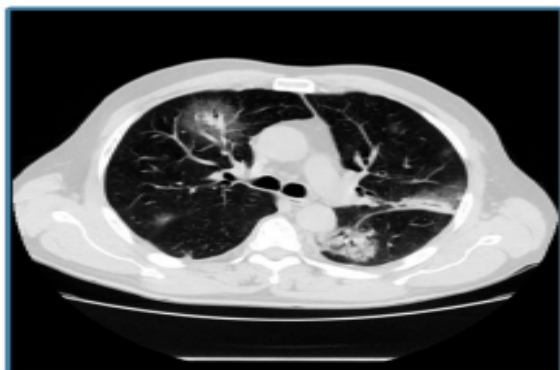
Fig. 1 In these 2 patients were recorded the following variables: type 1 lung weight (1192 g), gas volume (2774 ml), percentage of non-aerated tissue (8.4%), venous admixture (56%), P/F (68), and respiratory system compliance (80 ml/cmH₂O); type 2 lung weight (1441 g), gas volume (1640 ml), percentage of non-aerated tissue (39%), venous admixture (49%), P/F (61), and respiratory system compliance (43 ml/cmH₂O)

COVID-19 pneumonia: different respiratory treatments for different phenotypes?

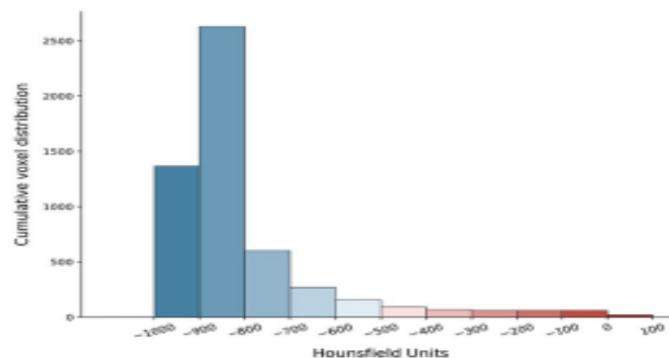


Luciano Gattinoni^{1*}, Davide Chiumello², Pietro Caironi^{3,4}, Mattia Busana¹, Federica Romitti¹, Luca Brazzi⁵ and Luigi Camporota⁶

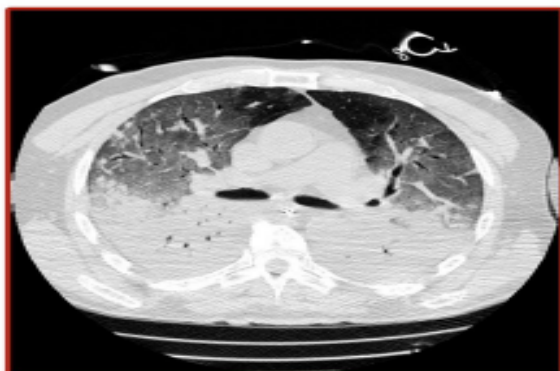
A



$\text{PaO}_2/\text{FiO}_2$
95 mmHg



B



$\text{PaO}_2/\text{FiO}_2$
84 mmHg

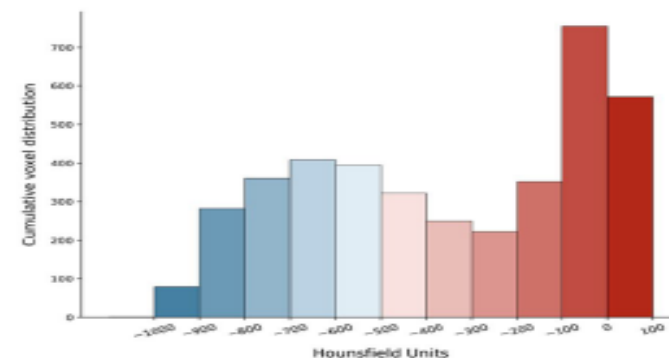


Fig. 1 **a** CT scan acquired during spontaneous breathing. The cumulative distribution of the CT number is shifted to the left (well-aerated compartments), being the 0 to -100 HU compartment, the non-aerated tissue virtually 0. Indeed, the total lung tissue weight was 1108 g, 7.8% of which was not aerated and the gas volume was 4228 ml. Patient receiving oxygen with venturi mask inspired oxygen fraction of 0.8. **b** CT acquired during mechanical ventilation at end-expiratory pressure at 5 cmH₂O of PEEP. The cumulative distribution of the CT scan is shifted to the right (non-aerated compartments), while the left compartments are greatly reduced. Indeed, the total lung tissue weight was 2744 g, 54% of which was not aerated and the gas volume was 1360 ml. The patient was ventilated in volume controlled mode, 7.8 ml/kg of tidal volume, respiratory rate of 20 breaths per minute, inspired oxygen fraction of 0.7

Treatment Protocols



Drugs

- Hydroxychloroquine
- Azithromycin
- Anti virals
- Immuno modulators- Tacilizumab
- Steroids
- Anti coagulation
- Vitamin C
- Plasma therapy
- Ulinastatin

Early Supportive Therapy and Monitoring

ANTIMICROBIALS

- Empiric administration covering like pathogens
- In sepsis introduce in first hour
- Consider CAP, HCAP, Sepsis
- Local epidemiology, susceptibility data
- Can cover Neuraminidase inhibitor for influenza

CONSERVATIVE FLUID MANAGEMENT IF NO SHOCK

Early Supportive Therapy and Monitoring

CORTICOSTEROIDS

- **Not routinely advised**
- **No survival benefits (SARS)**
- **Adverse effects –**
 - **Avascular necrosis,**
 - **Psychosis,**
 - **Diabetes and**
 - **Delayed viral clearance.**

Hydroxychloroquine

- Prophylactic – 400mg BD on day 1 followed by 400mg once a week for 6 weeks
 - *Therapeutic- 400mg BD followed by 200mg BD for 5 -7 days.
- Evolving evidence .
- ICMR , USA


Frie and Gbinigie, CEBM, 2020; Yao et al., Clin Infect Dis, 2020; Liu et al., Nature, 2020; Wang et al., Cell Res, 2020; Gautret et al., mediterranean-infection, 2020; Lane et al., medRxiv, 2020

Hydroxychloroquine and chloroquine *in vitro* and *in vivo*

Info

multiple RCTs ongoing,
no serious adverse events but possible
increased cardiovascular complications


Studies


 inhibited viral replication
in vitro and prevented
infection as pre-treatment

 20 vs 16
HCQ standard care

under-powered, no
follow up or
randomisation

Outcome

 *in vitro*, HCQ more effective
vs CQ

 70% of patients on HCQ had
viral clearance (vs 12.5%)

Azithromycin


- Being used
- Atypical Pneumonias
- Combination with HCQ is an issue
- QT prolongation with arrhythmias
- Quinolones and Doxycycline

Anti virals



- Lopinavir , Ritonavir, Oseltamivir
- Being used

Cao *et al.*, New Engl J Med , 2020; Li *et al.*, medRxiv, 2020; Ye *at al.*, Eur Rev Med Pharmacol Sci, 2020

Lopinavir-Ritonavir (antivirals) 3 patient studies

 Studies	99 vs 100 drug standard care	non-blinded study
	21 vs 7 drug standard care	under-powered study
	42 vs 5 drug + adjuvent adjuvent	no statistics and under-powered study

Outcomes

-  99 and 21: no difference in viral load, clinical improvement or mortality
-  42: clinical improvement, but no stats

Xiaoling *et al.*, ChinaXiv, 2020; Gritti *et al.*, medRxiv, 2020

Dexamethasone treatment for the acute respiratory distress syndrome: a multicentre, randomised controlled trial



Jesús Villar, Carlos Ferrando, Domingo Martínez, Alfonso Ambrós, Tomás Muñoz, Juan A Soler, Gerardo Aguilar, Francisco Alba, Elena González-Higueras, Luís A Conesa, Carmen Martín-Rodríguez, Francisco J Díaz-Domínguez, Pablo Serna-Grande, Rosana Rivas, José Ferreres, Javier Belda, Lucía Capilla, Alec Tallet, José M Anón, Rosa L Fernández, Jesús M González-Martín for the dexamethasone in ARDS network*

	Dexamethasone group (n=139)	Control group (n=138)	Between-group difference (95% CI)	p value
Ventilator-free days at 28 days	12.3 (9.9)	7.5 (9.0)	4.8 (2.57 to 7.03)	<0.0001
All-cause mortality at day 60	29 (21%)	50 (36%)	-15.3% (-25.9 to -4.9)	0.0047
ICU mortality	26 (19%)	43 (31%)	-12.5% (-22.4 to -2.3)	0.0166
Hospital mortality	33 (24%)	50 (36%)	-12.5% (-22.9 to -1.7)	0.0235
Actual duration of mechanical ventilation in ICU survivors, days	14.2 (13.2)	19.5 (13.2)	-5.3 (-8.4 to -2.2)	0.0009
Actual duration of mechanical ventilation in survivors at day 60, days	14.3 (13.3)	20.2 (14.0)	-5.9 (-9.1 to -2.7)	0.0004
Adverse events and complications*				
Hyperglycaemia in ICU	105 (76%)	97 (70%)	5.2% (-5.2 to 15.6)	0.33
New infections in ICU	33 (24%)	35 (25%)	1.6% (-8.5 to 11.7)	0.75
Barotrauma	14 (10%)	10 (7%)	2.8% (-4.0 to 9.8)	0.41

Data are n (%) or mean (SD). ICU=intensive care unit. *Data included the period from randomisation to day 10 (for hyperglycaemia) and from randomisation to ICU discharge (for new infections and barotrauma).

Table 2: Outcomes, adverse events, and complications

*Moderate to Severe ARDS got 20mg IV Dexa for D1-5 , 10mg OD for D6-10 .

- Reduced ventilator free days and all cause mortality
- What do we do ?

Russell et al., The Lancet, 2020; Villar et al., The Lancet, 2020


Corticosteroids SARS-CoV and ARDS



- In patients with SARS, no clinical data exist to indicate a benefit, but potential for increased risk of harm
- From ARDS, low dose dexamethasone may reduce mortality and requirement for mechanical ventilation


Anti coagulation

- Prothrombotic state
- Incidences of thrombo-embolic phenomenon more
- Pulmonary embolism and thrombotic events in nervous system
- More with cytokine surge
- D dimer and deranged PT, aPTT, INR ,platelet count
- Anticoagulation with LMWH and unfractionated heparin


 **Ivermectin**  **in vitro**  **Vero cell line**

 **Info**
anti-parasitic drug with some anti-viral properties

 **Study**  Previously shown to inhibit viral replication

-  Vero cells + SARS-CoV2
 - 2h incubation
 - +ivermectin

 **Outcome**

-  After 24h - reduced viral RNA in supernatant
-  After 48h - no viral material

Specific Therapy

Specific therapy

- NO SPECIFIC ANTIVIRALS have been proven to be effective as per currently available data. However, based on the available information (uncontrolled clinical trials), the following drugs may be considered as an off – label indication **in patients with severe disease and requiring ICU management:**
- Hydroxychloroquine (Dose 400mg BD – for 1 day followed by 200mg BD for 4 days) in combination with Azithromycin (500 mg OD for 5 days) under close monitoring including QTc interval.
- The above medication is presently not recommended for children less than 12 years, pregnant and lactating women.
- ***These guidelines are based on currently available information and would be reviewed from time to time as new evidence emerges.***

Oxygen Therapy



Oxygen therapy

- Target Spo₂ – 85-92%
- Pao₂ ≥ 55 mmHg
- Oxygen by nasal canula / mask/ venturi mask/
Reservoir mask
High Flow nasal canula

CPAP/ BIPAP/ NIV

Oxygen Therapy



Oxygen Canula (1-4litresO₂/min)



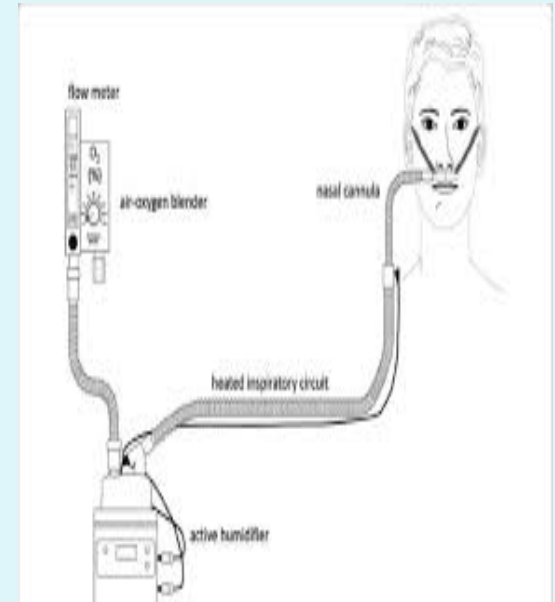
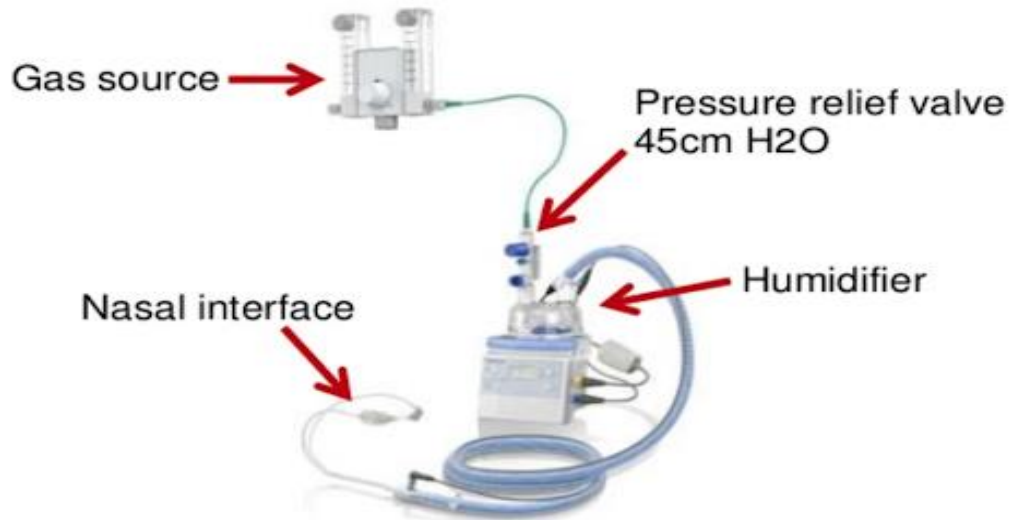
Face Mask – O₂ 4-8Lires/min



Oxygen Reservoir Mask -8-15 L/min

Nasal Canula (o ₂)	FiO ₂
1 L	25%
2L	29%
3L	33%
4L	37%

High-Flow Nasal Cannula



Disadvantage –

Increased generation of aerosols

Patient co operation

Non availability in many centres

Immuno Therapy



Convalescent Plasma Therapy

Transfuse sera of patients who have recovered

Presumed to have antibodies which may help

Evidence yet to evolve

Expert opinions . USA , UK, Kerala

Hematology support

Immuno Modulators

Xiaoming et al., medRxiv, 2020; Gritu et al., medRxiv, 2020

Tocilizumab / Siltuximab 2 studies with 21 patients each

Info
anti-IL6
receptor
antibodies

Studies

- Tocilizumab: no control group; risk of bias
- Siltuximab: no control group, all ARDS patients

Outcomes

- Tocilizumab: suggested effective; 53% returned to normal lymphocyte counts, 84% normalised CRP
- Siltuximab: **reduced CRP** levels; over 8 days, **33% CRP improved**, 43% stabilised; **24% worsened**

Frie and Gbinigie, CEBM, 2020; Yao et al., Clin Infect Dis, 2020; Liu et al., Nature, 2020; Wang et al., Cell Res, 2020; Gautret et al., mediterranean-infection, 2020; Lane et al., medRxiv, 2020

HLH syndrome – Histiocytic Hemo phagolytic Syndrome

Profound marrow suppression

Vaccination



Management of Septic Shock



Septic Shock

- **Adults:** persisting hypotension despite volume resuscitation, requiring vasopressors to maintain MAP ≥ 65 mmHg and serum lactate level > 2 mmol/L
- **Children:** any hypotension (SBP < 5 th centile or > 2 SD below normal for age) or 2-3 of the following: altered mental state; tachycardia or bradycardia (HR < 90 bpm or > 160 bpm in infants and HR < 70 bpm or > 150 bpm in children); prolonged capillary refill (> 2 sec) or warm vasodilation with bounding pulses; tachypnea; mottled skin or petechial or purpuric rash; increased lactate; oliguria; hyperthermia or hypothermia

Shock in COVID-19 – what we know so far..



- Shock in COVID –
 - 1-5% patients
 - 20-35% of ICU patients
- Type of shock !
 - Septic/cardiogenic
 - Cardiac injury 7-23% patients (China, JAMA 2020)
 - Shock (?myocarditis) as cause of death in 40% patients in ICU (China, Int Care Med 2020)

Management of Septic shock

- Recognize septic shock in adults when infection is suspected or confirmed AND vasopressors are needed to maintain mean arterial pressure (MAP) ≥ 65 mmHg AND lactate is < 2 mmol/L, in absence of hypovolemia.
- Fluid resuscitation : Adult : 30ml /kg.
- Isotonic crystalloids (NS / RL) < 3 hrs.
- Don't use hypotonic crystalloids (Hydroxy ethyl starch)
- Avoid volume overload
- Administer central venous catheter & measure central venous pressure

Management of Septic shock

- ❑ Judicious use of norepinephrine, epinephrine, vasopressin, dopamine.
- ❑ Reserved dopamine for selected patients with low risk of tachyarrhythmia or bradycardia.
- ❑ Monitor : MAP, Urine output $>0.5\text{ml/ kg.}$ per hour.
 - Skin mottling , consciousness, lactate.

Management of Septic shock

- ❑ Other therapeutic measures : to decrease the body's inflammatory response, glucocorticoids can be used for a short period of time (3 to 5 days)
- ❑ dose should not exceed the equivalent of methylprednisolone 1 – 2mg/kg/day
- ❑ larger dose of glucocorticoid will delay the removal of coronavirus due to immunosuppressive effects

Volume status - IVC



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IVC



शरीरमाद्यं खलु धर्मसाधनम्



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Early supportive therapy and monitoring

- Use **conservative fluid management** in patients with SARI when there is no evidence of shock
- Patients with SARI should be treated cautiously with intravenous fluids, because aggressive fluid resuscitation may worsen oxygenation, especially in settings where there is limited availability of mechanical ventilation

Early supportive therapy and monitoring

- **Closely monitor patients with SARI for signs of clinical deterioration**, such as rapidly progressive respiratory failure and sepsis, and apply supportive care interventions immediately
- Application of timely, effective, and safe supportive therapies is the cornerstone of therapy for patients that develop severe manifestations of nCoV

Early supportive therapy and monitoring

- Understand the patient's **co-morbid condition(s)** to tailor the management of critical illness and appreciate the prognosis
- During intensive care management of SARI, determine which chronic therapies should be continued and which therapies should be stopped temporarily
- **Communicate early** with patient and family
- Communicate **proactively** with patients and families and provide support and prognostic information
- **Understand the patient's values and preferences** regarding life-sustaining interventions

Admit in Hospital when..

- Tachypnea ($RR > 24/\text{min}$)
- $SpO_2 < 94\%$ on room air ($PaO_2/FiO_2 < 300$)
- Signs of hypoperfusion
 - Low BP, altered mentation
- Risk of severe disease
 - Age > 60
 - DM, HTN, immunocompromised
 - Chronic lung/cardiac/renal/hepatic disease

Who gets admitted to ICU ?

- Tachypnea/ Resp distress
- Requiring oxygen
- Low BP
- Altered sensorium
- Other organ dysfunction- Acute kidney Injury, Hepatitis, coagulopathy.

Unique features

- Cytokine storm
- Flooding of the lungs with bilateral peripheral opacities
- Necrotic lungs
- Profound vasodilatation
- Leukopenia
- High Ferritin and CRP
- High D dimer ...in order of thousands
- AKI

Prognosis :

- Case Fatality Rate : 2.3%
- Maximum Death Age Group : >60 years
- Maximum Death Comorbidity : Hypertension 6%
Diabetes 6%
CVD 10%
Cancer 5%
COPD 6%
- M – F mortality : 2.8 to 1.7%

SARS (10%)

MERS (37%)

Poor prognostic marker :

- Bacterial and Fungal co-infection
- Old age, Obesity & presence of comorbidity
- MuLBSTA score >12 predictor of mortality
 - Multilobar infiltration : 5 points
 - Lymphopenia (lymphocytes) $<0.8 \times 10^9$: 4 points
 - Bacterial co-infection: 4 points
 - Smoking History :
 - Acute smoker : 3 points
 - Quit smoker : 2 points
 - Hypertension : 2 points
 - Age >60 years : 2 points

Cause of mortality

- Cytokine storm
- Secondary Sepsis
- Co morbidities
- Immunosuppressed
- Lack of timely intervention



सत्यमेव जयते

Ministry of Health & Family Welfare
Government of India



World Health
Organization
India

Thank you

