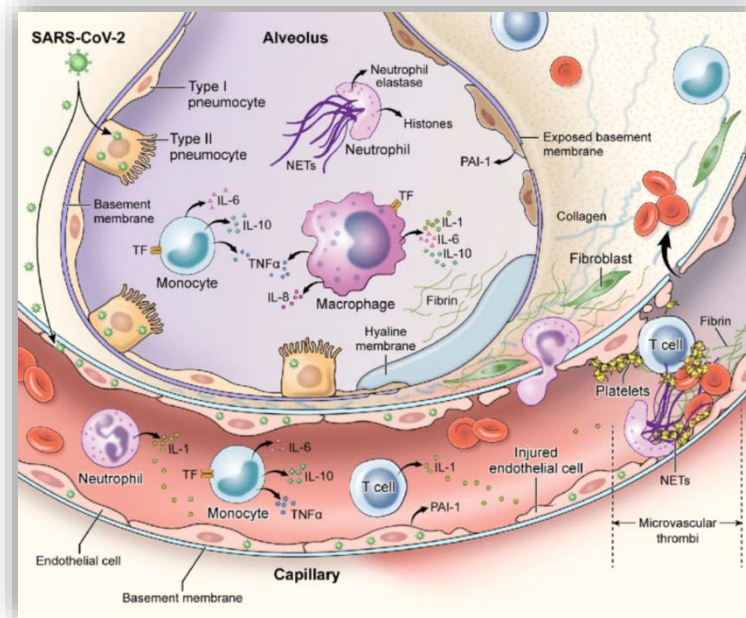


# Covid19 coagulopathy Case Presentation & Discussion



[Vasc. Med. 2020 Oct;25(5):471-478]

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# Case presentation



**56 Male**

## pMH:

- MI, insertion of drug-eluting stent in LAD ~4months ago
- DM type II
- Controlled HTN
- Controlled Hyperlipidaemia
- No evidence of CHF
- Mild COPD
- Smoker(pack-years=20)
- BMI=29

## Meds:

1. Aspirin 75mg OD
2. Rivaroxaban 2.5mg BD
3. Lansoprazole 30mg OD
4. Atenolol 25mg BD
5. Ramipril 1.25mg BD
6. Atorvastatin 80mg ON
7. PRN Salbutamol 5mg

*\*Consent for use of the data obtained from the patient*

# Assessment

## Vitals:

T=39, RR=39, SaO2=78%(admission), on **No-rebreather mask**(qCSI=12:High risk)

Respiratory rate, breaths/min	≤22 0	23-28 +1	>28 +2
Pulse oximetry Lowest value recorded during the first four hours of the patient encounter	>92% 0	89-92% +2	≤88% +5
O <sub>2</sub> flow rate, L/min	≤2 0	3-4 +4	5-6 +5

## Bloods:

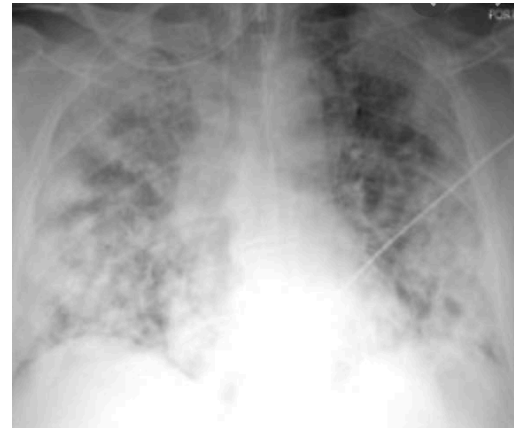
WBC=7.44(Neu=6.68, Lymp=0.55), Hb=134, PLT=98

PT=14.9, APTT=42, APTT 50/50 mix=35, Fib=8.59, D-Dimers=80,000

Ferritin=11,122, LDH=1,147, Trop=42

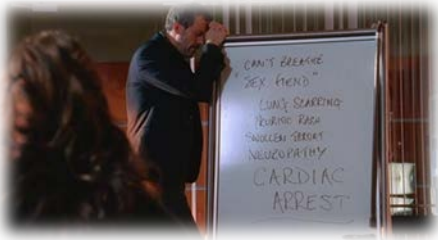
Bil=16

Rapid Covid-19 swab: pos



CXR

# Coagulopathy



Does the patient have DIC?

If our patient had DIC

- In non-bleeding patients, keep
  - platelet count above  $25 \times 10^9/L$
- In bleeding patients, keep
  - platelet count above  $50 \times 10^9/L$
  - fibrinogen above  $1.5 \text{ g/L}$
  - PT ratio  $<1.5$  (not the same as INR)

J. Thromb. Haem.. 2020 May;18(5):1023-1026



Why the haemostasis profile is deranged?

Thrombosis vs Fibrinolysis



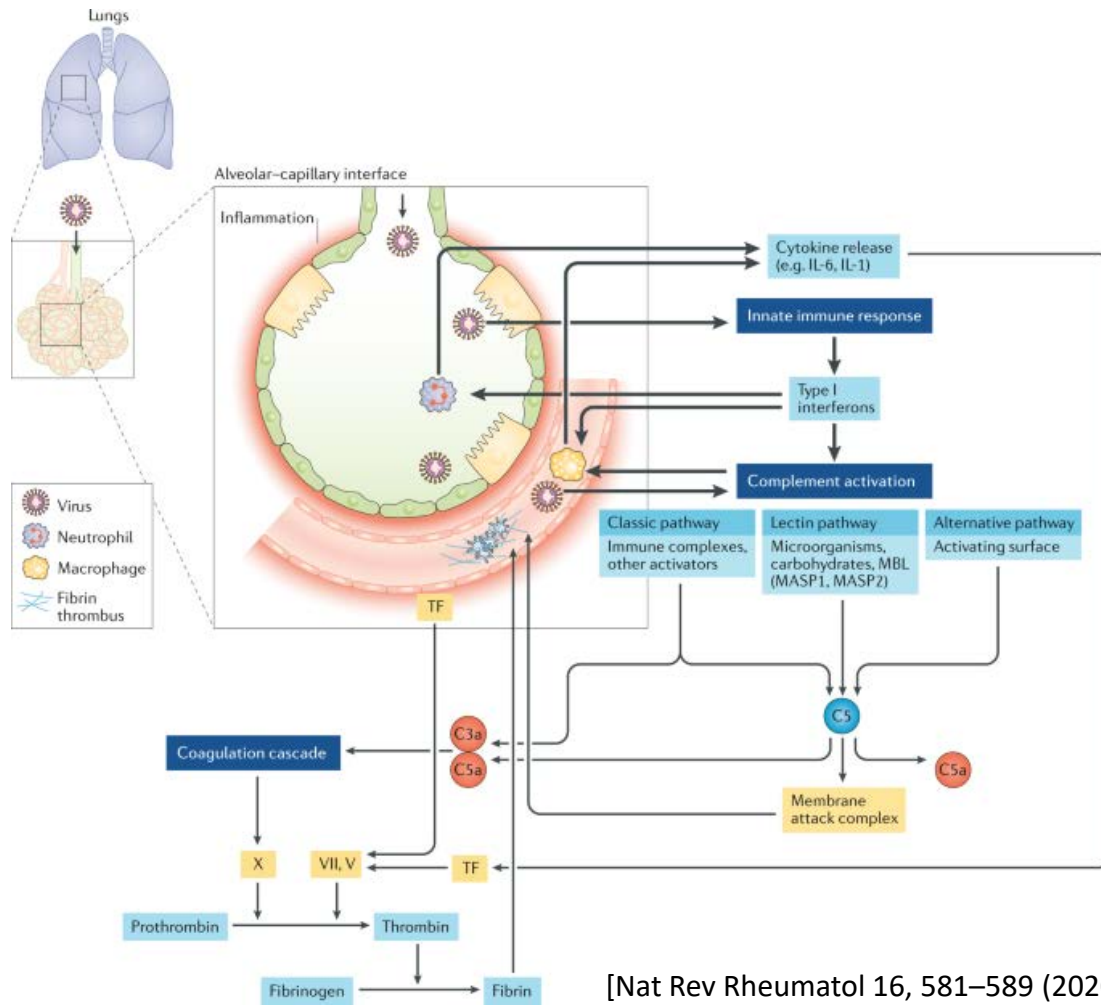
“The **Good**, the **Bad** and the **Ugly**” Clot

1. Keep blood in fluid state
2. Avoid host nutrients being lost
3. Stop micro-organisms entering the host ( «Immunothrombosis» )

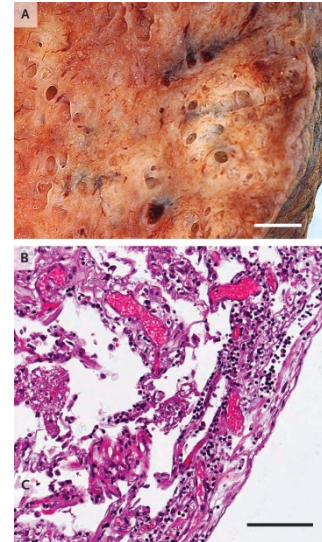
# Coagulopathy

“The **Good**, the **Bad** and the **Ugly**” Clot

## Cross-talk between Coagulation and Immune System



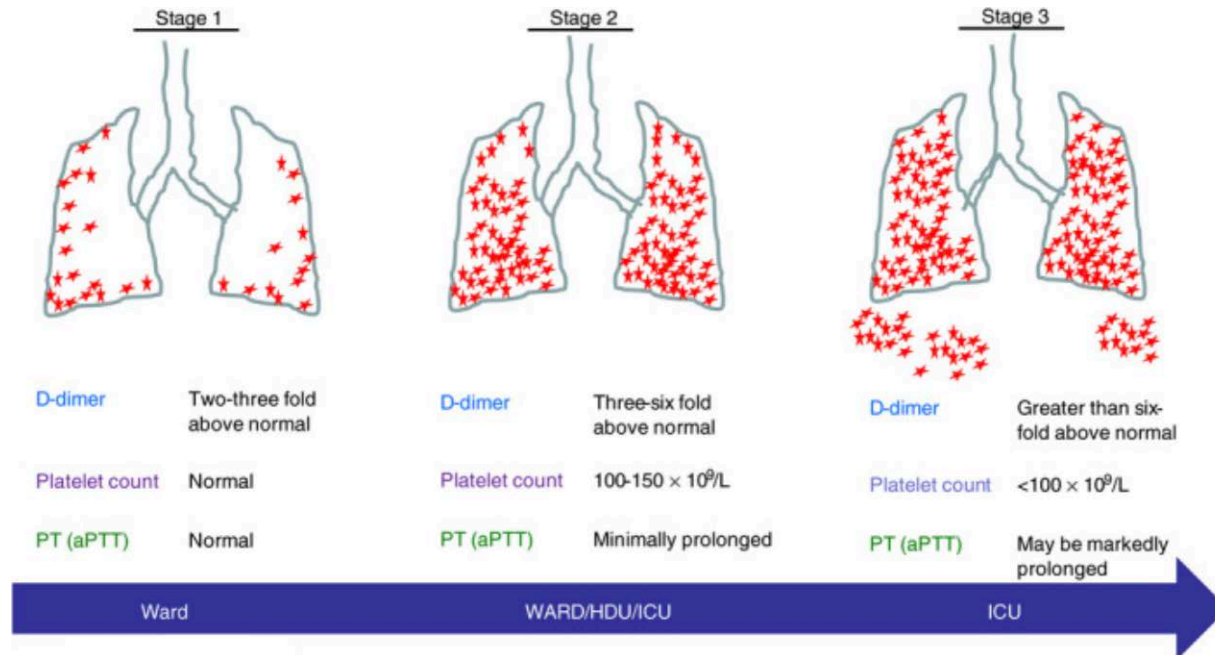
[Nat Rev Rheumatol 16, 581–589 (2020)]



Evidence of **endothelitis** and **microthrombi** in Covid-19  
[N Eng J Med 2020; 383: 120-128]

# Covid-19 severity in relation to coagulopathy

## Covid-19 Associated Hemostatic Abnormalities(CAHA)

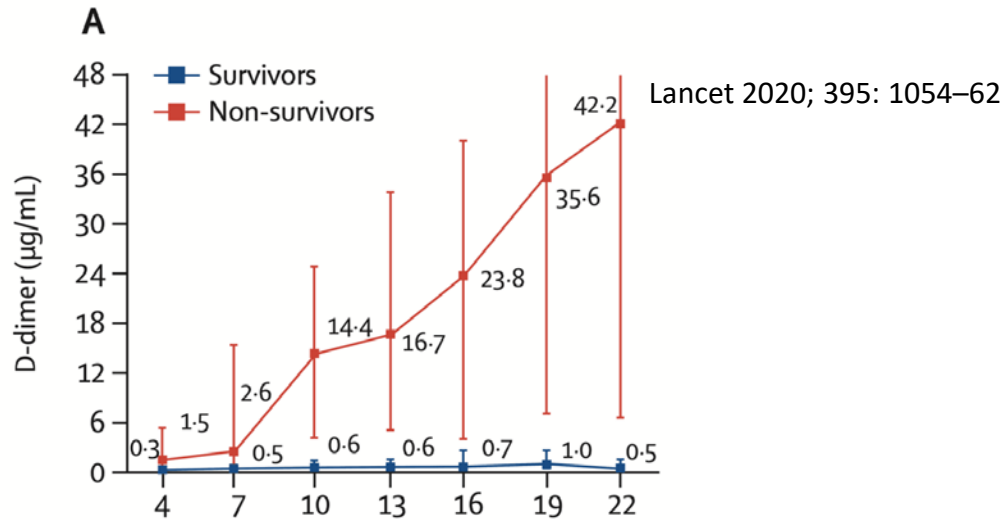


RPTH May 12 doi:10.1002/rth2.1237

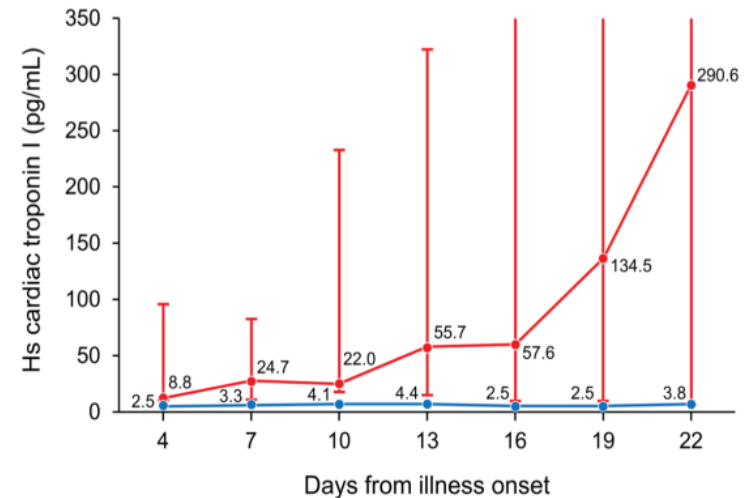
Our patient was admitted to ITU, intubated and ventilated →



# Covid-19 severity in relation to coagulopathy



Journal of the American College of Cardiology 2020, 76(10)L 1244-1258



Did our patient survive ?



# Covid-19 risk of clot and implications for screening

**RISK**



- 27% Covid-19 pos patients → Venous Thromboembolism
- 3.7% Covid-19 pos patients → Arterial Thrombosis

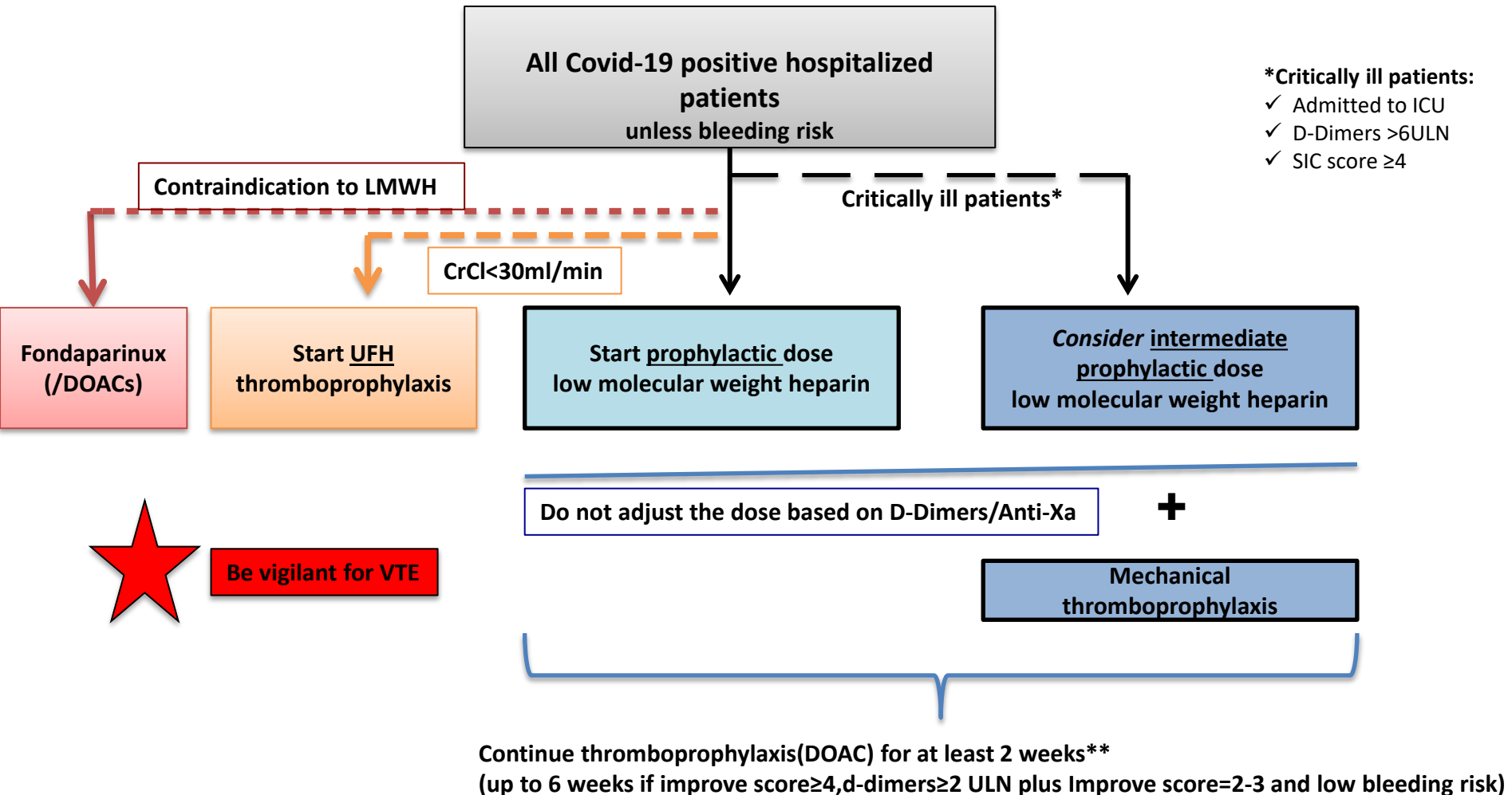


-Routine screening based on elevated D-dimers not recommended

-Patients with dynamic changes in Trop associated with MI symptoms/signs/ECG findings  
→further investigation



# Thromboprophylaxis recommendations



Unexpected error,

Our patient received **standard** dose LMWH

# Coagulation scores in Covid-19

## Sepsis Induced Coagulopathy (SIC) Score


INR	≤1.2	0	
	>1.2 to 1.4	+1	
	>1.4	+2	
Platelet count, cells x 10 <sup>9</sup> /L	≥150	0	
	100 to <150	+1	
	<100	+2	
<u>Total SOFA score</u> Sum the full SOFA Score's Respiratory, Cardiovascular, Hepatic, and Renal components	0 0	1 +1	≥2 +2

## The IMPROVE risk-assessment model

Risk factor	point
Prior venous thromboembolism	3
Diagnosed thrombophilia	2
Current lower limb paralysis	2
Current cancer	2
Immobilised for at least 7 days	1
Stay in ICU or coronary care unit	1
More than 60 years old	1

# Thromboprophylaxis recommendations

→ Our patient was diagnosed with **non-massive** PE and was started on **treatment dose LMWH**

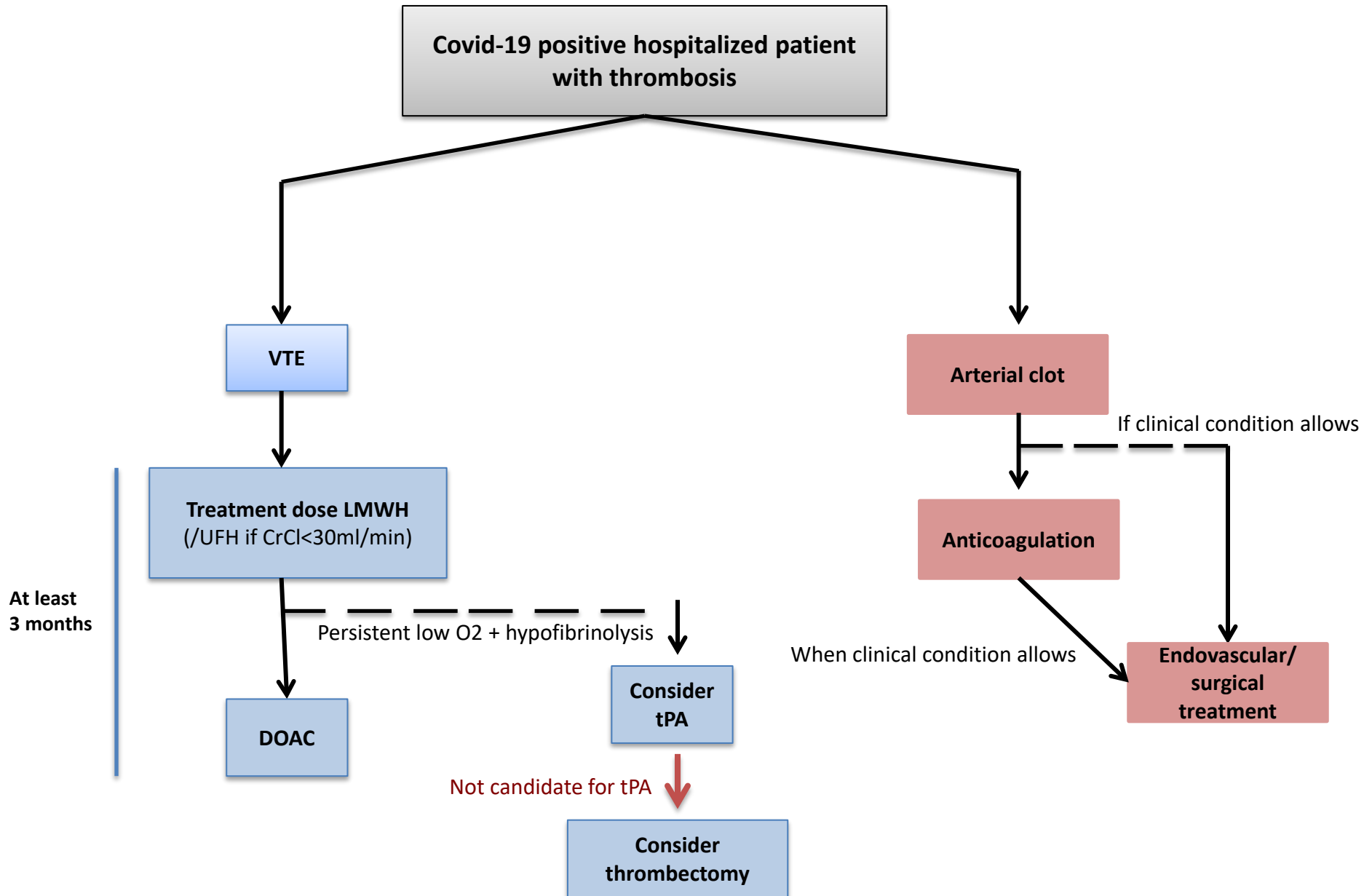
- 
- a) Nothing, the patient had PE since admission.
  - b) Patient should have been on intermediate dose LMWH
  - c) Antiplatelets should have been added
  - d) All the above could be true**

“...Half of the thromboembolic events were diagnosed within 24h of hospital admission...”(Thromb Res. 2020 Jul;191:9-14)

“Higher levels of platelet activation (Blood. 2020;136(11):1221-1223 )

“..platelet rich thrombi”(Rapkiewicz et.al.,Lancet.2020)

# Management of Covid-19 related thrombosis



# Questions that arise from the case

→ Our patient was stepped down to the ward and you receive a call from the Med Registrar...

Do I need to perform a thrombophilia screen for this patient?



VTE in Covid-19 patients are considered “provoked”. No need to perform a thrombophilia screen.

# Food for thought

Anticoagulation may not prevent **arterial** clots

Anticoagulation may not treat **microthrombi**

The place of **viscoelastic** testing to decide type and intensity of therapy

If the pathophysiology of thrombosis is **immunothrombosis**, is there any **group of patients protected** from Covid-19?

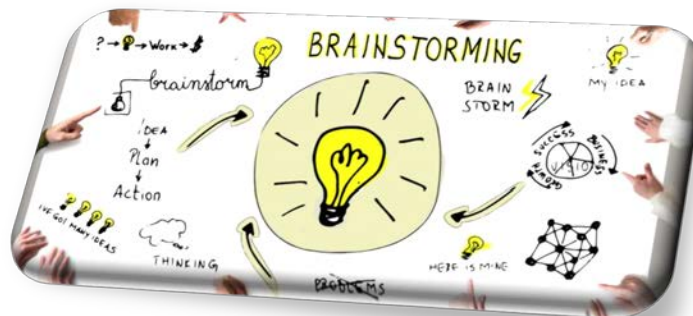
# Clinical Trials

<a href="#">Prevention of Arteriovenous Thrombotic Events in Critically-Ill COVID-19 Patients Trial</a>	Recruiting	No Results Available	<ul style="list-style-type: none"> <li>• COVID-19</li> <li>• Venous Thromboembolism</li> <li>• Arterial Thrombosis</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: Unfractionated Heparin IV</li> <li>• Drug: Enoxaparin 1 mg/kg</li> <li>• Drug: Clopidogrel</li> <li>• Drug: Unfractionated heparin SC</li> <li>• Drug: Enoxaparin 40 Mg/0.4 mL Injectable Solution</li> </ul>
<a href="#">Early Prophylactic Low-molecular-weight Heparin (LMWH) in Symptomatic COVID-19 Positive Patients</a>	Not yet recruiting	No Results Available	<ul style="list-style-type: none"> <li>• COVID-19</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: Enoxaparin</li> </ul>
<a href="#">Intermediate or Prophylactic-Dose Anticoagulation for Venous or Arterial Thromboembolism in Severe COVID-19</a>	Recruiting	No Results Available	<ul style="list-style-type: none"> <li>• COVID-19</li> <li>• Venous Thromboses</li> <li>• Arterial Thrombosis</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: Enoxaparin Prophylactic Dose</li> <li>• Drug: Heparin Infusion</li> <li>• Drug: Heparin SC</li> <li>• Drug: Enoxaparin/Lovenox Intermediate Dose</li> </ul>
<a href="#">COVID-19 Positive Outpatient Thrombosis Prevention in Adults Aged 40-79</a>	Not yet recruiting	No Results Available	<ul style="list-style-type: none"> <li>• COVID-19</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: Apixaban 2.5 MG</li> <li>• Drug: Apixaban 5MG</li> <li>• Drug: Aspirin</li> <li>• Drug: Placebo</li> </ul>
<a href="#">Preventing COVID-19 Complications With Low- and High-dose Anticoagulation</a>	Recruiting	No Results Available	<ul style="list-style-type: none"> <li>• COVID</li> <li>• Sars-CoV2</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: Enoxaparin</li> </ul>
<a href="#">D-dimer Adjusted Versus Therapeutic Dose Low-molecular-weight Heparin in Patients With COVID-19 Pneumonia</a>	Recruiting	No Results Available	<ul style="list-style-type: none"> <li>• Coronavirus Disease (COVID)19</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: low-molecular-weight heparin</li> </ul>
<a href="#">Anticoagulation in Critically Ill Patients With COVID-19 (The IMPACT Trial)</a>	Recruiting	No Results Available	<ul style="list-style-type: none"> <li>• COVID-19</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: Enoxaparin sodium</li> <li>• Drug: Unfractionated heparin</li> <li>• Drug: Fondaparinux</li> <li>• Drug: Argatroban</li> </ul>
<a href="#">Therapeutic Plasma Exchange for COVID-19-associated Hyperviscosity</a>	Enrolling by invitation	No Results Available	<ul style="list-style-type: none"> <li>• COVID-19</li> </ul>	<ul style="list-style-type: none"> <li>• Biological: Therapeutic plasma exchange (TPE)</li> <li>• Other: Standard of care</li> </ul>

# Clinical Trials

<a href="#">CorONa Virus edoxabaN ColchicinE (CONVINCE) COVID-19</a>	Not yet recruiting	No Results Available	<ul style="list-style-type: none"> <li>• SARS-CoV Infection</li> <li>• COVID-19</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: Edoxaban Tablets</li> <li>• Drug: Colchicine Tablets</li> </ul>
<a href="#">Dipyridamole to Prevent Coronavirus Exacerbation of Respiratory Status (DICER) in COVID-19</a>	Recruiting	No Results Available	<ul style="list-style-type: none"> <li>• COVID</li> <li>• Corona Virus Infection</li> <li>• Covid-19</li> <li>• SARS-CoV-2 Infection</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: Dipyridamole 100 Milligram(mg)</li> <li>• Drug: Placebo oral tablet</li> </ul>
<a href="#">Enhanced Platelet Inhibition in Critically Ill Patients With COVID-19</a>	Completed	No Results Available	<ul style="list-style-type: none"> <li>• Pneumonia, Viral</li> <li>• Corona Virus Infection</li> <li>• Respiratory Failure</li> <li>• Embolism and Thrombosis</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: Tirofiban Injection</li> <li>• Drug: Clopidogrel</li> <li>• Drug: Acetylsalicylic acid</li> <li>• Drug: Fondaparinux</li> </ul>
<a href="#">Impact of Tissue Plasminogen Activator (tPA) Treatment for an Atypical Acute Respiratory Distress Syndrome (COVID-19)</a>	Not yet recruiting	No Results Available	<ul style="list-style-type: none"> <li>• Acute Respiratory Distress Syndrome</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: Tissue plasminogen activator</li> <li>• Drug: Ringer solution</li> </ul>
<a href="#">Defibrotide Therapy for SARS-CoV2 (COVID-19) Acute Respiratory Distress Syndrome (ARDS)</a>	Recruiting	No Results Available	<ul style="list-style-type: none"> <li>• COVID</li> <li>• Sars-CoV2</li> <li>• COVID-19</li> <li>• Acute Respiratory Distress Syndrome</li> </ul>	<ul style="list-style-type: none"> <li>• Drug: Defibrotide</li> </ul>

Anti-complement therapies?



Caplacizumab?



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# Questions?

