

UC San Diego Health

ATS Critical Care Training Forum

*Management of Patients with Severe ARDS Due to
COVID-19 with ECMO*

Lauren Sullivan, MD

Pulmonary and Critical Care Fellow, UCSD



Case 1: RB

HPI – June 2020

54yo man with hypertension presented to an outside hospital with fever x 2 weeks, progressive SOB and cough x 1 week, found to have COVID pneumonia.

- **HD #1:** SpO2 70s on arrival -> started on HFNC. Given Ceftriaxone, azithromycin, remdesevir, convalescent plasma, and therapeutic enoxaparin.
- **HD #2:** Episode of 30cc hemoptysis – enoxaparin discontinued. Hypoxemia requiring intubation. Bronchoscopy - old blood in the LLL - no active bleeding.
- **HD #3:** Worsening hypoxemia and poor compliance. Cannulation by UCSD mobile ECMO team.

ECMO Cannulation

DRAINAGE: 25 Fr venous drainage cannula in R femoral vein

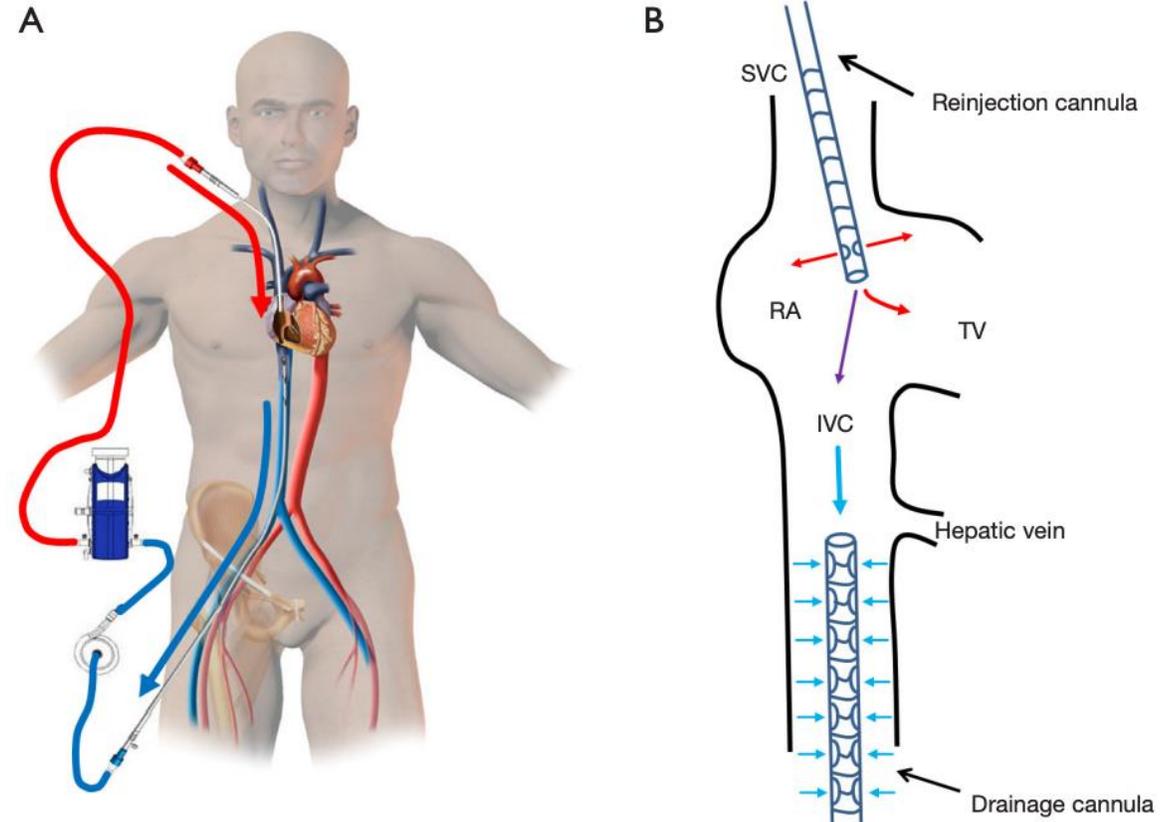
RETURN: 21 Fr return cannula in Right internal jugular vein

ECMO flows at 4.25 L/min with negative venous pressure of -60 mmHg

ECMO Sweep: 3L/min

PRE ECMO ABG: 7.3/68/58

POST ECMO ABG: 7.48/32/303



Physical Exam on Arrival

VS: T 97.2 | HR 64 | RR 12 | BP 127/80 on norepi 6 mcg/min | SpO2 100%

Vent: VTPC FiO2 1.0, PEEP 12, Vt 350, RR 12, PIP 26

ECMO: Flow 4.12L/min, FdO2 100%, sweep 3L/min

General: intubated, sedated

CV: RRR without murmur or rub

Lungs: coarse BS on left

Abdomen: soft, no organomegaly

Extremities: no edema, warm

Lines: ECMO cannulas without oozing, Left PICC clean

Skin: Vitiligo both hands and feet

Neuro: RAAS -4, on versed + fentanyl, Pupils symmetric, 3 mm

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Lung Protective Ventilation on ECMO

Pressure Control Ventilation

- Respiratory Rate 10
- Driving Pressure 10 – *resulting tidal volumes of 50 ml*
- PEEP 10



Labs on Arrival

ABG: 7.48 / 32 / 293 / 26 / 100%

CBC:

WBC 10.2 (72% Segs, 1% lymphs)

Hgb 10.5 (MCV 95.2)

Plts 146

BMP: 138 / 4.5 / 103 / 21 / 13 / 0.6 < 114

LFT: AST 48 / ALT 48 / AlkPhos 129 / Tbil 1.1 / TP 4.8 / Albumin 2.5

Coags: INR 1.4 / PT 15.4 / PTT 32

CK 994

LDH 568

D-dimer 25,144 (<241)

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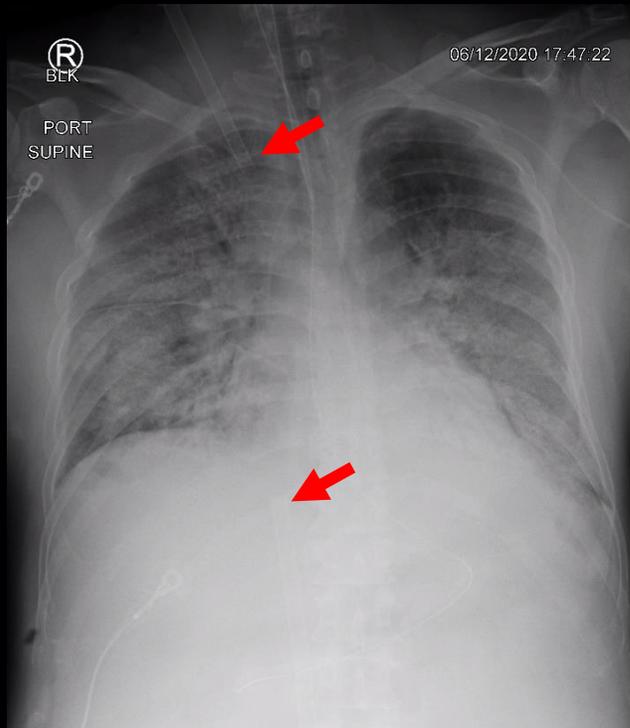
Coags: INR 1.4 / PT 15.4 / PTT 32

CK **994**

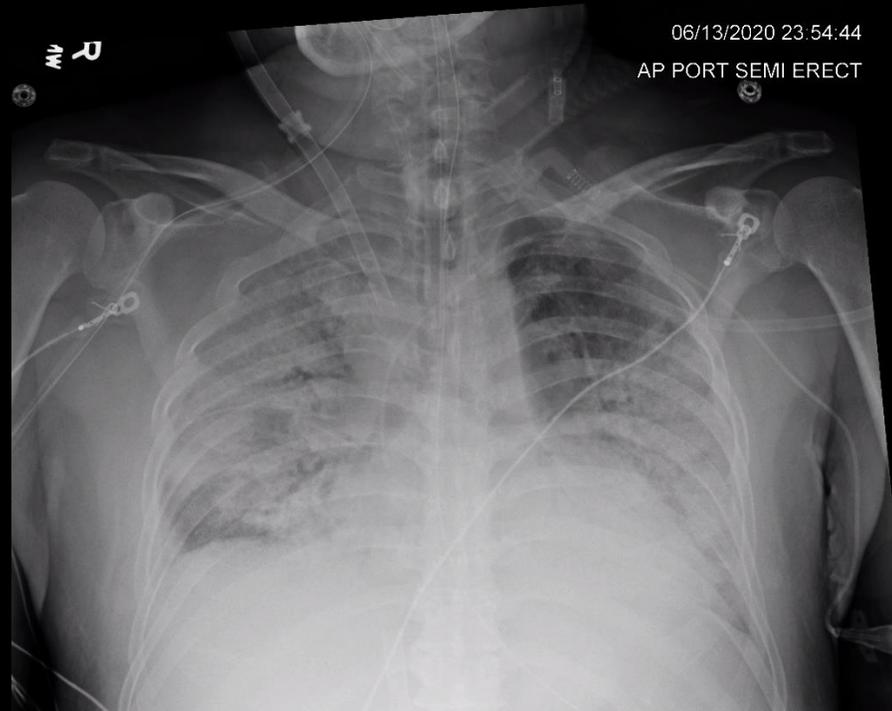
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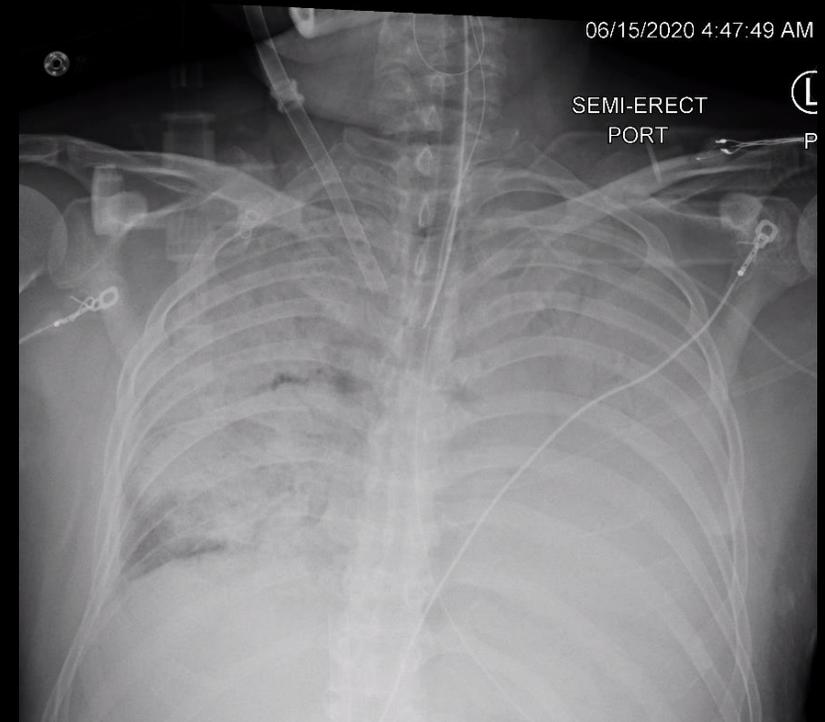
HD #1



HD #2



HD #4



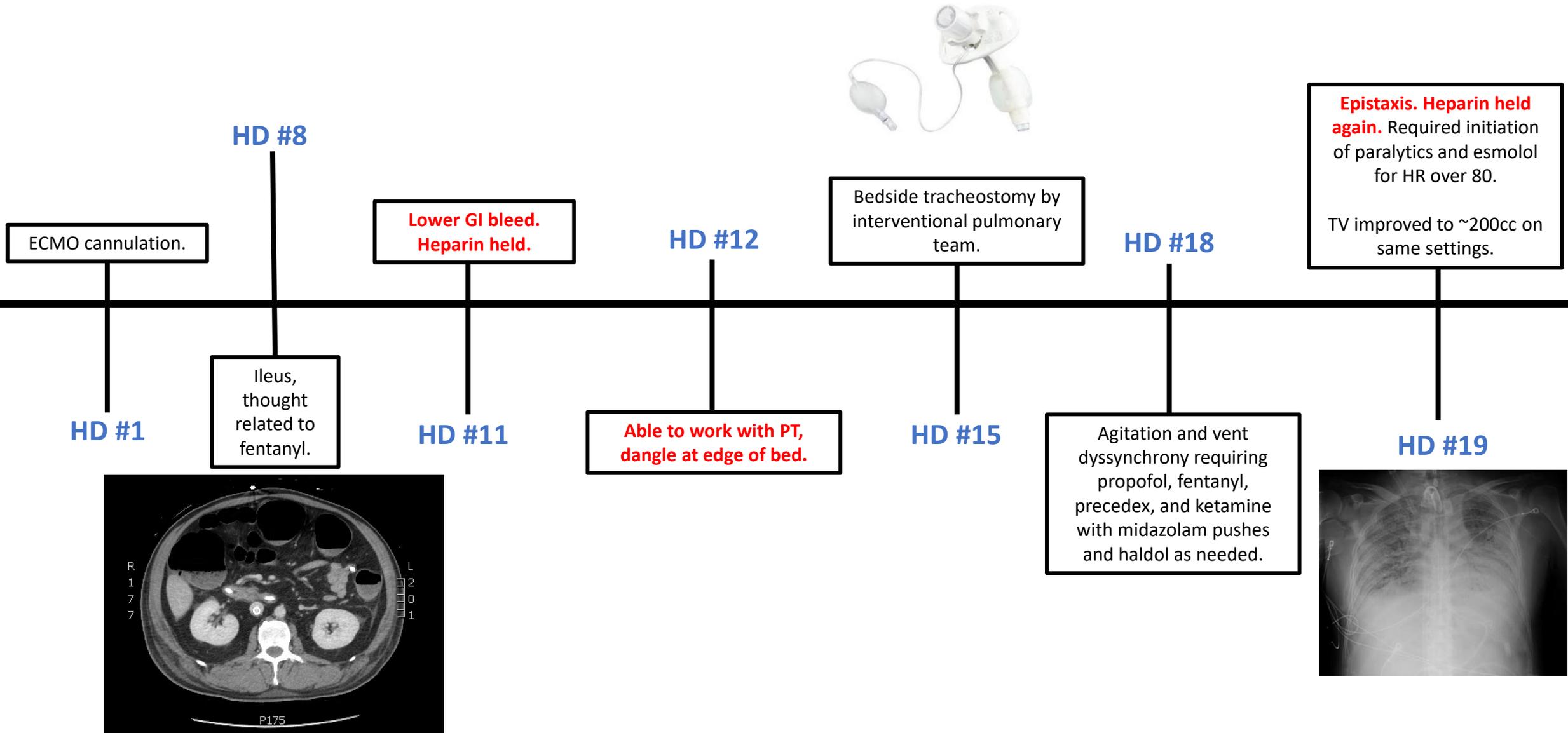
CT Chest - HD #4



Complete consolidation of the lungs, compatible with diffuse alveolar damage/ARDS.

Trace volume bilateral effusions.

Hospital Course



Hospital Course



HD #20

Shock requiring vasopressors and concern for VAP.

Bronchoscopy with BAL showed purulent secretions.

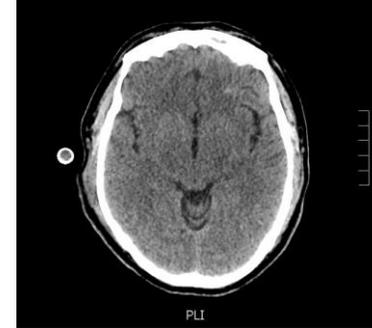
Femoral cannula repositioned due to frequent suction events.

HD#22

Unable to participate in PT due to desaturations and tachypnea

Re-paralyzed due to desaturations and vent dyssynchrony.

HD #26

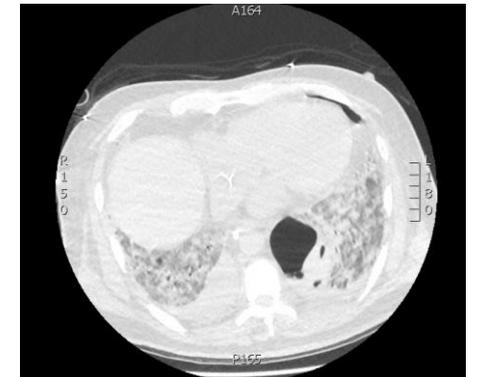


HD #27

CT head showed small left **frontal subarachnoid hemorrhage. Heparin held. Bleed stable on serial CT.**

CT chest shows hydropneumothorax – conservative management, PEEP decreased.
Able to work with PT.

HD #29



Hospital Course



HD #32

2u PRBC for
occult bleed.

Mental status improves and
patient regularly works
with PT.
Sweep challenges.
TV improved – 400-500cc.

HD #33-39



HD #41

**Decannulated from
ECMO.**
Pressure support
trial.

Able to walk with PT.
Tolerating trach
collar during the day.

HD#44

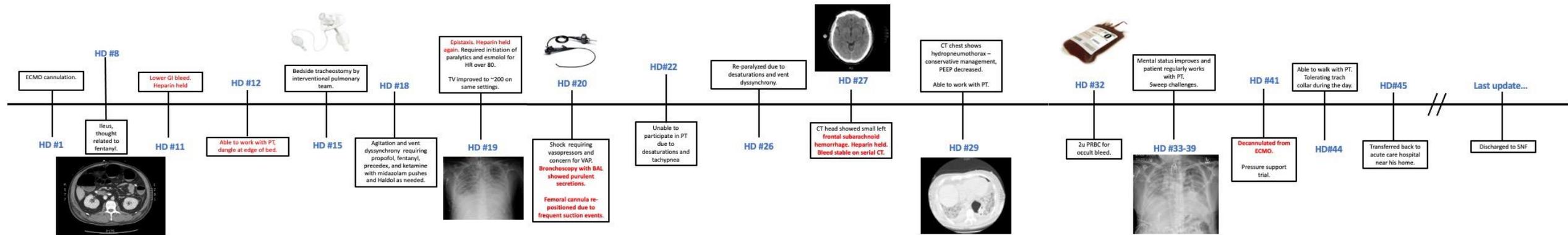
HD#45

Transferred back to
acute care hospital
near his home.

Last update...

Discharged to SNF

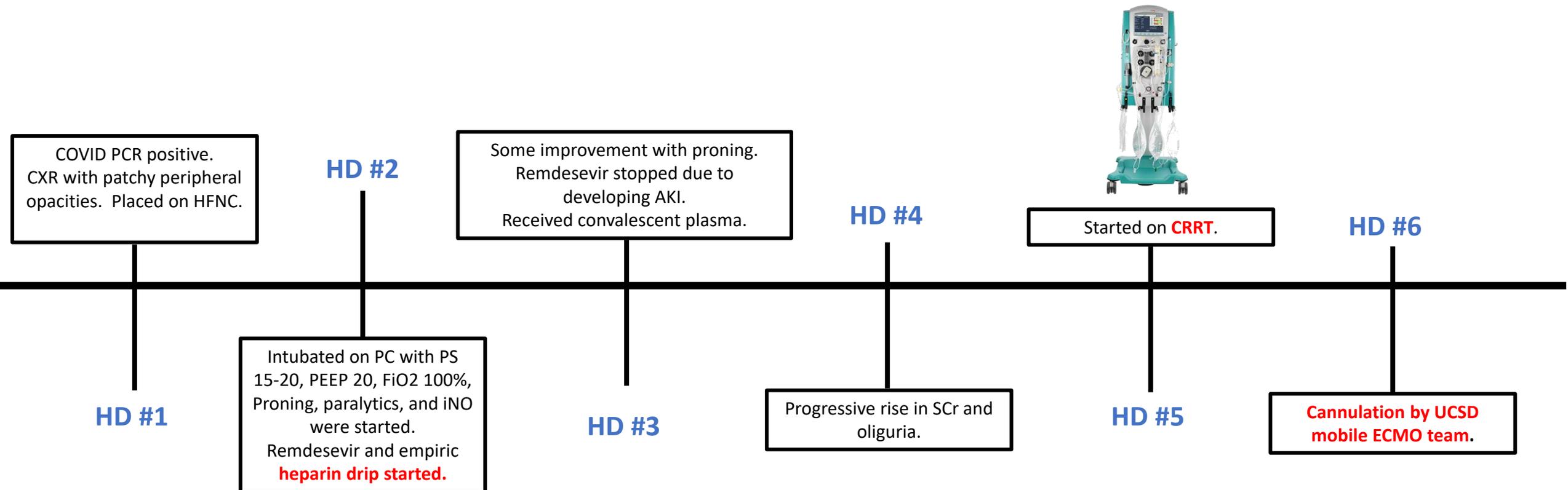
Total Hospital Course – 45 Days



Case 2: CE

HPI – May 2020

44yo woman with obesity working as a nurse in a SNF who presented to an outside hospital with 2 days of shortness of breath and fever.



ECMO Cannulation

DRAINAGE: 21 Fr venous drainage cannula in R femoral vein

RETURN: 19 Fr return cannula in Right internal jugular vein

Achieved flows at 4.25 L/min with negative venous pressure of -115 mmHg

PRE ECMO ABG: 7.11/110/60

POST ECMO ABG: 7.41/60/88

Some difficulty with R femoral access.

SpO₂ ~80 while proning prior to cannulation.

Physical Exam on Arrival

VS: T 97.7 | HR 99 | RR 10 | BP 159/74 on norepi 20 mcg/min | SpO2 88%

Vent: VTPC FiO2 1.0, PEEP 15, Vt 300, RR 10, PIP 35

ECMO: Flow 4.21L/min, speed 3165 rpm, FdO2 100%, Sweep 6L/min

General: intubated, sedated, paralyzed

HEENT: conjunctival edema. Pupils 2mm bilaterally and round. Anicteric sclera

CV: RRR, no murmurs

Lungs: decreased breath sounds

Abdomen: soft, obese

Extremities: +pulses on doppler bilaterally.

Skin: No rash

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CV: RRR, no murmurs

Lungs: decreased breath sounds

Abdomen: soft, obese

Extremities: +pulses on doppler bilaterally.

Skin: No rash

Labs on Arrival

ABG: 7.55 / 36 / 114 / 32 / 99%

CBC:

WBC 6.9 (80% Seg, 28% Lymph, 2% Eo)

Hgb 5.8 (MCV 77.6)

Plt 105

BMP: 146 / 3.5 / 102 / 27 / 54 / 6.58 > 114

LFT: AST 176 / ALT 41 / AlkPhos 108 / Tbil 0.81 / TP 5.1 / Albumin 2.7

Coags: INR 1.9 / PT 20.4 / PTT 173

Anti-Xa 0.57

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Hgb **5.8** (MCV 77.6)

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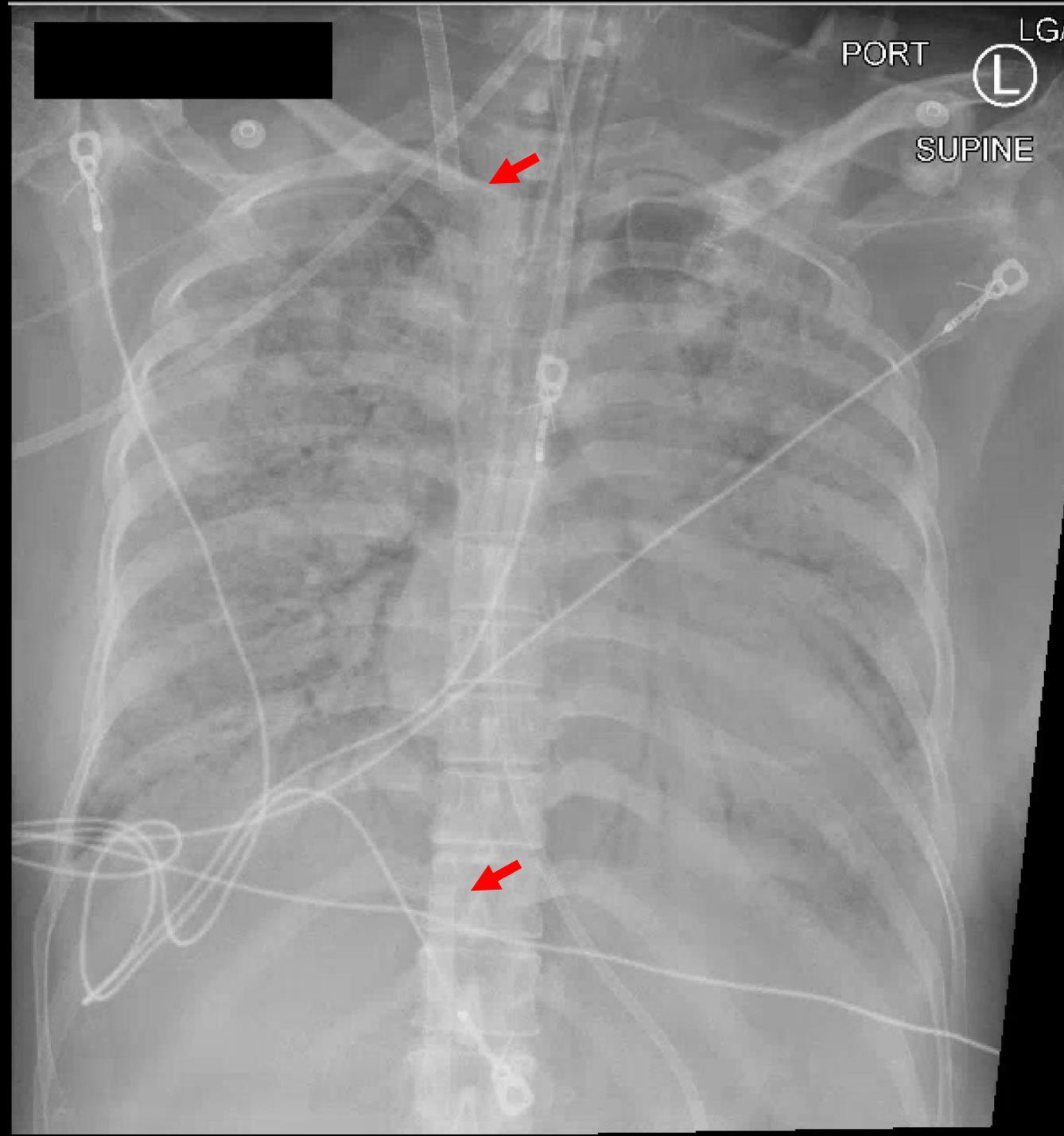
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Coags: **INR 1.9** / PT 20.4 / **PTT 173**

Anti-Xa 0.57

HD #1



Hospital Course

- **HD #1:**

- PEEP maintained at 15 given low PaO₂. Vasopressors given for shock. Given 2U PRBC for Hgb of 5.8 – thought possibly related to blood loss from ECMO cannulation. CRRT was re-started.

- **HD #2:**

- Stroke code called at 12:50pm for uneven pupils. Left pupil 6mm, irregular, and non-reactive to light. R pupil 3 mm, round and sluggish to light. Patient was given hypertonic saline and taken to CT scan.

HD #2

AS



Multifocal parenchymal hemorrhages involving both frontal lobes, the left temporal lobe, and left occipital lobe.

Mass effect - 17 mm of left to right midline shift and effacement of the left lateral ventricles.

Subarachnoid hemorrhage layering within the bilateral frontoparietal sulci. No aneurysm appreciated.

Hospital Course

- Neurosurgery and neurocritical care teams were consulted.
- Due to the extent of the bleed, surgery was not recommended.
 - Infarcts and bleed thought to be sub-acute.
- Transitioned to comfort care and compassionately extubated after family visited.
- She expired on HD #2.

Reflections from 2 ECMO Cases

- Patients may require long ECMO course
 - Bleeding and infectious complications
 - Sedation and delirium management
- Imaging may not prognosticate outcome
- Anticoagulation not always necessary with adequate ECMO circuit blood flow and it is possible to use lower PTT goals 40-60
- Physical therapy is feasible
- The benefit of empiric anticoagulation for COVID-19 (without confirmed VTE) remains unknown
 - Risks associated – intracranial hemorrhage