ACC-CCA Webinar Notes 3.19.20 (COVID-19 Severe Case Management)

Notes provided by University of Pittsburgh Medical Center FITs: **Agnes Koczo, MD; Natalie Stokes, MD;** and **Ricardo Nieves, MD**.

General Update: Today, for the first time, the number of newly diagnosed cases in Wuhan, China is 0

Case 1: COVID-19 case with multiple organ damage

- Zheyong Huang, MD and Jiatian Cai, MD
- Zhongshan Hospital
  - 31-year-old male
    - Intermittent fevers for 3 weeks
    - Patient developed fever with mild cough and presented to Wuhan Hospital 1/26
    - On presentation:
      - WBC: 2.73
      - Lymphocytes: 1.15
      - Thrombocytopenia to 99
      - CT imaging with multiple patchy infiltrates
    - Oropharyngeal swab (NAT): +COVID-19
    - Admitted with pneumonia → 5 days R of abx, oral Abidol (antiviral not FDA approved in US)
    - Fever continued over the course of the first three days
  - PMH
    - Untreated DM and HLD
  - Surgical History
    - Appendectomy
  - Social Living in Wuhan

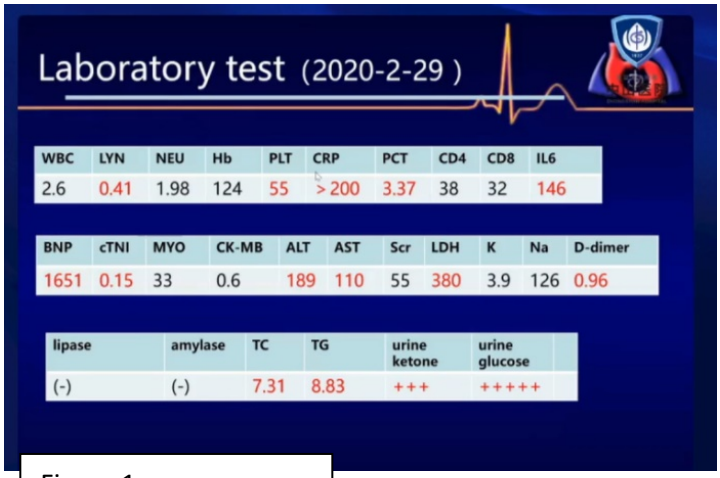

Figure 1

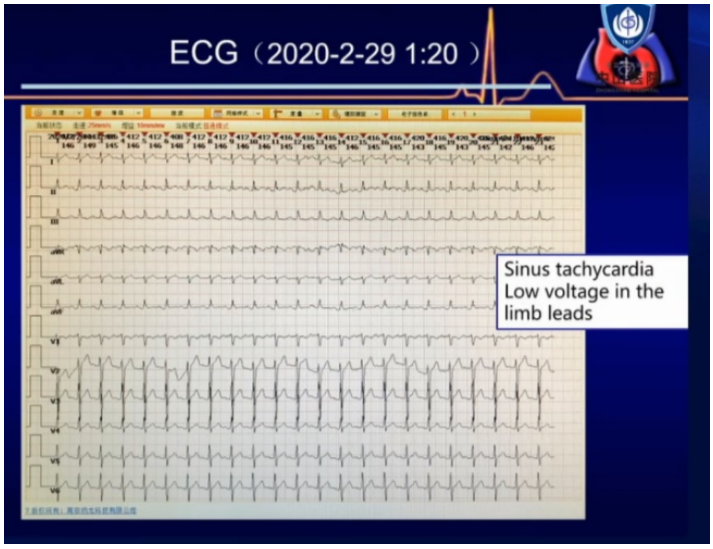

Figure 2

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- On transfer to higher level care 2/29:
- Vitals: 38.5C, HR: 152, RR: 24 BP: 134/101
- ABG on admission: 7.4/24/290 (on NC 7L)
- Blood glucose: 31mmol/L
- Labs, EKG and Imaging (Figure 1,2, and 3)

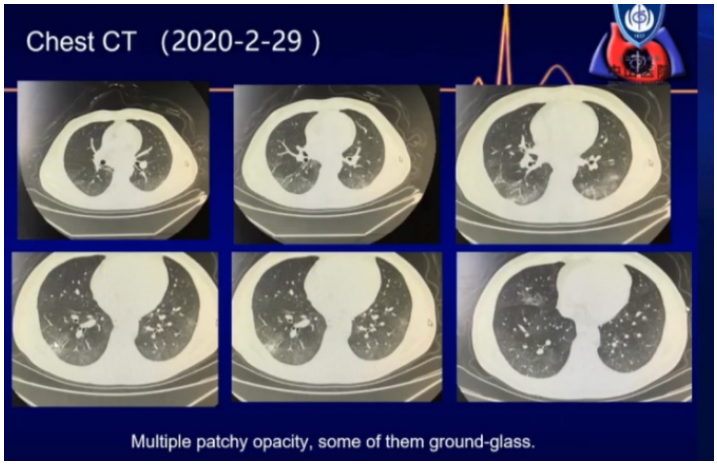
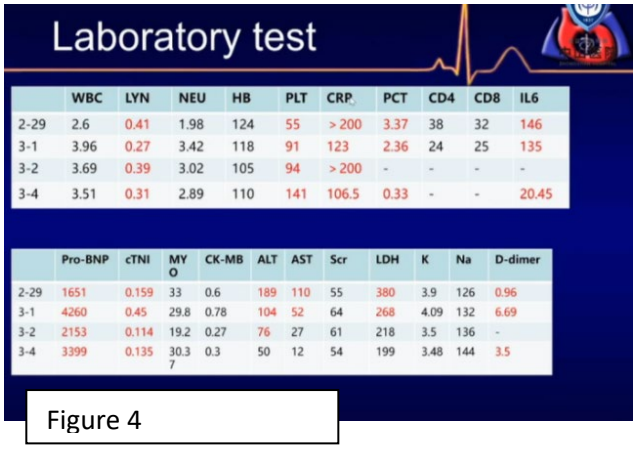


Figure 3

- Diagnosed with critical COVID-19
  - To note: markers of severe disease
  - Worsening lymphopenia
  - Worsening thrombocytopenia
  - Elevated D-Dimer
  - Elevated LFTs
  - Elevated inflammatory markers
  - Progression of CT findings



	WBC	LYN	NEU	HB	PLT	CRP	PCT	CD4	CD8	IL6
2-29	2.6	0.41	1.98	124	55	> 200	3.37	38	32	146
3-1	3.96	0.27	3.42	118	91	123	2.36	24	25	135
3-2	3.69	0.39	3.02	105	94	> 200	-	-	-	-
3-4	3.51	0.31	2.89	110	141	106.5	0.33	-	-	20.45

	Pro-BNP	cTNI	MYO	CK-MB	ALT	AST	Scr	LDH	K	Na	D-dimer
2-29	1651	0.159	33	0.6	189	110	55	380	3.9	126	0.96
3-1	4260	0.45	29.8	0.78	104	52	64	268	4.09	132	6.69
3-2	2153	0.114	19.2	0.27	76	27	61	218	3.5	136	-
3-4	3399	0.135	30.37	0.3	50	12	54	199	3.48	144	3.5

Figure 4

- Initial Treatment
  - Anti-inflammatory and immunomodulatory therapy (no specification)
  - Human immunoglobulin and thymalfasin
  - Anti-inflammatory therapy – methylprednisolone 20mg q12h
  - Oxygen
- Treatment of comorbidities
  - Blood glucose control
  - Aggressive hydration (lactated ringers, saline, albumin)
  - Thrombocytopenia – monitored and blood products delivered as needed
  - Liver dysfunction – monitored

- On 3/1 (second day of admission)
  - Patient experienced symptoms concerning for acute heart failure
  - Treated with Lasix, digoxin, BiPAP

- Echocardiogram completed and demonstrated normal structure, with normal systolic function and motion, LVEF; 60%
  - Right ventricular size and function normal

- Lymphopenia persisted throughout course (Figure 4)

- Outcome:
  - Patient recovered and ABG, lab findings have mostly returned to normal
  - BP recovered over the coming week

        - HR remains on the higher side in the 90s
    - Patient to be discharged soon to home

- Discussion: Questions
    - High BNP elevation and mild troponin elevation appear discordant with echo findings. Mechanism of elevated NT-proBNP and cTnI?
        - Low grade myocarditis in the setting of inflammatory response?
        - Not consistent with fulminant myocarditis
        - BNP elevation noted to be seen by several Chinese physicians caring for COVID-19 patients complicated by ARDS who did not have heart failure (Side note: ACC has nice discussion on this: https://www.acc.org/latest-in-cardiology/articles/2020/03/18/15/25/troponin-and-bnp-use-in-covid19)
        - Unclear time course with context of the clinical course ie could it be that echo was done prior to EF decline days later, seen in other cases where myocarditis developed later during hospitalization
        - Review of imaging during discussion of this case, concluded that imaging does not appear to be consistent with myocarditis, and there was agreement on echocardiogram assessment of normal EF and normal RV function.
    - Reasons for increased D-Dimer?
        - As discussed during yesterday's webinar, thought due to high ACE-2 expression in vascular endothelial cells
        - Bottom line: marker of disease severity and independent risk factor for in-hospital death, Chinese recommended anticoagulation of these patients
    - Liver Dysfunction?
        - Would normalize by the end of patient's course
        - Resultant of possible shock-like state
        - Many viruses can present with transaminitis
    - How many patients are needing mechanical ventilation and how do you decide who needed to be triaged to mechanical ventilation? → ~ 20% of cases
    - Oxygen Index of < 200 may require mechanical ventilation
    - Anything lower than 100 → may require ECMO
    - Role of interlukin-6 inhibition with monoclonal therapy (Tocilizumab as we use in CAR-T patients) – will require further investigation, no clear answers at this time

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- <u>Take away points from this case</u>

- Echocardiogram findings do not account for elevated BNP and troponin
- Clinical course appears to be consistent with a large systemic inflammatory response leading to a distributive shock- like response
    - Clinical management appears to center on getting a patient through the large systemic inflammatory response after which organ dysfunction appears to recover

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Case 2: The application of ECMO in critically severe COVID-19 patients

- Ning Zhou, MD
- Tonji Hospital

- Background: ~20% develop severe/critical type, classified by one of the following: Respiratory failure requiring mechanical ventilation, shock, or multi-organ system failure

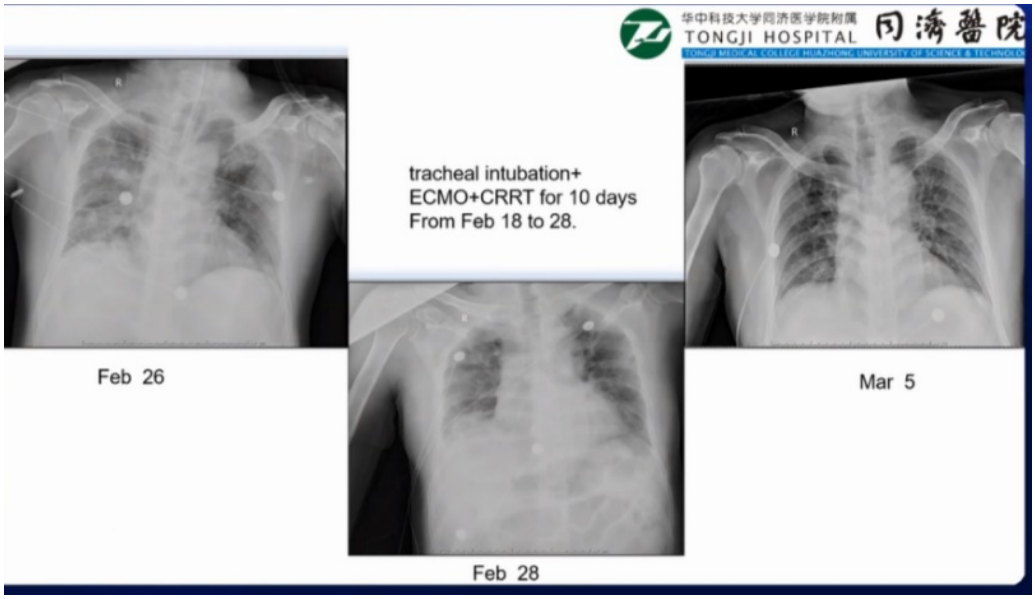
- Patient case: 50M with no PMH presenting with 11 days fever and 2 days SOB.
    - Afebrile, BP 132/86, RR 24, O2 75% RA
    - Workup: normal renal function, mild transaminitis, normal WBC with lymphocytosis, NT-proBNP 1077, troponin I 217.1
    - ABG: 7.43/30/51/22
    - Imaging: CT chest with diffuse GGOs; TTE EF 45%, global hypokinesis, non-dilated LV

- Hospital course: Treated with antibiotics, antivirals (Abidol), oxygen
- Progressed to ARDS. Intubated, paralyzed and proned. P:F <100, ABG 7.1/42/61/19
- Persistently acidotic with elevated lactate
- Placed on VV-ECMO, CRRT for 10 days with clinical improvement
- Decannulated after 10 days, discharged home

Take home points:

- ECMO has been demonstrated to successfully support patients with severe COVID-19 respiratory failure
    - 5 patients: 4 survived to decannulation and pending discharge.
    - 4 VV-ECMO, 1 VA-ECMO
    - Patient data: 4 male, 1 female; age range 44-68 years old
    - Duration: average 9.2days, longest 13 days, shortest 6 days
    - 3 patients supported with VV-ECMO without intubation first - encouraged providers to think about ECMO early in patients pending mechanical support

Inflammatory storm of covid-19 emphasized - ECMO helped support through course of virus



Audience questions:

- Question: how to triage which patients will develop severe respiratory failure?
    - Bottom line: They looked for patients with rapid development of symptoms, persistent and escalating hypoxia, persistent acidosis. Excluded patients who progressed to multi-system organ failure

- Question re: how to select VA mode; can impella or IABP be useful in these patients?
    - Bottom line: VA mode used in patient with evidence of progressively worsening cardiomyopathy (observed by change in EF with TTE). No experience using IABP or impella for patients with COVID-19 related cardiomyopathy

- Question re: how often to measure inflammatory markers?
    - Bottom line: They typically measured them once weekly for floor patients, and for ICU patients, testing done daily or qOD. These included d-dimer, trop, BNP, inflammatory markers including CRP and IL-6 (which they found to be predictive of course of disease)

- Question re: use of immunosuppressants - when did you use them?
    - Bottom line: They used corticosteroids in patients who were severely ill, but did not use them often in other patients due to the tendency to prolong the course of virus.

- Question: Did you make any decision to limit physicians >60yo from being on the front lines?
    - Bottom line: the two hospitals represented in the webcast reported that they limited physicians >60yo from working on front lines, especially in their ICUs

- Question: Is some of the increased mortality for elderly patients due to triage (not prioritized for critical care)?
    - Bottom line: Personal experience does not support this - think the mortality really is higher with increased age

- Question: Did you note sex differences in how the virus is acting?
    - Bottom line: from their personal experience, they noted about 60% of patients hospitalized were men, but the virus itself did not manifest differently between sexes.

- Question re: antivirals. Did they seem to make any difference in your experience?
    - Bottom line: in their personal experience, it is hard to say, as they would use them on patients who were critically ill, but did not note a significant difference between patients who receive the antivirals and those who did not.