Rapid progression to multi-organ failure in young patient with SARS-CoV-2 infection and Severe Glucose-6-phosphate dehydrogenase (G6PD) deficiency

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Introduction

- The newly discovered coronavirus pandemic, Covid-19, has resulted in more than 40 million cases and 1 million deaths globally.
- Most serious disease occurs in patients over 60 or known risk factors; we present an unusually severe case in a 21-year-old patient with severe G6PD deficiency.

Case Presentation

Day 1 (Presentation):

- 21yo Fillipino man with G6PD deficiency diagnosed with Covid-19 after one day of fever, chills, dyspnea with exertion, diarrhea.

Day 3 (Admission):

- Transfer to Madigan: HR 120s, T 38.5C, 98%RA
  - ESR 46, CRP 22.1, Ferritin 4263, IL-6 278
  - D-dimer 10.73, Fibrinogen 591, INR 1.3
- Hypoxic respiratory Failure -> ARDS -> Intubation -> transfer to ECMO center on day 4

Day 5 (at ECMO center):

- EF 21%; Trop 10.2, NE+Vasopressin+Dobutamine
- Renal Failure ->CRRT
- Anemia -> Transfusion

Day 13 (Self-extubation)

Day 15 (transfer to Madigan):

Day 18: last day of CRRT

Day 23: Discharge

Day 72: EF 60-65%

<u>Immunodeficiency Labs</u> (3-months post-transfusion):

G6PD <0.3 unit/g Hb (reference 7 – 20.5)

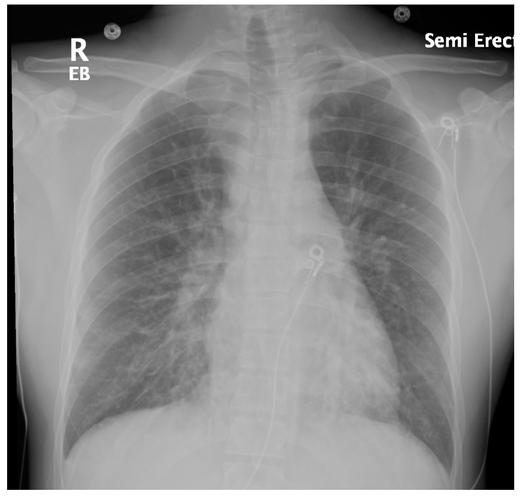

Image 1: Chest x-ray morning of admission

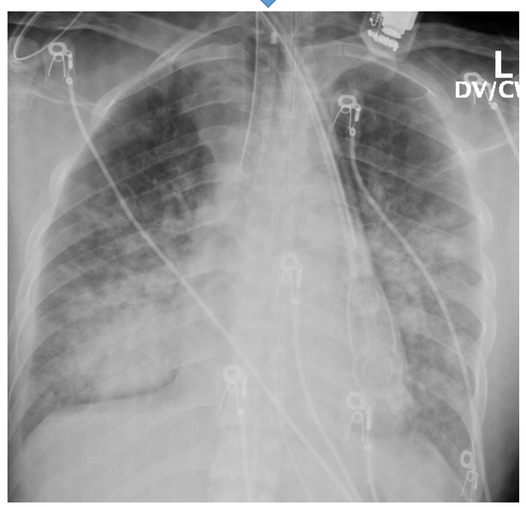

Image 2: Chest x-ray **same day** after intubation

Discussion

- Young patient with multi-organ failure and severe G6PD deficiency
- No published research on severe Covid-19 infections in adults with G6PD deficiency
- G6PD deficiency affects RBC, neutrophils, oocytes, fibroblasts, etc.
- Common cold virus, HCoV 229E effect on G6PD deficient fibroblasts and lung epithelial cells (Wu et al, 2008)
  - 1800-fold increase in viral gene expression 10 hours after infection of G6PD deficient cells compared to 155-fold increase in control cells
  - 3-fold increase in viral particle production of G6PD deficient cells compared to control cells
  - 8% cell death at 48 hours, 18% cell death at 72 hours of all G6PD deficient cell lines compared to controls
- G6PD is an X-linked recessive genetic condition, affects at least 400 million people worldwide

Conclusion

- Rapid progression to multi-organ failure in adult patient with severe G6PD deficiency and Covid-19 infection.
- Further investigation between the G6PD deficiency and severe Covid-19 cases is warranted.

References and Disclaimer

The views expressed are those of the author(s) and do not reflect the official policy or position of the US Army Medical Department, Department of the Army, Department of Defense or the U.S. Government.

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