COVID and Chest Pain - Patient Case Study

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Patient Case Overview

There is extensive evidence that COVID-19 involves differences in pathophysiology and prognosis across the sex and gender divides.1-9 As case numbers rise, it is essential to think critically about the role sex and gender may play in order to appropriately treat COVID-19 patients.

Patient Profile

- Initials: DC
- Age: 56
- Gender: F

Presenting Complaint

The patient came to the emergency department due to a constant “tight” non-radiating pain in the center of her chest, that has been present ever since she was diagnosed with Covid-19 three weeks ago. This pain began gradually during the worst of her illness at a 10/10 but decreased to a 5/10 by presentation without intervention. It worsened with exertion, but not with deep breathing or movement. She had not tried any medicines for this pain. The pain was different than chest pain she felt during prior panic attacks in its persistence and lack of association with anxiety; it was also different from her asthma attacks and postmastectomy pain. She contacted her primary care physician on the day of presentation for a routine postCOVID follow-up and after telling her doctor that this pain was still present, was advised to come in for an “x-ray” to “make sure I don’t have a blood clot.” Her Covid symptoms initially included cough and changes in taste and smell and then worsened to include fevers, chills, headaches, malaise, and diarrhea; these resolved 1 week prior to presentation.

Medical History

- Breast cancer, in remission for 2 years.
- Deep vein thrombosis (DVT) of the left leg 5 years ago while on tamoxifen.
- Asthma
- Seasonal allergies
- Anxiety/Panic disorder

Surgical History

- Unilateral mastectomy
- Hysterectomy and bilateral salpingo-oophrectomy

Current Medications

- Claritin
- Albuterol
- Anastrazole
- Fluoxetine
- CBD oil (applied to mastectomy scar tissue)

Social History

- Occupation: Administrator for Providence School District (works remotely)
- Living situation/marital status: single, lives alone
- Substance use (e.g. smoking, alcohol, street drugs): never smoker, drinks 1-2 glasses of wine a week, never any other substance use

Family History

No family history of heart attack, blood clots, stroke, or other clotting disorders. No family history of colon, breast, or ovarian cancer.

Patient Assessment

Physical Exam

- Vital signs: BP 110/74 (BP Location: Left upper arm, Patient Position: Sitting) | Pulse 70 | Temp 97.9 °F (36.6 °C) (Temporal) | Resp 18 | Ht 157.5 cm (62″) Wt 87.1 kg | SpO2 97% on room air | BMI 35.12 kg/m²
- Constitutional: No acute distress.
- Cardiovascular: Normal rate and regular rhythm. Normal S1 and S2. No murmur. No friction rub. No gallop.
- Pulmonary: Pulmonary effort is normal. No respiratory distress. Normal breath sounds, clear to auscultation across all lung fields. No stridor or transmitted upper airway sounds. No wheezing, rhonchi or rales.
- Chest: No crepitus of chest wall. No tenderness to palpation of sternum, costosternal angles, or trapezius muscles, and no tenderness with anterior/posterior, lateral, or sternal compression. Patient is tender over right mastectomy site.
- Lower extremities: No edema. 2+ dorsalis pedis pulses bilaterally.
- Psychiatric: Mood normal. Patient does not appear anxious.
- ECG: 65 bpm, normal sinus rhythm
- 3hr repeat ECG: 62 bpm, normal sinus rhythm

Laboratory results

- WBC: 6.7 x103 /µL
- Hemoglobin: 12.8 g/dL
- Hematocrit: 38.6 %
- Platelets: 160 x103 /µL
- Glucose: 85 mg/dL
- BUN: 15 mg/dL
- Creatinine: 0.61 mg/dL

- Sodium: 139 mEQ/L
- Potassium: 3.9 mEQ/L
- Chloride: 105 mEQ/L
- CO2: 28 mEQ/L
- Anion gap: 6
- Calcium: 8.7 mg/dL
- Troponin I: <0.006 ng/mL
- 3hr repeat Troponin I: <0.006 ng/mL
- B-type Natriuretic Peptide: 65.7 pg/mL

Radiology reports:

- Chest x-ray: Normal
- CTA chest: “1. No pulmonary embolus is identified. 2. Nonspecific appearance [of] lungs suggestive of air trapping. 3. Right upper lobe scarring”

Diagnosis

The CT, serial troponins, and ECGs respectively ruled out the most concerning acute processes: pulmonary embolus, pneumonia, and acute coronary syndrome. The CT findings of air trapping and right upper lobe scarring pointed to the most likely origin of the pain: like many COVID survivors, DC was suffering lung damage.

Treatment

Ibuprofen was given to the patient for pain control, which successfully alleviated her pain to a manageable level. She was discharged home and advised to speak to her primary care provider about arranging followup care with a pulmonologist for respiratory therapy to alleviate the air trapping and aid in lung remodeling and healing of the scarred tissue.

Discussion

Despite considerable research in the literature and multidisciplinary, multi-site initiatives attempting to equalize care, there remain several sex and gender related barriers to positive outcomes for women presenting to emergency departments with chest pain. In order to minimize any medical bias, care was taken during this patient’s workup to follow evidence-based standards, including serial troponins, ECGs, and Wells scoring, which have been validated for use across genders when ruling out the most acute pathologies.

DC’s recent Covid infection complicated her presentation. Her personal history of a provoked DVT, her moderate Wells score, and her risk factors for clotting, specifically a recent Covid infection including a five-day period of being bedbound at home, made pulmonary embolus a primary concern. Extensive evidence shows increased rates of venous thromboembolism among hospitalized Covid-19 patients[10,11] and association between Covid-19 and pulmonary emboli.[12,13]

Multiple studies have described sex- and gender-based disparities in treatment of PE, resulting in both increased risk of complications and increased all-cause mortality for female PE patients,[14,15,16,17] although one study also documented lower all-cause mortality among women than men.[18] No cause for this disparity in outcome has been confirmed, although some researchers speculate it may have to do with the older average age at presentation of female PE patients.[16] The increase in PE rates associated with the global pandemic makes further research into the cause of such disparities even more important.

DC's recent Covid infection also necessitated increased concern for cardiac pathology, as did her recent menopause. One meta-analysis found that both hypertension (an independent driver of heart disease) and cardiac injury were strongly associated with SARS-CoV-19 infection regardless of gender.[19] The same meta-analysis also identified myocarditis as a common cause of death among hospitalized Covid patients and found correlations between levels of cardiac biomarkers (troponin, CK-MB, myoglobin, and BNP) and Covid infection.[19]

The patient's symptoms ultimately appeared to be related to the lung damage wrought by Covid While there is no clear consensus on "typical" COVID sequelae, there has been extensive documentation of post-infection symptomatology since the COVID pandemic began. While there is no agreed-upon definition for Covid "long-haulers", the syndrome has been described most consistently as patients experiencing Covid-related symptoms weeks or months after resolution of the infection.[20] One survey found only 10.8% of Covid-19 survivors reported being symptom-free after recovery.[21]

While CT findings are rarely present in Covid patients at initial presentation,[22] so-called "long haul" Covid patients have been documented to have signs of lung damage on imaging including scarring, air trapping, and/or pulmonary fibrosis.[20-29] Several studies describe CT findings similar to DC's in Covid patients "in remission," implying that lung damage may persist despite clinical recovery.[25,27,29,30] Other authors recommend standardized pulmonary rehabilitation for patients with COVID as a preventative measure[24,31,32] or routine CT follow-up to evaluate for fibrosis.[30]

There is limited data on whether this lung damage differs by gender. Gu, Ouyang, and Xie et al found no difference in gender distribution of CT lesions in the lungs of Covid positive patients.[33] Shang, Xu, and Jiang et al's study of 307 Covid patients in Jiansu, China found that fibrosis was more commonly found in male patients' CTs.[34] Liu, Liu, and Li et al, however, described an increased number of "atypical" findings on chest CT of 59 pregnant patients with Covid-19; while this study size is small, it suggests a concerning tendency among pregnant patients to have more severe CT findings, and possibly worse resultant scarring caused by the Covid virus.[35]

This may also correlate with the growing body of evidence that Covid has increased disease severity in pregnant compared to non-pregnant patients.[36,37,38] As the number of Covid survivors worldwide grows rapidly, it is increasingly important to investigate how sex and gender play a role in the presentations of the sequelae of this disease.

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