CARDIOVASCULAR SEQUELAE OF COVID-19 IN ADULTS: Myocarditis and Other Myocardial Involvement

Definitions and Clinical Presentation

- Post-COVID Cardiac Involvement is suspected in a patient with new or worsening cardiac symptoms triggered by or in the aftermath of COVID infection.

  Cardiac symptoms
  - Chest pain
  - Exertional dyspnea
  - Palpitations
  - Excessive sinus tachycardia at rest or minimal exertion
  - Postexercise malaise, fatigue

- The possible underlying pathophysiology to consider:

  Myocarditis
  - As a result of cardiotropic viral injury (rare)
    - Elevated cTn
    - Abnormal electrocardiographic, echocardiographic, CMR, and/or histopathological findings on biopsy or postmortem evaluation in the absence of flow-limiting coronary artery disease
  - Myocardial involvement
    - Includes myocardial abnormalities noted to occur in the setting of SARS-CoV-2 infection that do not meet myocarditis criteria
  - Myocardial injury
    - cTn level above the 99th percentile upper reference limit
    - Myocardial injury with COVID-19 carries a worse prognosis

Post-vaccination Myocarditis

Data from the U.S. Vaccine Adverse Event Reporting System suggest that myocarditis following COVID-19 mRNA vaccination is rare. A very favorable benefit-to-risk ratio exists with the COVID-19 vaccine for all age and sex groups evaluated thus far.

Evaluation and Management of Patients With Suspected Myocarditis or Myocardial Involvement

SARS-CoV-2 infection

- Low suspicion for cardiac involvement
  - No cardiac testing

- Increased suspicion for cardiac involvement
  - Concerning ECG abnormalities, elevated cTn, or ventricular WMAs
  - Normal LV wall motion with/without other non-LV abnormalities
  - Cardiology consultation
  - Clinically stable
    - Consider CMR
  - Unstable/high-risk features
    - Referral to an advanced HF center

- Additional testing based on the differential diagnosis
  - ACS – Coronary angiogram
  - PE – CT pulmonary angiogram
  - Cor pulmonale – SaO₂, CXR
  - Stress CM – Coronary angiogram
  - Distributive/septic shock – RHC, procalcitonin
  - Pre-existing cardiac disease – History, prior medical records

- Other myocardial (and pericardial) involvement
  - Can likely manage as an outpatient
  - If pericardial involvement – NSAIDs, colchicine
  - Close monitoring for worrisome symptoms/signs

- Mild or moderate myocarditis
  - Consider hospitalization (if not already done)
  - If concurrent lung injury – Steroids
  - If pericardial involvement – NSAIDs, colchicine
  - If reduced LVEF – Initiate HF therapies

- Severe myocarditis
  - If severe concurrent lung injury – Steroids
  - If MIS-A – Consider empiric use of steroids
  - If reduced LVEF – Initiate HF therapies
  - If cardiogenic shock – MCS

- Avoid vigorous physical activities for 3-6 months; see RTP pathway (Figure 9)

- See Return to Play (RTP) pathway (Figure 9)
  - Consider repeat cardiac testing at 3-6 months

Please refer to the manuscript for footnote information. Please note, for pericardial involvement, low-dose corticosteroids are also reasonable.