Literature Review

Journal Of Clinical & Medical Images Case Reports

Open Access, Volume - 3

Review of clinical presentations, pathogenesis, and treatment for myocarditis associated with Covid-19

Sami Smerat[1]*; Majed Dwaik[2]

[1]Department of Medical Imaging, Faculty of Allied Medical Sciences, Palestine Ahliya University, Dheisha, Bethlehem, Palestine.

[2]Dean Medical College and Health Science, Palestine Polytechnic University, Hebron, Palestine.

Received Date : November 29, 2023
Accepted Date : December 11, 2023
Published Date : December 18, 2023
Archived : www.jcmimagescasereports.org

***Corresponding Author:** Sami Smerat, Department of Medical Imaging, Faculty of Allied Medical Sciences, Palestine Ahliya University, Dheisha, Bethlehem, Palestine.
Email: sami_sm2006@yahoo.com

Abstract

Acute or ongoing inflammation of the heart muscle, known as myocarditis, is usually brought on by viral infections and subsequent immune-mediated reactions. Myocarditis in COVID-19 patients has recently been linked to the SARS-CoV-2 virus. This raises questions about the role of cardiac MRI in such patients. As a result, we present a case of post-COVID-19 myocarditis where the diagnosis was made with the use of cardiac MRI.

Keywords: Cardiac Magnetic Resonance Imaging (CMR), Post coronavirus disease 2019 (COVID-19) myocarditis, T2- short-tau inversion recovery (STIR), Late Gadolinium Enhancement (LGE)

Introduction

A number of viral, immune-mediated, or toxic causes can cause myocarditis, an acute or chronic inflammatory reaction of the heart muscle [1]. Even though the term "myocarditis" unambiguously refers to myocardial inflammation, the clinical diagnosis is not always straightforward. First off, there is a vast range of clinical symptoms of myocarditis. Second, although being the gold standard for myocarditis diagnosis, endomyocardial biopsy (EMB) cannot be performed routinely due to its invasiveness [2, 8]. A non-invasive imaging modality called cardiac magnetic resonance imaging (CMR) has already been developed and is well-established for non-invasively detecting myocarditis. Additionally, CMR myocarditis symptoms in individuals with coronavirus disease 2019 (COVID-19) infection have lately drawn attention. Cardiovascular problems have been noted in a number of COVID-19 patients, with the majority pointing to myocarditis as the primary source of the heart malfunction [3, 9, 10]. Here, we describe a case of post-COVID-19 myocarditis where early identification and patient care were aided by CMR.

Clinical background

A 45-year-old female patient who was complaining of acute chest pain, dyspnea, palpitations, and cardiac arrhythmia in the form of ventricular tachycardia arrived to our emergency room. Her usual tests revealed elevated troponin and C-reactive protein levels along with electrocardiographic abnormalities. Her clinical scenario suggested that she might have coronary artery disease, therefore she underwent CT coronary angiography, which showed normal coronary arteries with no signs of thrombosis or blockage. She admitted that just two weeks earlier, she had received a COVID-19 diagnosis. To rule out any other potential explanations of the patient's heart problems, a CMR was recommended.

Imaging finding

The patient had cardiac MRI with contrast on a 3Tesla platform. The left ventricular outflow tract (LVOT) views, transverse black blood and bright blood images, vertical long axis, four-chamber, short-axis cine images, and three-chamber cine images were produced using CMR sequences. The short axis short-tau inversion recovery (STIR) pictures were acquired from the bottom to the top of the heart. Short axis, four-chamber, and vertical long-axis images of the delayed gadolinium enhanced phase-sensitive inversion recovery (PSIR) sequences were also obtained. The basal and mid cavity anterior and anteroseptal segments were hypokinetic, and the left ventricular ejection fraction (LVEF) was lowered to 38% as a result of the imaging findings. In the aforementioned parts of STIR pictures, there was a high signal intensity that suggested edematous tissue changes. In the post-contrast investigation, the corresponding regions of the basal and mid cavities showed subepicardial delayed gadolinium enhancement (DGE) (Fig. 1). Additionally,

Citation: Sami Smerat. Review of clinical presentations, pathogenesis, and treatment for myocarditis associated with Covid-19. J Clin Med Img Case Rep. 2023; 3(6): 1602.

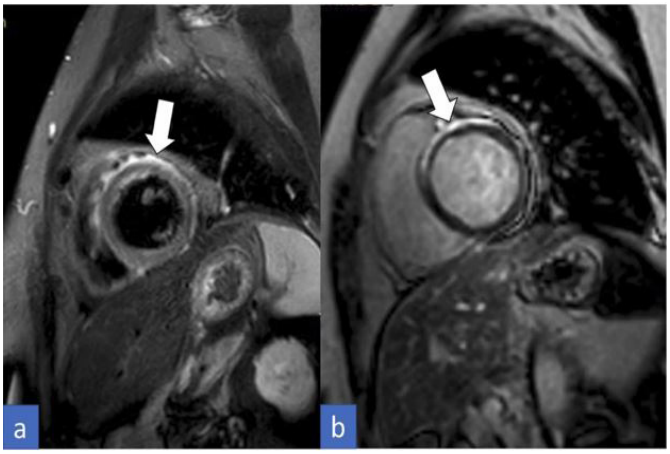

Figure 1: *Cardiac magnetic resonance (CMR) T2 short-tau inversion recovery (STIR) and post-contrast delayed gadolinium-enhancement (DGE) image short-axis view (b) demonstrate high signal intensity in the myocardium and subepicardial pattern of delayed GAD enhancement in the anterior and anteroseptal segments, respectively (arrow).*

there was little pericardial effusion, mild bilateral pleural effusion on the right, and mild mitral and aortic regurgitation on the left (Fig. 2). Therefore, utilizing modified Lake Louise Criteria (LLC), the patient was diagnosed with acute myocarditis based on the CMR results.

Discussion

Viral infections and post-viral immune-mediated reactions are frequently linked to myocarditis, a nonischemic inflammatory illness of the myocardium [2]. Although it can happen at any age, it is more common in young people, which is one requirement our case satisfies. About 30% of COVID-19 patients experienced cardiac damage, which has been linked to the SARS-CoV-2 virus among other viruses that produce inflammatory alterations in the heart muscle [4]. Numerous non-specific clinical symptoms that are associated with myocarditis are present, however they may not always be sufficient to make the diagnosis. CMR is really useful in defining myocarditis at this point. Since 2009, ratio) [1, 5, 6, 7]CMR imaging has been used to evaluate myocarditis using the Lake Louise criterion (LLC). It mostly consisted of necrosis/or fibrosis, hyperemia, and edema. But as a result of a number of constraints being gradually identified, the original LLC was changed in 2018. The 2018 LLC states that at least one T1-based criterion (increased myocardial T1 relaxation times, extracellular volume fraction, or Late Gadolinium Enhancement, LGE) and at least one T2-based criterion (increased myocardial T2 relaxation times, visible regional high T2 signal intensity representing edema on T2 STIR, or increased T2 signal intensity ratio) should be present in the diagnosis of CMR-based myocarditis.

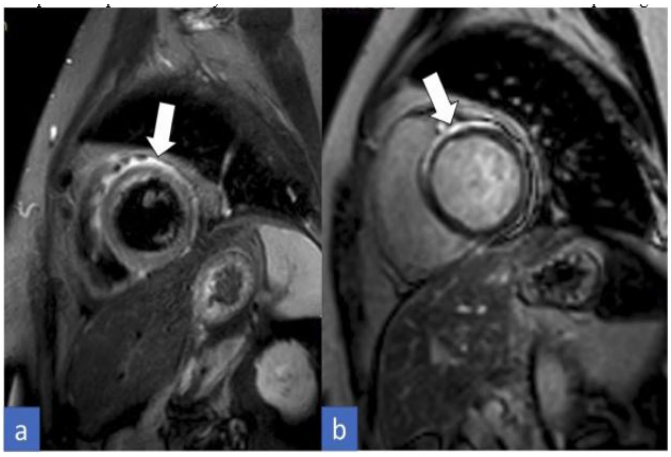

Figure 2: *Bright blood images from a cardiac magnetic resonance scan (CMR) demonstrating a minimal pericardial effusion (long arrow), a minimal to moderate bilateral pleural effusion (short arrows), and a minimal pericardial effusion (long arrows) in the short-axis view (b).*

Conclusion

In conclusion, CMR is suggested as a viable method to address numerous issues with myocarditis diagnosis as well as acute myocarditis linked with post-COVID-19. Additionally, CMR makes it possible to diagnose myocarditis noninvasively and offers great diagnostic accuracy according to an improved acquisition process and the introduction of new mapping techniques.

References

1. Hendren NS, Drazner MH, Bozkurt B, Cooper LT Jr. Description and proposed management of the acute COVID-19 cardiovascular syndrome. Circulation. 2020; 141: 1903-14.
2. Lala A, Johnson KW, Januzzi JL, et al. Prevalence and impact of myocardial injury in patients hospitalized with COVID-19 infection. J Am Coll Cardiol. 2020; 76: 533-46.
3. Zhou F, Yu T, Du R. et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. Lancet. 2020; 395: 1054-62.
4. Centers for Disease Control and Prevention (CDC). Advisory Committee on Immunization Practices (ACIP). COVID-19 vaccine safety updates. Available at: www.cdc.gov/vaccines/acip/meetings/downloads/slides-2021-06/03-COVID-Shimabukuro-508.pdf (accessed 10 November 2021)
5. Ferreira VM, Schulz-Menger J, Holmvang G, et al. Cardiovascular magnetic resonance in nonischemic myocardial inflammation. J Am Coll Cardiol. 2018; 72: 3158-76.
6. Aretz HT, Billingham ME, Edwards WD. et al. Myocarditis. A histopathologic definition and classification. Am J Cardiovasc Pathol. 1987; 1: 3-14.
7. Dwaik M, Bsharat M, Sandoka A. Extra cardiac Findings on CT Coronary Angiography. Cardiol Vasc Res. 2023; 7(2): 1-4.
8. Smerat S, Adwan S, Khatib M, Owenian HF, AlFaqih K. Pulmonary AVM and Stroke: Case Report from Istishari Arab Hospital. European Journal of Medical and Health Sciences. 2023; 5(2): 24-26.

9. Dwaik M, Smerat, S. Current Standards and Potential Future Advancements in the Spatial Resolution Development of Cardiac CT. Cardiol Vasc Res. 2023; 7(1): 1-5.

10. Khatib M, Salman M, Smerat S, Muhsen MA. The Diagnosis of Unilateral Diaphragmatic Paralysis Using M-mode: A Case Report from Palestine. European Journal of Medical and Health Sciences. 2021; 3(6): 1-4.