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Case Report

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Pericardial Effusion In A Pediatric Patient With Remote Exposure To Covid-19: A Case Report

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Abstract

Acute Coronavirus 19 is known to manifest mainly with respiratory symptoms, but cardiac involvement and complications were also frequently reported, especially in the adult patient population. Such cardiac complications include heart failure, acute coronary syndrome, arrhythmias, myocarditis, and pericardial effusion, resulting in tamponade in some cases. We describe a 7-year-old African American male who developed pericardial effusion five months after an asymptomatic acute COVID illness proven by positive COVID-19 IgG titers and a negative SARS-CoV-2 PCR test. This patient did not meet the diagnostic criteria for Multi-system Inflammatory Syndrome in Children. His treatment course was complicated by recurrent pericardial fluid accumulation requiring multiple pericardiocentesis and extended courses of Ibuprofen and Colchicine.

1. Introduction

Coronavirus 19 remains a global health concern since early 2020, with the number of deaths reaching 6,955,141 as of August 13, 2023 [1]. The main manifestations of the infection are known to be respiratory, ranging from flu-like symptoms to severe respiratory distress with respiratory failure. Since the beginning of the pandemic, cases of cardiac involvement were reported worldwide, with multiple cardiac manifestations recognized, including heart failure, acute coronary syndrome, arrhythmia, myocarditis, and pericardial effusion resulting in tamponade in some cases. Early cohort studies were conducted to understand cardiac complications better, and one of the earliest studies was undertaken in Wuhan, February 2020, showing an association between cardiac complications in older patients and those with cardiovascular risk factors as hypertension, diabetes mellitus, coronary heart disease, and chronic heart failure [2]. which concludes that the pediatric population is placed at lower risk for cardiac complications. Still, multiple pediatric cases were reported to have cardiac involvement, but very rarely, with almost all being observed in patients meeting criteria for MIS-C [3,4]. The reported cases of cardiac inflammation, either manifesting as myocarditis, myopericarditis, or isolated pericarditis, were described as occurring shortly after upper respiratory symptoms with a persistent positive PCR test for COVID-19 [5-8]. Pericarditis as a solo presentation remains an uncommon manifestation of COVID-19 infection, and few cases of such are reported to date [9,10]. We are presenting a case of a pediatric patient with pericardial effusion five months following an asymptomatic COVID-19 infection, considering it an unusual presentation.

2. Case Description

A 7-year-old African American male with a history of contact with a family member who died from COVID-19 infection five months earlier, presented with mid-chest and left shoulder pain that was worsening when lying on his back. This pain started one week prior and was associated with cough but no fever. The family reported absence of COVID symptoms in the past. The patient was not tested following exposure, as he remained asymptomatic. He was seen at another facility to evaluate his shoulder pain, and a left shoulder X-ray showed the incidental finding of an enlarged cardiac silhouette (Figure 1), and thus was followed by a chest radiograph that confirmed the findings (Figure 2).

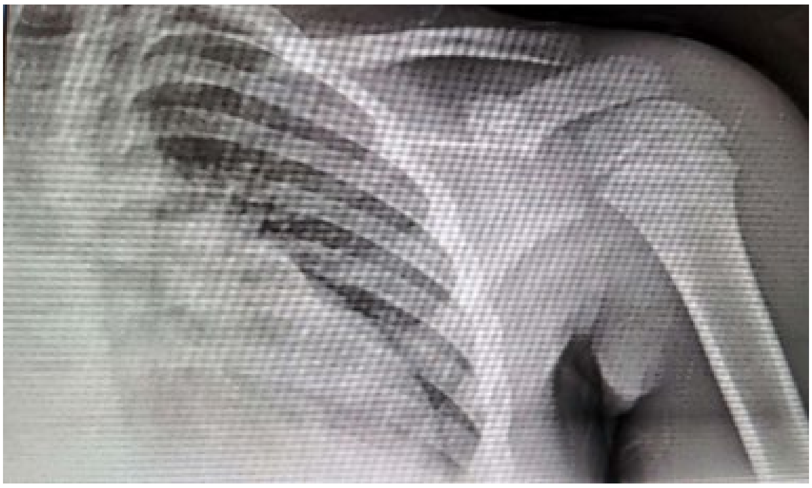

Figure 1: Left shoulder Xray to evaluate vague shoulder pain, and incidently showed enlarged left cardiac sillouette.

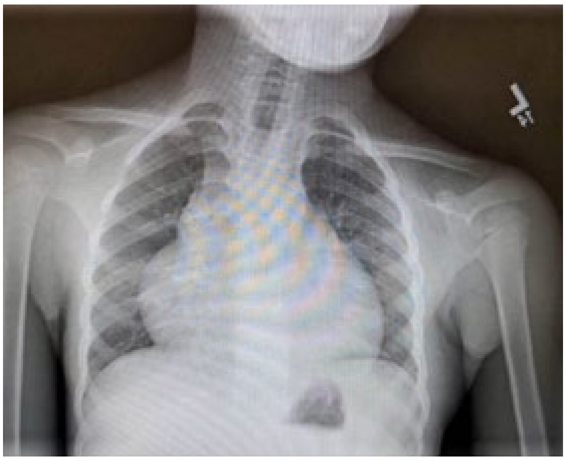

Figure 2: PA chest radiograph showing enlarged cardiac silhouette.

The patient was transferred to our ED for further evaluation. The physical examination was unremarkable other than chest and shoulder pain that worsens when lying supine and improves when leaning forward. Cardiac examination was free of abnormal findings, with no murmurs or abnormal sounds identified. Vital signs at time of presentation were normal for age as the following: Temp 36.4 C, HR 90, BP 101/64, SpO2 100% on room air. His vital signs remained normal and stable throughout his hospital course. The initial workup was as following: WBC count 10.6 x 10^9/L; CRP 0.17 mg/dL (normal reference value <1); ESR 28 mm/hr (normal reference value <10); Troponin and BNP within normal limits. COVID IgG was positive with a negative PCR test indicating a previously resolved infection.

EKG showed normal ST segments and PR intervals, T wave inversion in aVR and V1 leads. An echocardiogram showed moderate to large pericardial effusion, but with no evidence of tamponade or impaired cardiac function (Figure 3).

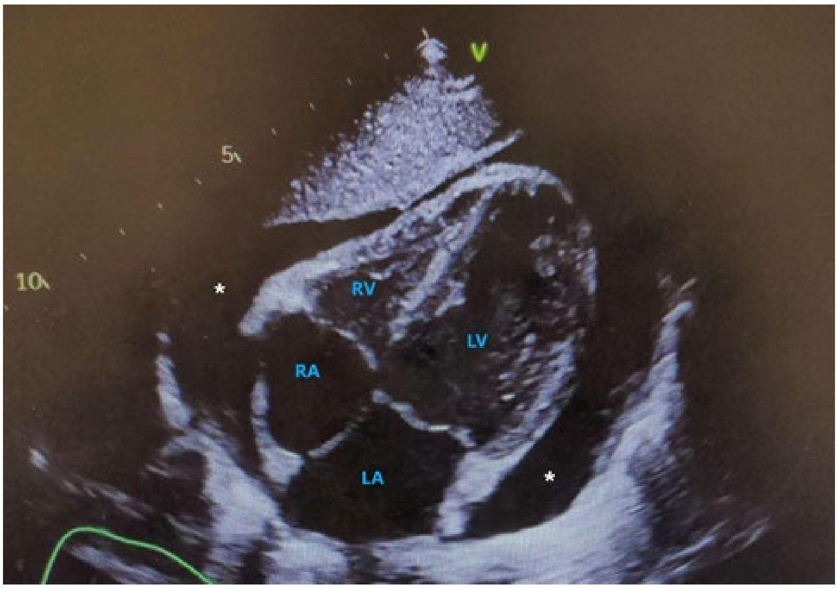

Figure 3: Subcostal four chamber view of the heart by echocardiogram, showing pericardial effusion as indicated by the asterisks.

The patient was admitted to our facility to further evaluate and treat his pericardial effusion and pericarditis, as he met the criteria for pericarditis diagnosis [11]. He was started on Ibuprofen and Colchicine as management for likely viral or post-viral pericarditis with Lasix to help resolve the effusion, but the response was unsatisfactory. Pericardiocentesis for persistent unresolved effusion was performed. The initial drained fluid volume was 200 ml, with a total of 149 ml drained over the following three days. Pericardial fluid was lacking evidence of ongoing inflammation and was free of malignant cells, and the analysis was as the following: RBC 59,500/mm3; WBC 4,409/mm3; Lymphocytes 15%; Neutrophils 53%; Protein 6.1 gm/dL; Glucose 81 mg/dL; PH 7.6.

Testing for LDH levels was not performed on the pericardial fluid. Both the pericardial fluid and serum tested negative for common viral infections via PCR. TB testing, bacterial and fungal cultures from the pericardial fluid were negative as well. Serological testing excluded rheumatological causes of pericarditis, with normal titers for the following markers: Anti-dsDNA, Anti-RNP, Anti-Sm, Anti-SSA, Anti-SSB, C3, and C4. The lack of severe symptoms with the moderate to large pericardial effusion led to the conclusion that this was a chronically evolving effusion, likely secondary to an asymptomatic acute phase of COVID-19. His chest pain resolved on the fifth day of admission, and he was discharged to continue Ibuprofen, Colchicine, and Lasix after serial echocardiograms showing resolution of his pericardial effusion.

The patient was seen in our cardiology clinic five days following his discharge. He was complaining of intermittent but improved left shoulder pain. An echocardiogram showed recurrence of small to moderate pericardial effusion. He developed orthopnea and dyspnea and was referred to a tertiary facility in our health system. Pericardiocentesis was performed for the second time with the same amount of fluid drained. He was started on a three-day course of steroids with improvement in his symptoms. He was discharged to follow up with our cardiology clinic. During a later outpatient follow up, a repeat echocardiogram showed reaccumulation of a small amount of pericardial fluid, and thus he was restarted on Colchicine, Ibuprofen, and Lasix. An echocardiogram done after two weeks showed only trivial pericardial fluid, and his symptoms have resolved, concluding that the medications provided above played a role in the medical management of his pericardial effusion, though the initial response was unsatisfactory.

3. Discussion

Acute pericarditis is caused by inflammation of the pericardium, the outermost layer of the cardiac tissue. It is a common disorder as it is reported in approximately 0.1% of hospitalized patients. In most patients, it is considered idiopathic, as diagnostic testing rarely establishes a clear cause. Pericarditis has been attributed to many viral infections, bacterial microorganisms, autoimmune disorders, tumors invading the cardiac tissue, and acute myocardial infarction, along with many other causes. The diagnosis can be made in the presence of at least two of the following four criteria: characteristic chest pain, pericardial friction rub, EKG changes, and new or worsening pericardial effusion. Typical ECG changes in acute pericarditis include diffuse ST-segment elevation and PR-segment depression. Treatment for viral or idiopathic acute pericarditis mainly consists of NSAIDs, Colchicine, and corticosteroids. It can be managed outpatient in mild cases in the absence of high-risk features. The Recurrence rate of pericarditis is very high and approaching an average of 24% [11].

Our patient's case is atypical in that he developed a cardiac complication following an acute asymptomatic COVID-19 infection proven by positive COVID IgG titers and a negative PCR test. Secondly, his cardiac complication was not in the context of MIS-C, which is relatively commonly described post-COVID-19 infection in the pediatric population. Thirdly, it appears that pericarditis was a chronic process in this case, as the significant pericardial effusion was well tolerated by the patient and did not result in tamponade or significant changes in his vital signs, and the pericardial effusion resolved only after several months. Myopericarditis linked to COVID-19 is mostly described during the acute phase of the infection and can rarely be the sole presentation for acute COVID-19 infection in the absence of respiratory symptoms [9,10]. Lloyd Dini et al. presented multiple cases of acute pericarditis in the scope of COVID-19 long haul, but the described cases were only limited to adult patients with no pediatric patients included in their review [12].

The pathogenesis of COVID-19 associated myopericarditis is not fully understood. It could be explained by SARS-CoV-2 spike protein binding to the ACE 2 receptors present on cardiac cells along with other organs and triggering an inflammatory response with a surge in cytokines [5,6]. Another suggested mechanism could be an autoimmune process during which antiviral antibodies cross-react with the cardiac proteins by molecular mimicry as it was suggested with other viruses preceding pericarditis [9], possibly explaining the late and relapsing pericarditis with effusion observed in our patient. COVID-19 related pericarditis follows the typical pericarditis signs and symptoms such as chest pain that typically worsens in supine positions and improves with leaning forward, friction rub, and EKG findings being typical for pericarditis [1,2]. No specific biomarkers are available to diagnose pericarditis. However, inflammatory markers like ESR, CRP, WBC, and imaging like chest X-ray, CT scan, and ECHO are often utilized to diagnose and rule out other etiologies for chest pain [1-3]. Diagnostic pericardiocentesis can be avoided in most cases [6]. Cardiac specific biomarkers such as troponin-I and BNP can be used to monitor disease progression and response to treatment.

Covid testing on pericardial fluid is neither available nor validated, however COVID-19 was demonstrated in pericardial fluid using reverse transcriptase polymerase chain reaction and electron microscopy for academic purposes [6]. Pericardial fluid analysis exam is mainly used to exclude other causes of pericardial effusion [6]. Main treatment options consist of anti-inflammatory agents like ibuprofen, aspirin, and steroids, with the addition of Colchicine to prevent relapses [6]. The combination of NSAIDs and Colchicine has been successfully used in adults and children. Anakinra was used in treatment resistant pericarditis due to COVID-19 with successful zesults [13].

4. Conclusion

It is important to maintain a high index of suspicion for cardiac complications in children of families with COVID-19 infected members. This case is intriguing because the cardiac complication occurred out of the previously reported contexts of acute phase and/or MIS-C, but rather in isolation, as a post-viral immune reaction to cardiac tissue and leading to late sequelae. Pericarditis was persistent and presented months after the acute COVID-19 infection. In the context of high exposure in the general population during the pandemic, the development of cough and chest pain in a pediatric patient should trigger an evaluation with a CXR, as well as EKG and ECHO to properly investigate a cardiac complication. Such cases should be referred to Cardiology and Infectious Disease specialists for treatment and appropriate follow-up to resolution. Long-term Cardiology follow-up to monitor for sequelae may be warranted.

References

1. (WHO Coronavirus (COVID-19) (2024). Dashboard | WHO Coronavirus (COVID-19) Dashboard With Vaccination Data, n.d.)
2. Shi, S., Qin, M., Shen, B., Cai, Y., Liu, T., Yang, F., ... & Huang, C. (2020). Association of cardiac injury with mortality in hospitalized patients with COVID-19 in Wuhan, China. *JAMA cardiology, 5*(7), 802-810.
3. Nakra, N. A., Blumberg, D. A., Herrera-Guerra, A., & Lakshminrusimha, S. (2020). Multi-system inflammatory syndrome in children (MIS-C) following SARS-CoV-2 infection: review of clinical presentation, hypothetical pathogenesis, and proposed management. *Children, 7*(7), 69.
4. Raymond, T. T., Das, A., Manzuri, S., Ehrett, S., Guleserian, K., & Brenes, J. (2020). Pediatric COVID-19 and pericarditis presenting with acute pericardial tamponade. *World Journal for Pediatric and Congenital Heart Surgery, 11*(6), 802-804.
5. Kumar, R., Kumar, J., Daly, C., & Edroos, S. A. (2020). Acute pericarditis as a primary presentation of COVID-19. *BMJ Case Reports CP, 13*(8), e237617.
6. Fox, K., Prokup, J. A., Butson, K., Jordan, K., & Jordan, K. M. (2020). Acute effusive pericarditis: a late complication of COVID-19. *Cureus, 12*(7).
7. Farina, A., Uccello, G., Spreafico, M., Bassanelli, G., & Savonitto, S. (2020). SARS-CoV-2 detection in the pericardial fluid of a patient with cardiac tamponade. *European journal of internal medicine, 76,* 100.
8. Sauer, F., Dagrenat, C., Couppie, P., Jochum, G., & Leddet, P. (2020). Pericardial effusion in patients with COVID-19: case series. *European Heart Journal: Case Reports, 4*(FI1), 1.
9. Asif, T., Kassab, K., Iskander, F., & Alyousef, T. (2020). Acute pericarditis and cardiac tamponade in a patient with COVID-19: a therapeutic challenge. *European journal of case reports in internal medicine, 7*(6).
10. Ghosh, S., Panda, P., Sharma, Y. P., & Handa, N. (2022). COVID-19 presenting as acute pericarditis. *BMJ Case Reports CP, 15*(1), e243768.
11. Khandaker, M. H., Espinosa, R. E., Nishimura, R. A., Sinak, L. J., Hayes, S. N., Melduni, R. M., & Oh, J. K. (2010, June). Pericardial disease: diagnosis and management. In *Mayo Clinic Proceedings* (Vol. 85, No. 6, pp. 572-593). Elsevier.
12. Dini, F. L., Baldini, U., Bytyçi, I., Pugliese, N. R., Bajraktari, G., & Henein, M. Y. (2023). Acute pericarditis as a major clinical manifestation of long COVID-19 syndrome. *International Journal of Cardiology, 374,* 129-134.
13. Karadeniz, H., Yamak, B. A., Özger, H. S., Sezenöz, B., Tufan, A., & Emmi, G. (2020). Anakinra for the treatment of COVID-19-associated pericarditis: a case report. *Cardiovascular Drugs and Therapy, 34,* 883-885.