



FROM CORONA VIRUS TO HEARTACHE: INVESTIGATING ACUTE PERICARDITIS AFTER COVID-19

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ABSTRACT

Cardiovascular disorders have been associated with coronavirus disease 2019 (COVID-19). One of the emerging complications is acute pericarditis, characterized by inflammation of the pericardium. Pericarditis is a complication that arises after COVID-19 infection because the virus can cause widespread inflammation, including in the pericardium, the outer layer of the heart. Risk factors that may exacerbate pericarditis in COVID-19 patients include the severity of COVID-19 disease, an immunocompromised state, or an excessive immune system response to infection. The aim of the study is to describe a case of acute pericarditis that occurred after Severe Acute Respiratory Syndrome - Coronavirus 2 (SARS-CoV-2) infection. This study used a case study design. This study was conducted on one of the patients who experienced pericarditis after Covid-19. Researchers conducted nursing assessments and analyzed nursing data. Data analysis was carried out descriptively to describe the results of nursing assessment. A few days after experiencing SARS-CoV-2 pneumonia, 51-year-old Mr. S. developed chest pain that became more painful during exertion, and received a diagnosis of acute pericarditis. As a result, medical treatment was escalated with clinical improvement continuing to improve. Electrocardiography showed elevation in ST segment and depression in PR interval. Echocardiography showed grade I diastolic phase disruption. Acute pericarditis is a rare complication following viral infection. This report shows the assessment and management of acute pericarditis so as to prevent complications that can occur.

Keywords: acute pericarditis; COVID-19; patients

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INTRODUCTION

COVID-19 has impacted more than 775,293,630 people worldwide as of March 2024 (WHO, 2024). In general, patients with COVID-19 experience respiratory system disorders. However, the impact of COVID-19 can cause acute and chronic damage to the cardiovascular system (Dini et al., 2023). Cardiovascular symptoms of COVID-19 that can be caused are arrhythmias, acute coronary syndrome, left ventricular heart failure, and myocarditis. SARS-CoV-2 infection has been associated with potential damage to cardiomyocytes (the cells of the heart muscle), which can lead to inflammation in the heart (Galea et al., 2023). This damage may activate mast cells and macrophages, contributing to the inflammatory response observed in conditions like myocarditis.

In severe cases of COVID-19, especially with high viral loads, the virus's impact on the heart muscle cells and the resulting inflammation are believed to be significant factors in the development of myocarditis or pericarditis (Fatima et al., 2022). This condition underscores the importance of monitoring cardiac health in individuals with severe COVID-19 symptoms and highlights the potential complications of viral infections affecting the heart (Patone et al., 2022). Data on pericardial involvement are scarce. A recent systematic review, including studies of adult patients who underwent various types of cardiac examinations after recovery from COVID-19, reported that 63 of 758 patients had pericardial problems and 99 of 758 patients had pericardial effusion based on Cardiac Magnetic Resonance (CMR), or 12 of 811 patients based on Echocardiography examination (Dixit et al., 2021).

The gap in knowledge about post-COVID cardiovascular manifestations can create significant clinical dilemmas for healthcare professionals treating patients with new symptoms such as chest pain, shortness of breath, palpitations, dizziness, and increased heart rate at rest, especially when patients also report a history of SARS-CoV-2 infection (Vosko et al., 2024). The purpose of this study is to present the clinical assessment of a patient with a case of acute pericarditis after COVID-19.

METHOD

This research method used a case study approach to describe the results of assessment in patients with acute pericarditis after covid-19 (Crowe et al., 2011). The sample was one patient who had been diagnosed with COVID-19 and then experienced symptoms of acute pericarditis after recovery. Nursing assessments were conducted on patients who met the inclusion criteria, focusing on evaluating pericarditis symptoms, medical history, and medication use before and after the diagnosis of pericarditis. The ethical principles applied in this study included autonomy, by providing information and respecting patients' independent decisions; beneficence, by providing the best benefit for patients in the research process; maleficence, by preventing possible harm or harm to patients; and veracity, by providing honest and accurate information to patients and related parties. Data analysis was performed qualitatively by describing the results of nursing assessment in selected patients, including the symptoms of pericarditis experienced, previous medical history, and medication use. The results of this analysis were then compared with existing theories about pericarditis and COVID-19.

RESULTS

Patient Mr. S with the age of 51 years entered the Emergency Department on December 24, 2022 at 01.38 P.M. The patient was examined for Vital Signs (TTV) with the results of blood pressure 145/93 mmHg, pulse 65x / m, breathing 24x / m, temperature 36.6 C, and SpO2 : 99%. The patient entered with complaints of chest pain. The pain was felt since 1:00 PM, the pain was felt more when doing activities, and felt like being hit by a heavy object. The pain is on the left chest and radiates to the back. The pain scale was measured using the Numeric Rating Scale (NRS) with a pain scale of 6/10. In December 2020, the patient was admitted to the Intensive Care Unit with a diagnosis of pneumonia and Covid-19 with positive PCR results. The patient has received the Covid-19 vaccine 2 times. X-ray results in December 2020 can be seen in Figure 1. The patient also has a history of high blood pressure and takes amlodipine with a dose of 10 mg regularly. The patient was given a physical examination and during auscultation using a stethoscope, a friction sound of heart sound was found. On inspection, there was no abnormality in the movement of the patient's chest wall.

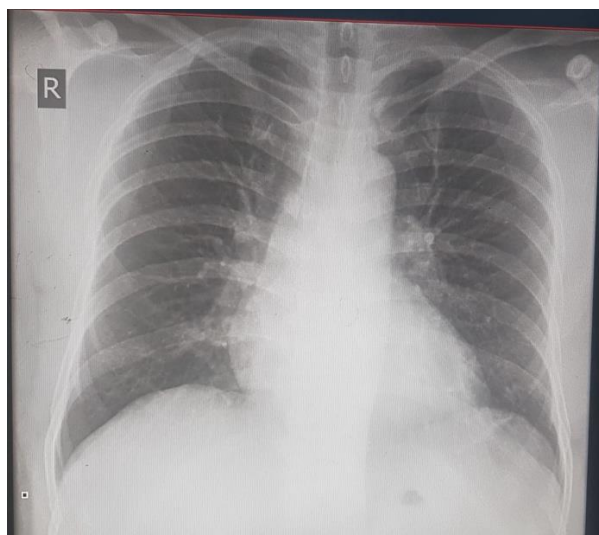


Figure 1. Chest X-ray results with diagnosis of Pneumonia in December 2020

After the examination, the patient was given fluid therapy and medication. Fluids were given in the form of NaCl 0.9% with 10 drops per minute. The patient was given oral medications such as Ibuprofen 800mg 3 times a day, Lipitor 40 mg once a day, Augmentin 1 gram given 2 times a day, and omeprazole 20 mg once a day before meals. After administering therapy, the patient underwent a supporting examination in the form of Electrocardiography, and the results were found in the form of Elevation in the ST segment and depression in the PR interval which can be seen in Figure 2. The patient also underwent a supporting examination in the form of a chest X-ray. The results of X-rays in December 2022 can be seen in Figure 3. Patients are routinely given complete blood tests during treatment. The results of complete blood tests from admission to discharge can be seen in Figure 4. After an increase in WBC, Neutrophils and Monocytes was found, the doctor gave additional therapy in the form of Augmentin 1 gram and given 2 times a day.

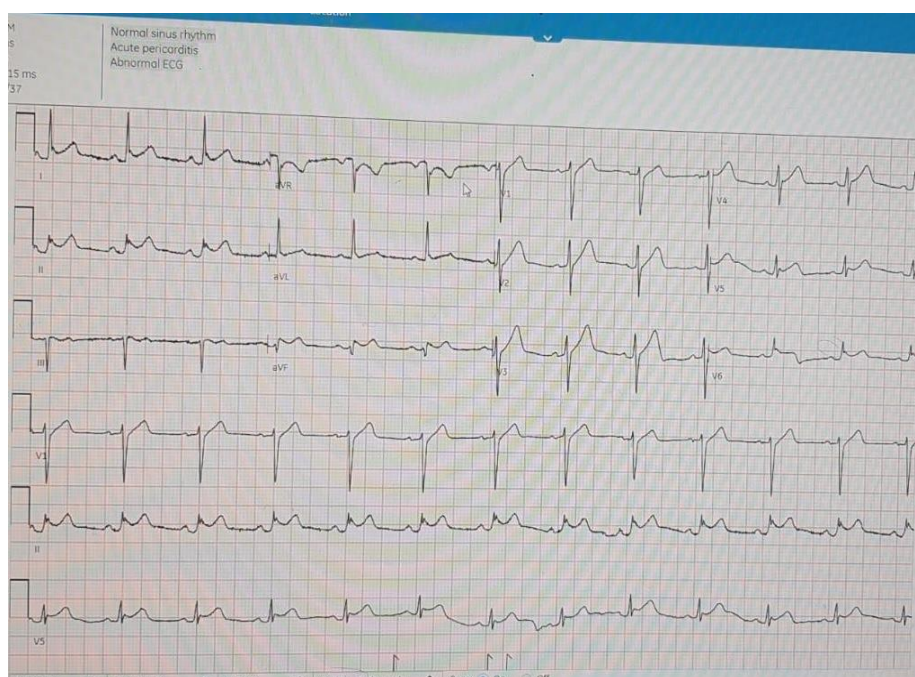


Figure 2. Electrocardiography results with a diagnosis of pericarditis in December 2022

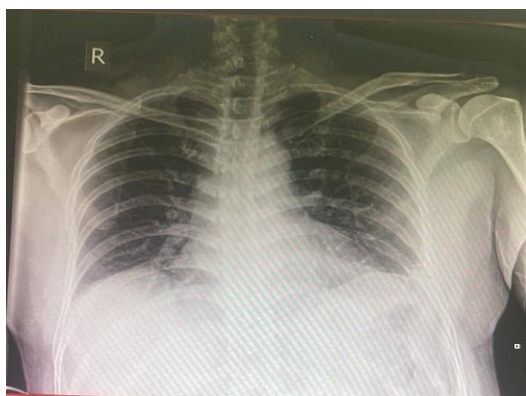


Figure 3. Chest X-ray results with a diagnosis of pericarditis in December 2022

PATIENT CUMULATIVE REPORT						
Test Name	27/12/2022 05:19:32 2209118783	26/12/2022 05:19:09 2209115809	25/12/2022 05:05:16 2209112763	24/12/2022 21:49:46 2209111956	Reference	Unit
WBC	7.4	8.7	13.4 H	13.2 H	4-10	10 ⁹ /L
RBC	5.12	4.95	4.87	5.09	4.5-5.5	10 ¹² /L
Hb	158	156	154	159	130-170	g/L
Hct	0.472	0.453	0.453	0.466	0.4-0.49	L/L
MCV	92.2	91.5	93.0	91.6	80-96	fL
MCH	30.9	31.5	31.6	31.2	27-32	pg
MCHC	335	344	340	341	334-355	g/L
RDW-CV	12.0	12.5	12.2	12.2	11.6-14	%
Platelet	316	299	298	323	150-450	10 ⁹ /L
MPV	9.4	9.5	9.6	9.7	6.9-10.8	fL
Neutrophils#	3.89	5.02	10.88 H	9.10 H	2-7	10 ⁹ /L
Lymphocytes#	2.29	2.32	1.13	2.86	1-3	10 ⁹ /L
Monocytes#	0.80	1.03 H	1.29 H	1.04 H	0.2-1	10 ⁹ /L
Eosinophils#	0.35	0.28	0.04	0.16	0.02-0.5	10 ⁹ /L
Basophils#	0.05	0.03	0.04	0.05	0.02-0.1	10 ⁹ /L
NRBC#	0.00	0.00	0.00	0.00		#
NRBC%	0.0	0.0	0.0	0.0	0-1	%

Figure 4. Complete blood test in December 2022.

It is known that this patient has been hospitalized 4 times after experiencing Covid-19 with complaints of tightness and chest pain. The patient has undergone Swab PCR examination 5 times due to complaints experienced. The last patient was carried out Swab PCR in 2021 with the result that the COVID-19 virus was not detected. The patient underwent an Echocardiography examination on December 26, 2024 and found data in the form of Left Ventricle Ejection Fraction (LVEF) at a value of 60-65%. The movement of the chest wall of the heart is normal. There is a disturbance in the diastolic function of the heart at the Grade I stage. Concluding from the physical examination and supporting examinations that have been carried out with the results there is a cardiac rub sound on auscultation of the heart, there is ST Segment elevation and PR Interval depression on the ECG picture, there is diastolic disturbance on echocardiography, and an increase in WBC on blood tests and looking at the results of chest X-rays, the diagnosis concluded by the doctor is pericarditis due to COVID-19.

After complaints decreased and laboratory results were within normal limits, the patient was discharged on December 27, 2024. However, an electrolyte examination was carried out and found a decrease in calcium with a value of 2.15 mmol/L. The therapy to be brought home to the patient is Istin (Amlodipine) 10 mg once a day, Lipitor (Atorvastatin) 20 mg once a day, Cetirizine (Zytrec) 10 mg once a day, Calcium Salts (Ca+Vit.D) once a day, Augmentin (Amoxi + Clavulanica) 1 gram once a day, and Esomeprazole 20 mg once a day.

DISCUSSION

Acute pericarditis is a pericardial inflammatory syndrome with or without pericardial effusion (LeWinter, M. M., 2014). Pericarditis is the most common form of pericardial disease worldwide and can recur in as many as one-third of patients who develop idiopathic and viral pericarditis (Imazio & LeWinter, 2015). Enteroviruses (coxsackieviruses, echoviruses), herpesviruses (EBV, CMV, HHV-6), adenoviruses, parvovirus B19 are viruses that often cause pericarditis (Adler et al., 2015). From our observation, pericarditis caused by COVID-19 is one of the rare cases. SARS-CoV-2 infection has been associated with potential damage to cardiomyocytes (the cells of the heart muscle), which can lead to inflammation in the heart (Kumar et al., 2020). This damage may activate mast cells and macrophages, contributing to the inflammatory response observed in conditions like myocarditis. In severe cases of COVID-19, especially with high viral loads, the virus's impact on the heart muscle cells and the resulting inflammation are believed to be significant factors in the development of myocarditis (Anastassopoulou et al., 2022). This condition underscores the importance of monitoring cardiac health in individuals with severe COVID-19 symptoms and highlights the potential complications of viral infections affecting the heart (Fox et al., 2020).

Risk factors for post-COVID-19 pericarditis involve a number of potential contributors which include the severity of the initial infection, an uncontrolled immune response to the virus, and the presence of medical conditions that may exacerbate inflammation in the pericardium (Fairweather et al., 2023). In the context of isolated cases, such as in certain patients who may have a history of heart disease or a weakened immune system, the risk of developing pericarditis after COVID-19 infection may increase (Fox et al., 2020). In addition, other factors such as the severity of COVID-19 disease, duration of infection, and the presence of other complications may also affect the risk of pericarditis. Patients with COVID-19 who develop severe pneumonia or require treatment in an intensive care unit may have a higher risk of developing pericarditis post-recovery (Patone et al., 2022).

ACE2 (angiotensin converting enzyme 2) is an enzyme as a receptor utilized by SARS-CoV-2. Increased SARS-CoV-2 interacts with ACE2 and is then broken down by TMPRSS2 (transmembrane serine protease-2) to facilitate virus entry into cells (Karadeniz et al., 2020). COVID-19 predominantly affects males, which may be due to the higher expression of ACE2 in male cells than in female cells. In the heart, ACE2 is produced in cardiomyocytes (heart muscle cells), pericytes (cells lining capillary walls), and macrophages. ACE2 excretion tends to be lower in fibroblasts (cells that make up connective tissue) and endothelial cells (cells that line the inner surface of blood vessels) (Diaz, 2021). The detection of the SARS-CoV-2 genome by Polymerase Chain Reaction (PCR) in heart tissue from autopsies of COVID-19 patients showed that the virus has the ability to infect the heart (Fairweather et al., 2023).

The patient arrived at the emergency room with complaints of chest pain after previously undergoing 4 hospitalizations in a two-year period. This statement is in line with a case report conducted by Dominguez (2021) where the case states that patients are often in and out of the hospital with a diagnosis of pericarditis after being diagnosed with COVID 19 (Domínguez et al., 2023). Pericarditis that is not treated early on will experience cardiac tamponade and result in heavier heart work (Latif et al., 2020). Research conducted by Cvetko (2022) also shows that COVID-19 is the cause of pericarditis, and can cause purulent methicillin-sensitive *Staphylococcus aureus* in the fluid in the pericardium layer (Cvetko et al., 2023). According to Alder (2015), the clinical diagnosis of pericarditis can be established if there are two of several criteria such as sharp chest pain that usually improves when sitting and bending forward, the sound of friction or squeaking when auscultated at the top of the left sternal due

to pericardial friction, the criteria for the description of the results of the Electrocardiogram (ECG) showing elevation in the ST segment and there is depression in the PR interval (Buckley et al., 2021). Elevation of the ST segment is a hallmark of pericarditis (Adler et al., 2015). In post-COVID patients, transient or prolonged ECG abnormalities have been reported. This explanation is in line with the case we present where the patient has acute pericarditis. However, often pre-COVID ECG controls are not available, and changes such as nonspecific ST changes, T wave abnormalities, prolonged QT interval, or complete or incomplete bundle branch block tend to resolve within 6 months (Vosko et al., 2024). Additional tests to support the diagnosis such as C-reactive protein, erythrocyte sedimentation rate, computed tomography (CT) and cardiac magnetic resonance (CMR) were not performed on our patient (Le Vu et al., 2022).

Recommendations for preventing pericarditis after COVID-19 include a series of measures aimed at reducing the risk of complications in patients recovering from infection. The first step is to closely monitor patients who have recovered from COVID-19, especially in identifying symptoms of pericarditis such as chest pain or shortness of breath (Patone et al., 2022). Patient education is also important, including providing information on symptoms to look out for and the importance of getting appropriate medical care at the first sign of pericarditis. In addition, an individualized risk assessment for each patient, including medical history and risk factors that may increase the likelihood of pericarditis, will help in planning appropriate prevention strategies (Le Vu et al., 2022). Therapies aimed at managing systemic inflammation or autoimmune diseases may also play a role in preventing post-COVID-19 pericarditis. Collaboration between doctors, nurses and the rest of the healthcare team is important to devise a holistic and individualized prevention plan for each patient (Buckley et al., 2021). A comprehensive and proactive approach to patient monitoring and management is expected to reduce the incidence and impact of pericarditis in the patient population recovering from COVID-19.

From the results of this case report, we can underline that the possibility of complications in the cardiovascular system after being infected with COVID-19 disease is very large. Although there are no typical signs and symptoms that can distinguish pericarditis caused by the COVID-19 virus from other viruses. Although several cases of pericarditis such as pericardial effusion, and cardiac tamponade suspected to be related to COVID-19 have been reported (Talerico et al., 2022), no one has reported cases of acute pericarditis after testing negative for covid for a long time. Examination through clinical symptoms, echocardiography, radiology, and electrocardiography showed the presence of pericarditis in the patient. However, there are no guidelines that specifically explain how to manage patients, appropriate therapy, prevention of cardiac tamponade, and other complications associated with diseases of the pericardial lining as a result of the 2019 coronavirus.

CONCLUSION

The main clinical manifestation of COVID-19 is pneumonia, but SARS-CoV-2 is also involved in several extrapulmonary manifestations, including various cardiovascular disorders. Acute pericarditis is a rare cardiac complication of COVID-19 that requires special vigilance and evaluation, to prevent more severe pericarditis. Preventing pericarditis after COVID-19 entails close monitoring of recovered patients, patient education on symptom recognition, individual risk assessment, and collaborative care to mitigate potential complications. Nursing implications involve vigilant monitoring for acute pericarditis symptoms, early pain management, patient education, interdisciplinary collaboration, and recommendations for routine screening, individualized treatment plans, long-term follow-up,

and further research and education to enhance care delivery and patient outcomes. Further research could focus on elucidating the underlying mechanisms linking COVID-19 infection and acute pericarditis, exploring potential risk factors for its development, evaluating the efficacy of different treatment modalities, and assessing long-term outcomes and recurrence rates among affected individuals.

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