INTERNATIONAL JOURNAL OF CARDIOVASCULAR RESEARCH & INNOVATION
Oct-Dec 2024, VOL. 2, ISSUE 4, pp. 37-39
https://doi.org/10.61577/ijcri.2024.1000026

RESEAPRO JOURNALS

CASE REPORT

OPEN ACCESS

Post-COVID myocarditis in a Japanese High School student: A case report with public health reflections

Jong-Dae Doi

Department of Cardiovascular, Hokkaido University School of Medicine, Sapporo, Japan

ABSTRACT

Background: Myocarditis, an inflammatory condition of the heart muscle, has emerged as a potential complication following SARS-CoV-2 infection, particularly in adolescents and young adults. While globally recognized, such cases remain underreported in the Japanese school-going population, where pandemic control measures and vaccination policies have differed.

Case Presentation: We report the case of a 16-year-old male high school student from Japan who presented with acute chest pain and fatigue three weeks after recovering from a mild COVID-19 infection. Diagnostic evaluations, including elevated cardiac biomarkers and cardiac MRI, confirmed the presence of myocarditis. The patient was managed with supportive care and showed gradual recovery. This case raises critical questions regarding early recognition of cardiac complications in young individuals and the implications for school-based health monitoring.

Conclusion: This case highlights the importance of clinician awareness of post-COVID cardiac manifestations in adolescents. It also prompts a re-evaluation of health screening protocols in Japanese schools and underscores the need for longitudinal research on COVID-19's cardiovascular effects in youth.

KEYWORDS

COVID-19; Myocarditis; Adolescents; Japan; Public health; Cardiac inflammation

ARTICLE HISTORY

Received 03 December 2024; Revised 24 December 2024; Accepted 31 December 2024

Introduction

Myocarditis, an inflammation of the myocardium, has been increasingly recognized as a complication associated with SARS-CoV-2 infection, particularly among adolescents and young adults. Although COVID-19 primarily affects the respiratory system, its impact on cardiovascular health has become a growing area of clinical concern [1]. In post-infectious cases, the presentation of myocarditis may be subtle and is often underdiagnosed without a high index of suspicion.

In Japan, the adolescent population has largely experienced mild or asymptomatic COVID-19 infections due to early containment measures, widespread mask usage, and high public compliance with vaccination policies. However, as the pandemic has evolved and schools have resumed in-person instruction, new challenges have emerged concerning the identification and management of post-COVID complications in youth [2,3].

To date, there are limited case-based reports documenting post-COVID myocarditis in the Japanese school-going population. The lack of such reports may reflect differences in clinical presentation, social perceptions, or diagnostic pathways [4]. Moreover, adolescent patients may not always articulate cardiac symptoms clearly, making early detection difficult.

Here, we present a case of post-COVID myocarditis in a Japanese high school student. This report aims to contribute to the growing international discourse while also drawing attention to the need for enhanced cardiovascular monitoring and awareness in school health programs in Japan.

Case Presentation

A 16-year-old male high school student from suburban Tokyo presented to our outpatient department with complaints of intermittent chest discomfort and fatigue persisting for five days. The patient had recovered from a mild case of COVID-19 approximately three weeks prior, confirmed by reverse transcription polymerase chain reaction (RT-PCR) [5]. His symptoms at that time included low-grade fever, sore throat, and general malaise, and he had completed home isolation without requiring hospitalization.

The patient had no prior medical history of cardiovascular disease, and there was no significant family history of cardiac conditions. He was not on any regular medications, and his COVID-19 vaccination history included two doses of an mRNA-based vaccine administered more than six months earlier.

Upon clinical examination, the patient's vital signs were within normal limits, although he reported occasional palpitations. Cardiac auscultation revealed no murmurs or gallops. Electrocardiography (ECG) showed nonspecific ST-segment changes, while laboratory investigations revealed elevated high-sensitivity troponin I (45 ng/L) and C-reactive protein (2.5 mg/dL). Echocardiography demonstrated mild left ventricular dysfunction with preserved ejection fraction (LVEF 52%), and no pericardial effusion was noted [6].

Cardiac magnetic resonance imaging (MRI) was subsequently performed and revealed subepicardial late gadolinium enhancement in the inferolateral wall of the left

***Correspondence:** Dr. Jong-Dae Doi, Department of Cardiovascular, Hokkaido University School of Medicine, Sapporo, Japan, e-mail: jongdae.doi@cardio.hokudai.ac.jp

ventricle, consistent with myocarditis. Coronary artery anomalies were ruled out, and a viral panel excluding SARS-CoV-2 was negative, suggesting a post-infectious inflammatory response [7].

The patient was admitted for monitoring and managed conservatively with rest, beta-blockers, and supportive care. No arrhythmic events or hemodynamic instability were observed during hospitalization. He was discharged after five days in stable condition with a plan for regular follow-up and gradual return to physical activity under supervision.

At one-month follow-up, the patient remained asymptomatic, and repeat echocardiography showed improved ventricular function. He was advised to refrain from competitive sports for a minimum of three months in accordance with current Japanese cardiology guidelines.

Findings

A summary of the patient's clinical findings, diagnostic results, and management plan is provided in Table 1.

Table 1. Summary of key clinical findings and investigations.

Parameter	Value / Observation
Age / Sex	16 / Male
COVID-19 status	Recovered 3 weeks prior
Vaccination	Two doses of the mRNA vaccine
Chief complaints	Chest discomfort, fatigue
ECG	Nonspecific ST-segment changes
Troponin I	45 ng/L (elevated)
C-reactive protein (CRP)	2.5 mg/dL
Echocardiography	LVEF 52%, mild LV dysfunction
Cardiac MRI	Subepicardial enhancement (LV)
Final diagnosis	Post-COVID myocarditis
Treatment	Rest, beta-blocker, observation

Timeline of clinical events

- Day 0 – Positive COVID-19 test (mild symptoms)
- Day 21 – Onset of chest discomfort and fatigue
- Day 25 – Presentation to hospital, diagnosis confirmed
- Day 30 – Discharged in stable condition
- One-month follow-up – Asymptomatic, cardiac function improved

Psychosocial Considerations

The patient reported experiencing significant mental stress due to an upcoming academic examination period, which coincided with his recovery from COVID-19. He noted that he initially ignored mild symptoms due to school responsibilities. This highlights the potential role of **psychosocial stress** and the **school culture** in delayed presentation among adolescents in Japan. The pressure to perform academically, common in Japanese society, can influence adolescents' health-seeking behaviors, potentially delaying the recognition of even mild cardiac symptoms.

Discussion

This case underscores the occurrence of post-COVID myocarditis in an adolescent, an emerging concern given the growing number of COVID-19 cases. Although myocarditis is a known complication of viral infections, it has become more prominent with the COVID-19 pandemic [8]. The patient's presentation of chest discomfort, fatigue, elevated biomarkers (troponin I and CRP), and characteristic MRI findings of subepicardial late gadolinium enhancement in the left ventricle confirmed the diagnosis of myocarditis. This aligns with previous studies that suggest SARS-CoV-2 infection can induce myocardial inflammation, either through direct viral invasion or immune-mediated injury [9-11].

Although the patient had received two doses of an mRNA vaccine more than six months earlier, the myocarditis was more likely a result of his prior COVID-19 infection, not the vaccination. This finding is consistent with current literature, which reports that post-vaccination myocarditis typically occurs shortly after vaccination, while post-infectious myocarditis tends to manifest weeks later.

Clinical implications and management

The management of post-COVID myocarditis typically involves conservative care, including rest, beta-blockers, and monitoring for arrhythmias [12]. In this case, the patient was treated with beta-blockers and closely monitored during hospitalization. No arrhythmic events or hemodynamic instability were observed, and the patient was discharged after five days in stable condition. Follow-up echocardiography showed improved ventricular function, highlighting the importance of early intervention and monitoring in mild cases of myocarditis. The decision to refrain from competitive sports for a minimum of three months is based on guidelines designed to prevent exercise-induced complications, including arrhythmias or sudden cardiac arrest.

Psychosocial factors

A critical aspect of this case is the patient's delayed presentation due to significant academic stress. Adolescents in Japan often face intense pressure to perform academically, which can lead them to ignore or underestimate symptoms in favor of school responsibilities [13-15]. This is particularly concerning in cases like myocarditis, where early intervention is crucial. The psychosocial stress experienced by the patient, combined with the cultural emphasis on academic achievement, may have influenced his decision to delay seeking medical care. This highlights the need for healthcare providers to consider cultural and psychosocial factors when diagnosing and managing adolescent patients, particularly in post-COVID contexts [15].

This case adds to the growing body of evidence on post-COVID myocarditis in adolescents. Early diagnosis and management are essential for favorable outcomes. Additionally, addressing psychosocial factors, such as academic stress, can improve early detection and intervention. Public health awareness and education about post-COVID complications, along with a focus on mental health support, are crucial to ensuring that adolescents receive timely care.

https://doi.org/10.61577/ijcri.2024.1000026

Conclusions

This case report illustrates the clinical and psychosocial complexities of post-COVID myocarditis in a Japanese adolescent. It reinforces the importance of considering cardiac evaluation in young patients presenting with persistent chest symptoms after recent SARS-CoV-2 infection, even when the initial infection was mild. Cardiac MRI remains a key diagnostic tool, especially in ambiguous cases.

Furthermore, the influence of academic stress and societal expectations in Japan played a role in delayed healthcare-seeking behavior. Recognizing such cultural factors is essential for timely diagnosis and management. Integrating mental health support and public health education into adolescent care may help bridge gaps in early recognition and treatment of cardiovascular complications in the post-COVID era.

Patient Consent

Informed consent for publication of this case report, including clinical data and imaging findings, was obtained from the patient and his legal guardians. All personal identifiers have been removed to ensure anonymity. The consent procedure was conducted by institutional guidelines and ethical principles for academic research in Japan.

Disclosure Statement

The authors declare that they have no competing interests.

References

1. Bozkurt B, Kamat I, Hotez PJ. Myocarditis with COVID-19 mRNA vaccines. Circ. 2021;144(6):471-484. https://doi.org/10.1161/CIRCULATIONAHA.121.056135
2. Imamura T, Saito M, Ko YK, Imamura T, Otani K, Akaba H, et al. Roles of children and adolescents in COVID-19 transmission in the community: a retrospective analysis of nationwide data in Japan. Front Pediatr. 2021;9:705882. https://doi.org/10.3389/fped.2021.705882
3. Andalibi A, Koizumi N, Li MH, Siddique AB. Symptom and age homophilies in SARS-CoV-2 transmission networks during the early phase of the pandemic in Japan. Biol. 2021;10(6):499. https://doi.org/10.3390/biology10060499
4. Nagasaka T, Koitabashi N, Ishibashi Y, Aihara K, Takama N, Ohyama Y, et al. Acute myocarditis associated with COVID-19 vaccination: a case report. J Cardiol Cases. 2022;25(5):285-288. https://doi.org/10.1016/j.jccase.2021.11.006
5. Minocha PK, Better D, Singh RK, Hoque T. Recurrence of acute myocarditis temporally associated with receipt of the mRNA coronavirus disease 2019 (COVID-19) vaccine in a male adolescent. J Pediatr. 2021;238:321-323. https://doi.org/10.1016/j.jpeds.2021.06.035
6. McCarthy CP, Raber I, Chapman AR, Sandoval Y, Apple FS, Mills NL, et al. Myocardial injury in the era of high-sensitivity cardiac troponin assays: a practical approach for clinicians. JAMA Cardiol. 2019; 4(10):1034-1042. https://doi.org/10.1001/jamacardio.2019.2724
7. Sanchez Tijmes F, Thavendiranathan P, Udell JA, Seidman MA, Hanneman K. Cardiac MRI assessment of nonischemic myocardial inflammation: state of the art review and update on myocarditis associated with COVID-19 vaccination. Radiology: Cardiothoracic Imaging. 2021 Nov 18;3(6):e210252. https://doi.org/10.1148/ryct.210252
8. McLean K, Johnson TJ. Myopericarditis in a previously healthy adolescent male following COVID-19 vaccination: a case report. Acad Emerg Med. 2021;28(8):918-921. https://doi.org/10.1111/acem.14322
9. Paul JF, Charles P, Richaud C, Caussin C, Diakov C. Myocarditis revealing COVID-19 infection in a young patient. Eur Heart J Cardiovasc Imaging. 2020;21(7):776. https://doi.org/10.1093/ehjci/jeaa107
10. Yu B, Wu Y, Song X, Liu G, Wang F, Zhang F, et al. Possible mechanisms of SARS-CoV2-mediated myocardial injury. Cardiovascular Innovations and Applications. 2023;8(1):981. Available at https://www.scienceopen.com/hosted-document?doi=10.15212/CVIA.2023.0031
11. Magadum A, Kishore R. Cardiovascular manifestations of COVID-19 infection. Cells. 2020;9(11):2508. https://doi.org/10.3390/cells9112508
12. Sayegh MN, Goins AE, Hall MA, Shin YM. Presentations, diagnosis, and treatment of post-COVID viral myocarditis in the inpatient setting: a narrative review. Cureus. 2023;15(5). https://doi.org/10.7759/cureus.39338
13. Xinyue Ma. Major Depressive Disorder in Adolescents: a General Overview. Int J Educ Hum Soc Sci.2023. https://doi.org/10.54097/ehss.v22i.12422
14. Kachi Y, Abe A, Ando E, Kawada T. Socioeconomic disparities in psychological distress in a nationally representative sample of Japanese adolescents: A time trend study. Aust N Z J Psychiatry. 2017;51(3):278-286. https://doi.org/10.1177/0004867416664142
15. Tamura N, Komada Y, Inoue Y, Tanaka H. Social jetlag among Japanese adolescents: Association with irritable mood, daytime sleepiness, fatigue, and poor academic performance. Chronobiol Int. 2022;39(3):311-22. https://doi.org/10.1080/07420528.2021.1996388

https://doi.org/10.61577/ijcri.2024.1000026