

Case Report

POST-PCI LAD ANEURYSM IN A SARS-COV2 IgG POSITIVE PATIENT

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Received on: 19-12-2020; Revised and Accepted on: 08-02-2021

ABSTRACT

Since its outbreak in December 2019, COVID-19 infection became a pandemic disease, spreading in more than 200 countries within a short period of time. Despite the usual presentation as a respiratory infection, most commonly as bilateral pneumonia, the extra pulmonary manifestations are in greater focus for the last few months. Understanding the pathophysiological mechanisms of different clinical presentations and possible complications are of great importance for further treatment and prognosis. Cardiovascular complications are various including myocardial injury, arrhythmias, myocarditis, arterial, and venous thrombotic events, mainly presented as acute coronary syndrome and pulmonary embolism. Recently, specific hyperinflammatory syndrome within COVID-19 infection has been described in children and occasionally in adults, with features similar to those of Kawasaki disease, leading to multiorgan failure and shock. Although it's presenting similarly to Kawasaki disease in terms of symptoms, the cases of Kawasaki like hyperinflammatory syndrome with the development of coronary artery aneurysms haven't been described yet in adults. In this case report, we review a case of SARS-CoV-2 IgG positive 63-year old patient with a large aneurysm of the left anterior descending artery (LAD) after percutaneous coronary intervention and signs of possible viral myocardial involvement.

Keywords: COVID-19, acute coronary syndrome, percutaneous coronary intervention, coronary aneurysm, Kawasaki disease, cardiac magnetic resonance.

1. ABBREVIATIONS

SARS-CoV-2 - severe acute respiratory coronavirus 2

LAD - left anterior descending artery

PCI - percutaneous coronary intervention

NSTEMI - Non-ST Elevation Myocardial Infarction

RCA - right coronary artery

OCT - optical coherence tomography

CMR - cardiac magnetic resonance

DES - drug eluting stent

CABG - coronary artery bypass graft.

2. INTRODUCTION

COVID-19 infection is a pandemic disease that to this date affected more than 70 million people with more than 1, 6 million registered death cases globally, as of 18 December 2020 [1]. Numerous studies over the last few months have shown a wide specter of clinical presentations of infection with the SARS-CoV-2 virus. It is usually presented as bilateral pneumonia, but with multiple extra pulmonary manifestations and complications that can lead to severe clinical presentation and death. The most common cardiovascular complications in patients infected with SARS-CoV-2 virus are myocardial injury, arrhythmias, myocarditis, acute coronary syndrome events, and thromboembolism, mainly presented as pulmonary

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DOI: <https://doi.org/10.5281/zenodo.7229600>

embolism [2, 3]. Also, a hyperinflammatory syndrome with features that are similar to those of Kawasaki disease has been described in children and occasionally in adults, but still without coronary aneurysms as a consequence [4]. In this case report, we review a case of SARS-CoV-2 IgG positive 63-year old patient with post-PCI aneurysm of the left anterior descending artery (LAD).

3. CASE REPORT

A 63-year old male was admitted to the hospital due to chest pain that occurred 10 hours before admission with discreet propagation into the left arm, followed by nausea and fatigue. The patient felt these difficulties for the first time in his life, chest pain lasted for about 30 minutes. The patient denied previous chronic diseases and therapy. At the moment of the admission, he was without chest pain, hemodynamically stable. ECG showed sinus rhythm with biphasic T wave in V2 lead and negative T-waves from V3-V6. Initial troponin was 117 ng/L, and CK was 307 U/L, both without further rising, LDL elevated up to 5.71 mmol/L and with the borderline value of glycemia. Other results were normal. Echocardiography showed preserved ejection fraction, without wall motion abnormalities, but with diastolic dysfunction. The therapy was ordered according to the protocol for patients with NSTEMI.

Coronary angiography was performed the next morning but in a 24hr time frame from the first difficulties. It showed diffusely diseased, tortuous, extremely calcified right coronary artery with multiple stenoses, but with distal TIMI 3 flow, mid LAD with subtotal stenosis which was marked as an infarct-related artery, in correlation with previous ECG findings (Fig. 1, 2).



Figure 1. Angiography of the right coronary artery - diffusely diseased, tortuous, extremely calcified right coronary artery with multiple significant stenosis



Figure 2. Angiography of the left coronary artery (cranial view) – mid-LAD significant calcified stenosis

There was no significant stenosis on the circumflex artery, so PCI LAD was performed with the implantation of two drug-eluting stents, both covered with everolimus (Xience PRO 3.5x33, Xience PRO 4.0x12mm, Abbott, USA). The procedure went without any complications, with the optimal final angiographic result and distal TIMI 3 flow. PCI RCA was planned afterward, in a one month period.



Figure 3. Final post-PCI angiography of the left anterior Descending artery (cranial view)

The patient was admitted again after 33 days, with negative PCR test for SARS-CoV-2, but with an information about having a high fever for 5 days, up to 38.7 degrees, followed by diarrhea, arthralgia, fatigue and sore throat with mouth cracking 6 days after the discharge from the previous hospitalization, without chest pain in the meantime.

In that moment, laboratory tests in regional health center showed elevated CRP (140mg/L), ferritin (738ug/L), LDH (529 U/L), hyponatremia (135mmol/L), slightly elevated neutrophils ($7.64 \times 10^9/L$) and lymphopenia ($0.67 \times 10^9/L$). Urine culture was sterile. Chest X-ray was without signs of pneumonia, and SARS-CoV-2 serology was negative, which was the reason why general practitioner didn't indicate the PCR test. The patient was treated with antibiotics and symptomatic therapy at home and was feeling better after a week.

In laboratory results on admission to hospital we noticed slightly elevated value of ferritin (595 ug/L), CRP (9.9 mg/L), and sedimentation (30mm/h). The absolute number of lymphocytes was decreased to $0.88 \times 10^9/L$. Also, the significant finding was the presence of SARS-CoV-2 IgG antibodies. Chest CT showed no signs of pneumonia.

Due to diffusely diseased, calcified RCA, it was impossible to cross the multiple lesions with different coronary wires. Having in mind the fact that the patient was without any difficulties in the meantime, the further procedure was stopped. Recoronarography of the left coronary artery revealed a large fusiform LAD aneurysm in the mid-LAD segment, extending between the first and the second diagonal branch (Fig. 4).

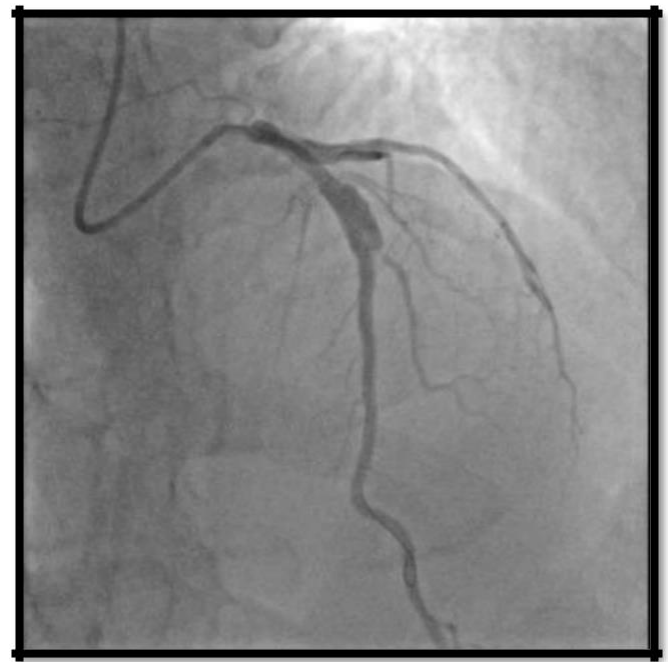


Figure 4. Recoronarography of the left anterior descending artery showing a large aneurysm in the mid segment, between two diagonal branches

Due to further evaluation of the visualized aneurysm, optical coherence tomography (OCT) was performed. OCT showed an insignificant malapposition on the proximal stent edge, with satisfying expansion index overall. The largest diameter of the aneurysm was 4.7 mm. There were no signs of possible stent fracture, but with accessory finding of nodular calcifications in the stented segment. Also, there were no leukocyte groups detected in the stented area (Fig. 5).

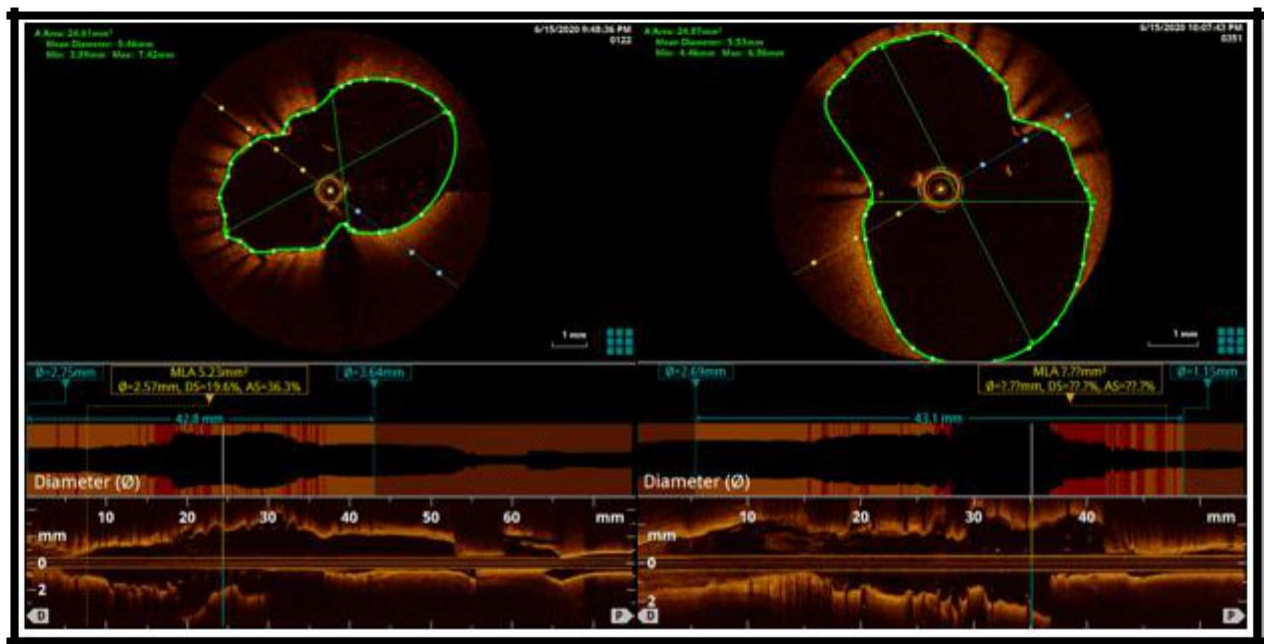


Figure 5. Cross-sectional and longitudinal view of mid-LAD coronary aneurysm visualized by optical coherence tomography (OCT)

The patient was presented to the council of interventional cardiologists and cardiac surgeons. Because the patient was asymptomatic, had no comorbidities, without steady evidence of procedure-caused aneurysm, and with a serious risk of periprocedural complications, the decision at that moment was to continue with optimal medical therapy.

After two months, the patient was still without symptoms. Control chest CT showed no pathological findings except bilateral apical fibrosis. The quantitative serology test was repeated and the patient was still positive for SARS-CoV-2 IgG antibodies. Cardiac magnetic resonance was performed to evaluate possible myocardial viral involvement. Oedema on T2 and STIR sequences, as well as the presence of LGE phenomenon were seen in the apical segments of the myocardium. Subendocardial zones of edema and LGE were also registered in proximo-medial segments of inferior parts of the myocardium indicating a subendocardial ischemic lesion with preserved viability (**Fig. 6**). T1 and T2 mapping revealed prolonged T2 and native T1 times in basal anterior and anterior-lateral segments (**Fig. 7**).

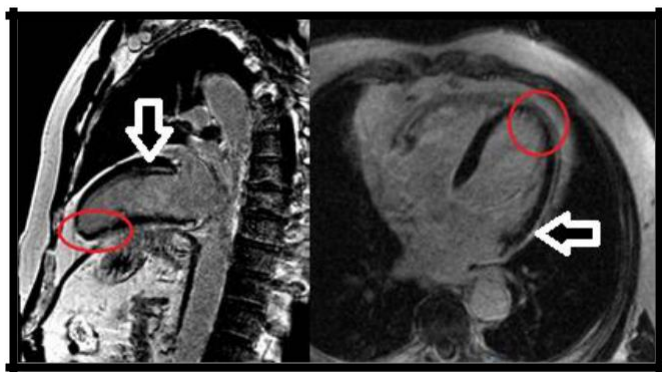


Figure 6. Zones of edema on T2 and STIR sequences, and LGE phenomenon pointing out possible inflammatory myocardial involvement

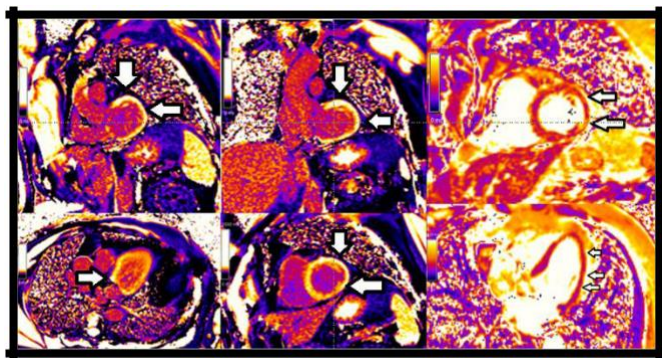


Figure 7. High intensity signal on T1 and T2 mapping (prolonged T2 and native T1 times) pointing out myocardial oedema in basal anterior and anterior-lateral segments highly suspectable for myocardial inflammation in COVID infection

4. DISCUSSION

Certain studies have shown a large percentage of patients with cardiovascular manifestations within COVID-19 infection. A recent study by Puntmann et al. revealed cardiac involvement on CMR in 78% and ongoing myocardial inflammation in 60% of the COVID-19 recovered patients [5]. Hyperinflammatory syndrome within COVID-19 infection, with features that are similar to those of Kawasaki disease, has been described in children, with a few cases in adults with typical symptoms, but without coronary artery aneurysms being formed [4, 6]. Angiographically registered large LAD aneurysm has been described 27 days after the onset of symptoms. The lab test results at that moment revealed highly increased CRP, ferritin, LDH, hyponatremia, neutrophilia, and lymphopenia which all could point out the hyperinflammatory syndrome within COVID-19 infection, considering the patient was positive for SARS-CoV-2 IgG antibodies afterward. The diagnostic criteria for Kawasaki disease are based on signs and symptoms including high fever for at least 5 days plus rash, bilateral nonexudative conjunctivitis, oral changes, extremity changes, cervical lymphadenopathy or fever plus fewer criteria with coronary aneurysms [7]. Hyponatremia, as registered in our patient, is more common in Kawasaki disease patients with higher CRP, longer duration of fever, neutrophilia, and it could be a predictor of the formation of giant coronary aneurysms [8]. Coronary artery aneurysms usually develop early in the acute phase of Kawasaki disease and they rarely develop more than 4 weeks after disease onset [9].

The patient didn't have positive PCR test, but he was admitted to the hospital with the finding of specific IgG antibodies, still present after 2 months with certain suspected minimal deviations in laboratory test results. With currently available data, SARS-CoV-2 IgG antibodies develop between 6-15 days post disease onset and have been detectable in 79.8% of patients from day-15 after onset. Detectable levels may remain over the course in 80% of the cases until day 49 [10].

The finding of prolonged T2 and native T1 times on T1 and T2 mapping in basal anterior and anterolateral segments is highly suspicious for typical myocardial inflammation in COVID infection, as presented by Puntmann et al. [5]. Most of these patients had signs of myocardial inflammation in areas of the interventricular septum, anterior, anterior-lateral, and inferior wall at the base and mid-chamber.

Technical aspects of the PCI procedure should also be considered. The overall percentage of complications with DES has been decreased, while the incidence of coronary aneurysms after PCI with DES ranges from 0.8 to 1.3 % [11, 12]. Two second-generation drug-eluting stents with biodegradable polymer were used, there were 4 balloon inflations during the pre-dilation and two inflations during optimization, but on the lower values of pressure from the maximum. The OCT study showed an

optimal expansion index, without visualized dissections and with an appropriate stent diameter measured by external elastic lamina OCT protocol. Early development of CAA is mainly observed as a consequence of mechanical problems during the complicated procedures including large dissections, contained perforation, or even rupture, which have not been observed during our case.

5. FOLLOW-UP

The patient was referred to the hospital 4 months after the initial procedure due to occasional chest pain and fatigue in the last 30 days. Another coronary angiography was performed, without any significant changes to the previous findings. The patient was, once again, presented to the council of interventional cardiologists and cardiac surgeons who've decided to perform CABG in a 6-month period.

6. DISCLOSURES

The authors state that no relationship with industry exists.

7. FUNDING STATEMENT

The funders had no role in preparation of the manuscript or decision to publish. The authors received no specific funding for this work.

8. CONCLUSION

This case illustrates potential extrapulmonary cardiac manifestation caused by SARS-CoV-2 virus that can significantly affect patient's further prognosis. Cardiac magnetic resonance can be helpful in the evaluation of possible myocardial inflammation in patients with COVID-19, providing proof of direct or indirect viral involvement. In a current lack of reliable evidence and possible predictors for future complications in patients with COVID-19, an individual approach is of great importance for the treatment.

We declare no competing interests.

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Article Citation:

Authors Name. Viseslav Popadic. POST-PCI LAD ANEURYSM IN A SARS-COV2 IgG POSITIVE PATIENT. SJC2020; 2(1): 15-20

DOI: <https://doi.org/10.5281/zenodo.7229600>