

Journal Pre-proof

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Complication of Late Presenting STEMI due to Avoidance of Medical Care during COVID-19 Pandemic

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Keywords

STEMI; Myocardial infarction; Complication; COVID-19

Abbreviations

COVID-19 = Coronavirus disease 2019

SARS CoV-2 = Severe acute respiratory syndrome coronavirus 2

MI = Myocardial infarction

STEMI = ST-elevation myocardial infarction

PCI = Percutaneous coronary intervention

LAD = Left anterior descending artery LAD

CCU = Coronary care unit

Abstract

Patients are avoiding hospitals for fear of contracting SARS-CoV-2. We are witnessing a reemergence of rare complications of myocardial infarctions (MI) due to delayed revascularization. Herein, we describe a case of hemorrhagic pericarditis from thrombolytics administered to a patient with late presenting MI.

History of presentation

A 69-year-old male presented to an outside hospital with exertional chest pain of unknown duration. Vitals on admission: BP 99/71 HR 66 O2Sat: 97% on RA

Physical examination: on general appearance he was in distress due to pain, JVD 2 cm above clavicle, chest were clear bilaterally, regular heart sounds, S1/S2 audible, no murmurs.

Extremities were warm with trace edema bilaterally.

Past Medical History

Hypertension, hyperlipidemia, abdominal aortic aneurysm of 2.7 cm, uncontrolled diabetes and 1 pack-year tobacco use.

Differential Diagnosis

Acute coronary syndrome

Investigation

Electrocardiogram revealed a posterior STEMI (Figure 1) for which he received tenecteplase, clopidogrel and aspirin. He was airlifted to our hospital for coronary angiography due to ongoing chest pain and persistent ST elevation. Angiography revealed a left-dominant system with a culprit 100% thrombotic occlusion of the left circumflex coronary artery and a non-culprit 90% proximally diseased left anterior descending artery (LAD) (Figure 2 and Figure 3, Video 1 and Video 2). Although we were able to wire past the lesion, balloon angioplasty was unsuccessful due to extensive thrombus burden.

Management

An intra-aortic balloon pump was inserted, and he was transfer to the coronary care unit (CCU) for medical management of STEMI. Transthoracic echocardiography revealed a left ventricular ejection fraction of 25% (Video 3) and a small circumferential pericardial effusion with visible

thrombus (Figure 4, Video 4). On further inquiry about the duration of symptoms, he admitted having chest pain for the last six days but had been avoiding seeking medical care due to ongoing pandemic. He was diagnosed with hemorrhagic pericarditis after treatment of MI with tenecteplase. For his STEMI he was managed with aspirin 81mg daily and ticagrelor 90mg twice daily. Anticoagulation was avoided and the intra-aortic balloon pump was removed next day. He tested negative for COVID-19.

Discussion

Coronavirus disease 2019 (COVID-19) syndrome triggered a global pandemic with over three million confirmed cases to-date. Hospital systems worldwide have instituted emergency protocols to limit the spread of this pandemic, and some have transitioned to fibrinolytics for initial management of MI including STEMI (1). Although STEMI presentations are on the decline because patients are afraid of hospital contact (2-4), delayed revascularization poses a challenge due to reemergence of rare MI-related complications.

A study from China reported that patients with STEMI delayed seeking help from fear of COVID-19 (2). Italy also revealed a decrease in MI admissions for the last several months when compared to the same timeframe in the prior year (3). Moroni et al (5), described complications of STEMI in three Italian patients who avoided the hospital because of COVID-19. One US study observed a 38% reduction of STEMI activations during the early phase of the pandemic (4). Multiple studies corroborate that public fear of contracting SARS CoV-2 is leading to a decline in timely presentation of MI patients (2-4). This phenomenon has been reported before in the SARS CoV-1, and H1N1 pandemics of 2003 and 2009, respectively (6). Our patient reported avoiding early medical care due to fear of acquiring COVID-19 in the hospital. One study

suggests a significant increase in mortality during ongoing pandemic that is not fully explained by COVID-19 deaths alone (3). This raises the question of whether some patients died from undiagnosed MI.

The incidence of MI related complications increases with delayed presentations and management (7). In addition to the common sequelae of MI (i.e., arrhythmia and heart failure), rare complications such as papillary muscle rupture, ventricular septal rupture, and pericarditis can develop from delayed management.⁸ Streptokinase trials from the early 1990s revealed that the incidence of early post-infarction pericarditis (first 2-5 days post MI) was 20%, with a decline to 6% after thrombolytics, and 4% after primary PCI; generally a pericardial effusion is not present in this group of patients (8). Late pericarditis (i.e., Dressler's syndrome) develops 1 week after MI and has an incidence of 3% in the pre-revascularization era that has decreased to 0.1%; (8) in the current age. Diagnosis can be made from symptoms, diffuse ST elevations on electrocardiography, and a pericardial effusion on echocardiography (8). The risk of Dressler's syndrome is increased after early post-MI pericarditis.⁸ Risk factors include late presentation (>6 hours) and primary PCI failure (Odds ratio 2.8), both of which are expressions of reduced myocardial salvage or failed revascularization (8). Our patient's course was complicated by hemorrhagic pericardial effusion likely from thrombolytics and an underlying inflamed pericardium. Hemorrhagic pericarditis has been described in case reports in patients with large transmural MI receiving thrombolytics as early as two hours after the institution of therapy (9). This complication usually evolves into tamponade with hemodynamic instability requiring pericardiocentesis (9). Fortunately, our patient's small pericardial effusion did not require invasive therapy, and was managed with avoidance of anticoagulation during his CCU stay.

Prompt coronary vascular reperfusion has decreased the incidence of rare MI complications, and has improved mortality (7). In pre COVID-19, ~13% of STEMI in the US are managed with fibrinolytic-focused reperfusion strategies, mostly in geographically isolated areas (1). In the COVID-19 era, the American College of Cardiology still recommends PCI as the standard of care for STEMI (10). However, emergency departments are facing delays in triaging patients, and similarly cardiac catheterization laboratory activations are slowed due to extra steps required to ensure safety of staff (2). In PCI-capable centers, immediate fibrinolytic administration in the emergency department may mitigate systems-based delays. However, hemorrhagic pericarditis could represent a caveat to this eminent and needed strategy, especially in delayed MI cases.

Follow-up

Echocardiography after six days showed resolution of hemorrhagic pericardial effusion. He underwent successful staged percutaneous coronary intervention (PCI) of LAD lesion on the tenth day, and transferred to the cardiology wards before discharge on hospital day 19.

Conclusion

With the progression of this global pandemic, management of MI with thrombolytics or delayed reperfusion strategies may show a reemergence of rare complications such as post-MI pericarditis. This will be further exacerbated by patients who avoid medical care due to fear of contracting SARS-CoV-2. Hemorrhagic pericarditis is a rare entity precipitated by thrombolytics in late presenting MI which may lead to deleterious outcomes. Healthcare providers should continue educating patients to recognize life-threatening cardiovascular symptoms and seek timely care to avoid serious complications.

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Learning Objectives

- To recognize the reemergence of rare complications of MI from delayed presentation and management during the COVID-19 pandemic.
- To acknowledge patient fears of acquiring SARS CoV-2 and subsequent delay in seeking timely medical care for MI.

- References

1. Daniels MJ, Cohen MG, Bavry AA, Kumbhani DJ. Reperfusion of STEMI in the COVID-19 Era - Business as Usual? *Circulation*. 2020. doi:10.1161/circulationaha.120.047122
2. Tam CCF, Cheung KS, Lam S, et al. Impact of Coronavirus Disease 2019 (COVID-19) Outbreak on ST-Segment-Elevation Myocardial Infarction Care in Hong Kong, China. *Circ Cardiovasc Qual Outcomes*. 2020;13(4). doi:10.1161/CIRCOUTCOMES.120.006631
3. De Filippo O, D'Ascenzo F, Angelini F, et al. Reduced Rate of Hospital Admissions for ACS during Covid-19 Outbreak in Northern Italy. *N Engl J Med*. April 2020;NEJMc2009166. doi:10.1056/NEJMc2009166
4. Garcia S, Albaghdadi MS, Meraj PM, et al. Reduction in ST-Segment Elevation Cardiac Catheterization Laboratory Activations in the United States during COVID-19 Pandemic. *J Am Coll Cardiol*. 2020. doi:10.1016/j.jacc.2020.04.011
5. Moroni F, Gramegna M, Ajello S, Baldetti L, Vilca LM. Collateral damage: medical care avoidance behavior among patients with acute coronary syndrome during the COVID-19 pandemic. *JACC Case Reports*. 2020. doi:10.1016/j.jaccas.2020.04.010
6. Yeung NCY, Lau JTF, Choi KC, Griffiths S. Population responses during the pandemic phase of the influenza A(H1N1)pdm09 epidemic, Hong Kong, China. *Emerg Infect Dis*. 2017;23(5):813-815. doi:10.3201/eid2305.160768
7. Patel MR, Calhoon JH, Dehmer GJ, et al. ACC/AATS/AHA/ASE/ASNC/SCAI/SCCT/STS 2016 Appropriate Use Criteria for Coronary Revascularization in Patients With Acute Coronary Syndromes: A Report of the

- American College of Cardiology Appropriate Use Criteria Task Force, American Association for Thorac. *J Am Coll Cardiol*. 2017;69(5):570-591.
doi:10.1016/j.jacc.2016.10.034
8. Imazio M, Negro A, Belli R, et al. Frequency and Prognostic Significance of Pericarditis Following Acute Myocardial Infarction Treated by Primary Percutaneous Coronary Intervention. *Am J Cardiol*. 2009;103(11):1525-1529. doi:10.1016/j.amjcard.2009.01.366
 9. Renkin J, De Bruyne B, Benit E, Joris JM, Carlier M, Col J. Cardiac tamponade early after thrombolysis for acute myocardial infarction: A rare but not reported hemorrhagic complication. *J Am Coll Cardiol*. 1991;17(1):280-285. doi:10.1016/0735-1097(91)90739-V
 10. Mahmud E, Dauerman HL, Welt FG, et al. Management of Acute Myocardial Infarction During the COVID-19 Pandemic. *Catheter Cardiovasc Interv*. 2020.
doi:10.1002/ccd.28946

Figure legends**Figure 1**

Twelve-lead electrocardiogram showing 4mm horizontal ST depression in V1-V3, tall broad R wave (>30 ms) in V1-V3 and upright T wave in V3. A 2mm ST elevation in II, aVF and V6. Compatible with inferior-lateral-posterior STEMI.

Figure 2

Coronary angiogram, LAO caudal view showing a culprit 100% occlusion of the left circumflex coronary artery (red arrow) and a non-culprit left anterior descending artery with 90% proximal stenosis (white arrow).

LAO: left anterior oblique

Figure 3

Coronary angiogram, RAO view showing a culprit 100% occlusion of the left circumflex coronary artery (red arrow) and a non-culprit left anterior descending artery with 90% proximal stenosis (white arrow).

RAO: right anterior oblique

Figure 4 (Central Figure)

2-D Transthoracic echocardiogram. Subcostal view showing small pericardial effusion with visible thrombus (arrow), suggestive of hemorrhagic pericarditis.

RA: right atrium; RV: right ventricle; LA: left atrium; LV: left ventricle

Video 1

Coronary angiogram, LAO caudal view showing a culprit 100% occlusion of the left circumflex coronary artery and a non-culprit left anterior descending artery with 90% proximal stenosis.

LAO: left anterior oblique

Video 2

Coronary angiogram, RAO view showing a culprit 100% occlusion of the left circumflex coronary artery and a non-culprit left anterior descending artery with 90% proximal stenosis.

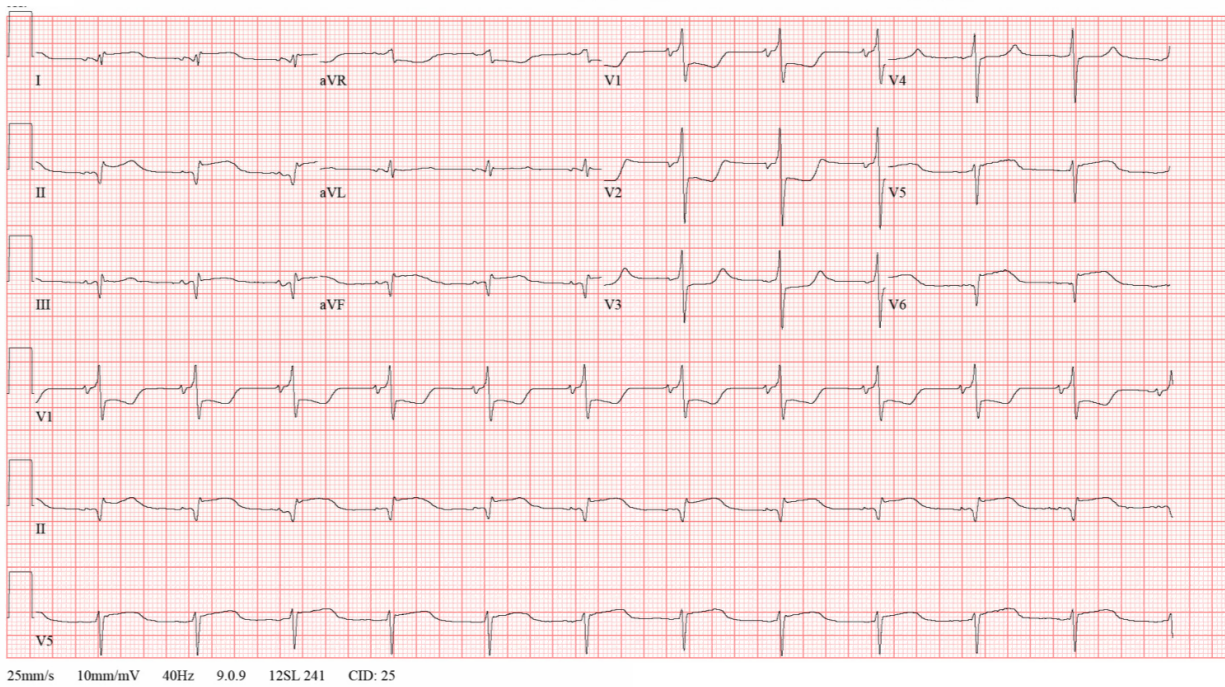
RAO: right anterior oblique

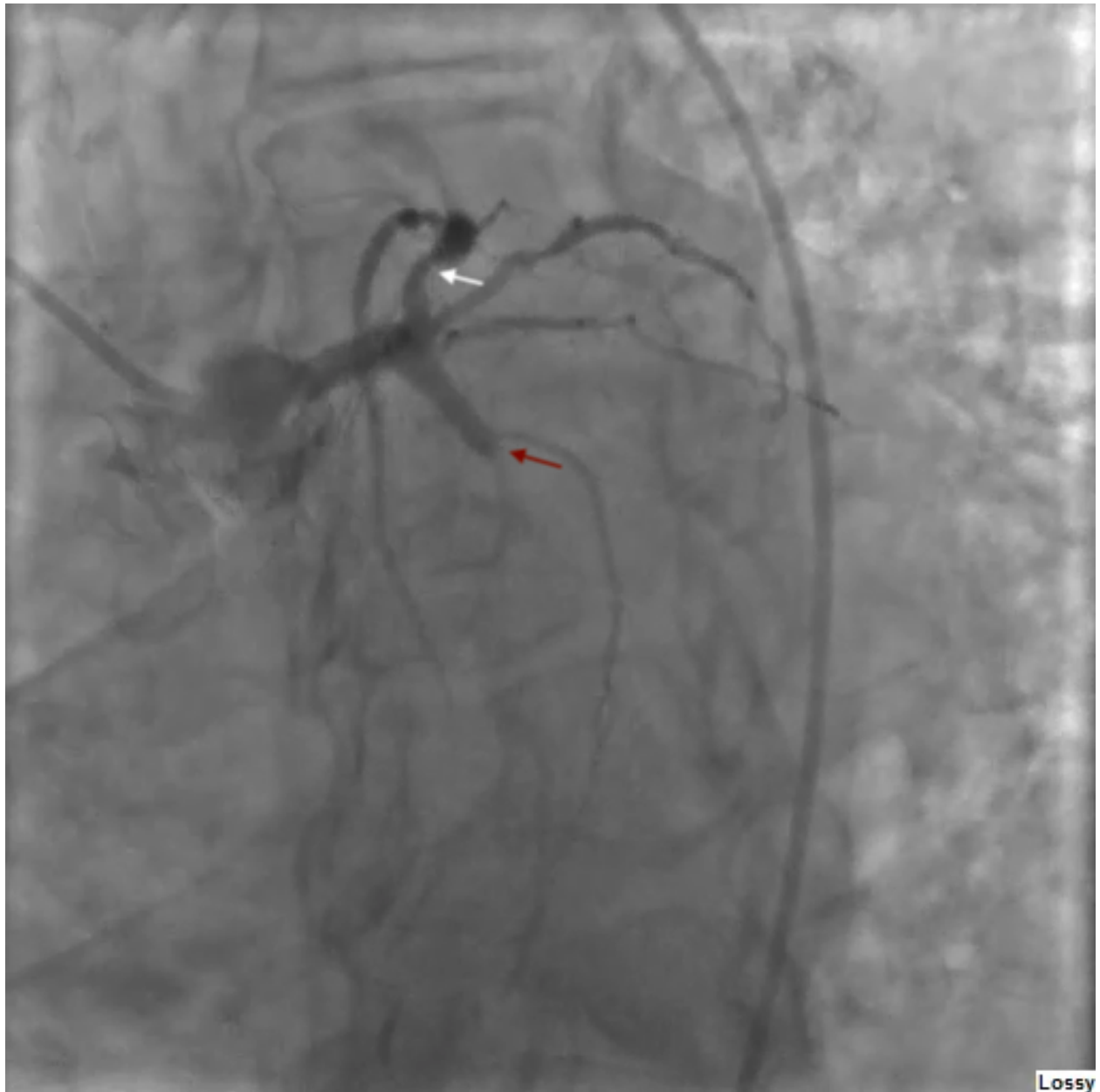
Video 3

2-D Transthoracic echocardiogram. Apical four-chamber view showing a 1.9 cm circumferential pericardial effusion and left ventricular ejection fraction of 25%.

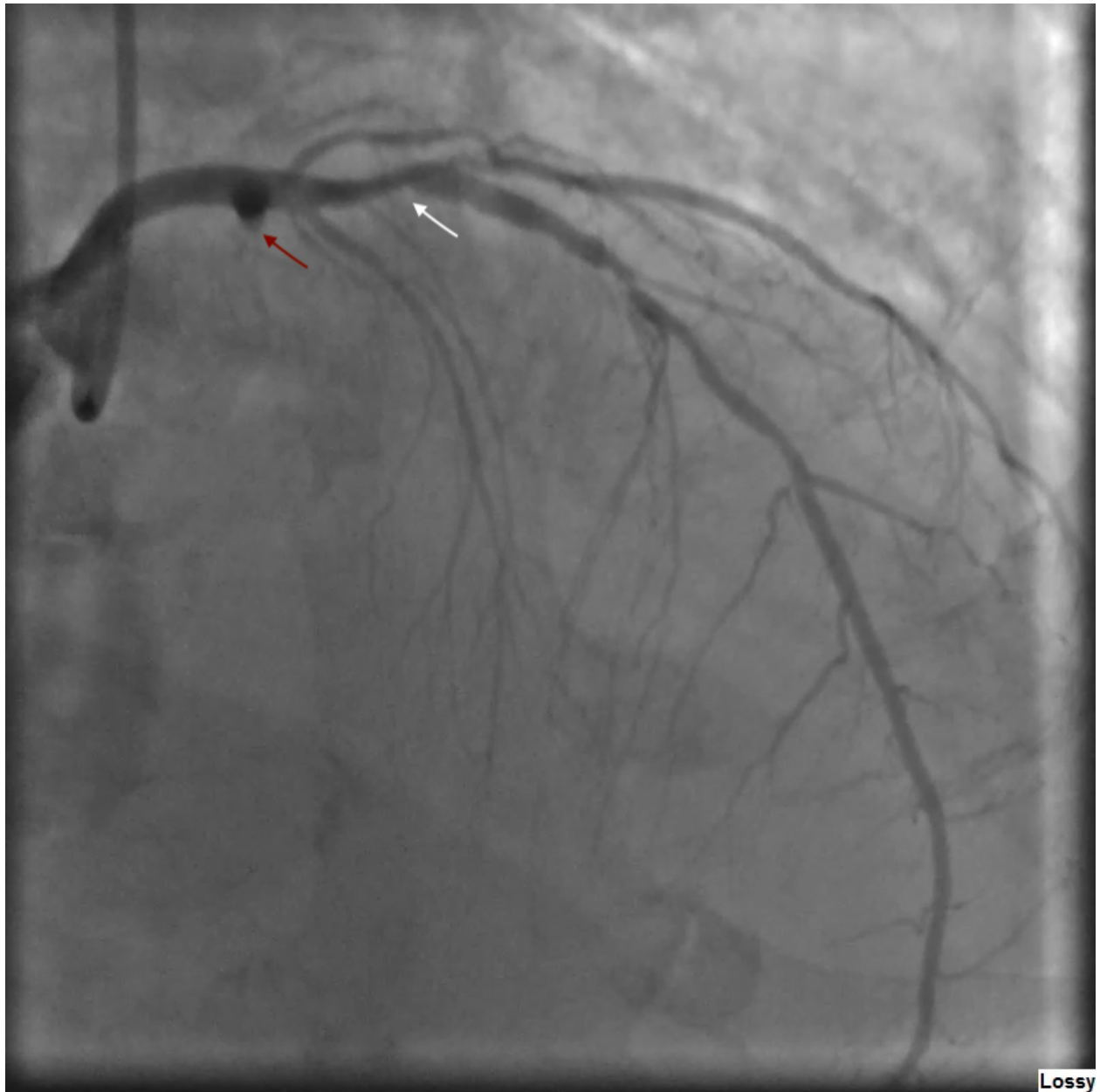
Video 4

2-D Transthoracic echocardiogram. Subcostal view showing a 1.9 cm circumferential pericardial effusion with visible thrombus, suggestive of hemorrhagic pericarditis.





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