CASE REPORT

Dobutamine stress echocardiogram-related in-stent thrombosis with acute myocardial infarction

Puneet Gupta,¹ Anand Chockalingam²¹Division of Cardiovascular Medicine, University of Missouri Health Care, Columbia, Missouri, USA²Division of Cardiovascular Medicine, University of Missouri Health Care, Columbia, Missouri, USA**Correspondence to**Dr Puneet Gupta,
puneetgupta1109@gmail.com

Accepted 24 December 2018

SUMMARY

Dobutamine stress echocardiogram (DSE) is considered a safe and reliable method for screening for underlying myocardial ischaemia. We report a case of a 60-year-old man who developed inferior ST-segment elevation myocardial infarction within 30 minutes of a normal DSE. The patient was found to have a 99% in-stent restenosis in the mid-right coronary artery with significant thrombosis for which successful percutaneous coronary intervention (PCI) was performed. Acute coronary syndrome after a normal DSE has been rarely reported in the literature. The reported cases were found to have obstructive or non-obstructive coronary plaques with overlying thrombus, which suggests plaque destabilisation and rupture as the possible underlying mechanism behind coronary occlusion.

BACKGROUND

Acute myocardial infarction (MI) within a few hours after dobutamine stress echocardiogram (DSE) represents a very rare complication of this procedure. Physicians should be aware of this complication given its potential serious consequences and amenability to treatment on timely recognition.

CASE PRESENTATION

A 60-year-old Caucasian man was referred to our echocardiography laboratory for a DSE ordered for preoperative evaluation before the elective intervention of a right superficial femoral artery occlusion. His medical history was significant for coronary artery disease (CAD) with an inferior ST-segment elevation MI (STEMI) 5 years ago that was treated with percutaneous coronary intervention (PCI) and thrombus extraction in the right

Figure 2 Coronary angiography showing 99% in-stent restenosis of mid-right coronary artery with significant thrombosis.

coronary artery (RCA). Other medical comorbidities included a 60-pack-year history of smoking, chronic obstructive pulmonary disease (COPD), statin-induced myalgias, type 2 diabetes mellitus and polycythaemia.

Baseline ECG prior to the start of DSE showed sinus rhythm with inferolateral Q waves. Resting echocardiographic images suggested normal left ventricular (LV) size and systolic function with left ventricular ejection fraction (LVEF) of 60%. He achieved 88% of age-predicted heart rate with dobutamine infusion. There was no evidence of new LV regional wall motion abnormalities with low and peak dose dobutamine infusion. Appropriate reduction in LV size and augmentation in LV function were noted. No significant ECG changes were seen at peak stress. The patient reported mild chest pressure at peak stress that spontaneously resolved within a minute of stopping dobutamine infusion. As no further monitoring was indicated, the patient was discharged home in stable condition.

OUTCOME AND FOLLOW-UP

The patient noted significant retrosternal chest discomfort on walking to his car and reported to the emergency department 30 minutes later for further evaluation. His 12-lead ECG in the emergency department showed inferior STEMI (figure 1), which resulted in prompt activation of

Figure 1 The 12-lead ECG in the emergency room showing inferior ST-segment elevation myocardial infarction. aVR = augmented Vector Right, aVL = augmented Vector Left, aVF = augmented Vector Foot

© BMJ Publishing Group Limited 2019. No commercial re-use. See rights and permissions. Published by BMJ.

To cite: Gupta P, Chockalingam A. *BMJ Case Rep* 2019;**12**:e228080. doi:10.1136/bcr-2018-228080

the catheterisation laboratory. He was found to have a 99% in-stent restenosis in the mid-RCA with significant thrombosis (figure 2). Intravascular ultrasound (IVUS) was not performed and RCA PCI was successful. He was discharged home in a stable condition after completion of an uneventful 48 hour monitoring period in the cardiology inpatient unit. On follow-up in a clinic within a week after discharge, he was doing well without any symptoms.

DISCUSSION

Acute MI within a few hours after normal DSE has been rarely reported in the literature. Very similar to our case, Elhendy *et al* reported a 52-year-old male patient who developed acute inferior STEMI 2 hours after a normal DSE.¹ The authors postulated that high shear stress may result in destabilisation of a complex plaque with subsequent thrombotic occlusion, despite the absence of a flow-limiting lesion at the time of DSE.

There have been some case reports of acute MI within 30 min after a negative exercise stress test. Al-Alawi *et al* described a case of a 48-year-old man who presented with acute antero-septal MI within 30 min of a negative exercise stress test.² This patient was successfully treated with thrombolysis followed by thrombus aspiration and balloon angioplasty at a tertiary centre. Other case reports reporting acute MI after negative exercise stress tests were also treated with systemic or intracoronary thrombolysis.^{3–5} Shah *et al* reported the case of a 68-year-old man who developed acute STEMI within 6 min of regadenoson infusion during a pharmacological stress test.⁶ The authors attributed this to coronary steal phenomenon from regadenoson.

Although the exact mechanism behind the occurrence of acute MI after these negative stress tests remains unclear, several hypotheses have been put forward. There have been some studies which have suggested that strenuous exercise may increase the risk of arterial thrombogenesis in healthy male volunteers.⁷ Even low-grade exercise can transiently increase whole blood platelet aggregability in patients with obstructive CAD and may increase the risk of thrombosis.⁸ This is in agreement with the finding of coronary thrombosis during angiography in these patients, which was also noted in our case subsequent to dobutamine infusion. Hofman *et al* reported an interesting case of a 53-year-old man who developed mid-circumflex occlusion postexercise single-photon emission computed tomography (SPECT) stress testing, presumably due to discontinuation of heparin which was initiated after hospital admission for chest pain.⁹

Coronary vasospasm has also been postulated to play a role in causing myocardial ischaemia from dobutamine. This was suggested by a case of a 70-year-old man who developed angina, inferior ST-segment elevation and inferobasal hypokinesis on DSE.¹⁰ Subsequent coronary angiography only showed 20%–30% stenosis of the RCA.

In our case, the clinical timeline and imaging features suggest that DSE contributed to endothelial shear stress, plaque rupture and acute in-stent thrombosis. Although the occurrence of acute coronary syndromes (ACSs) after dobutamine administration

during stress testing may be coincidental, clinicians should be aware of the possible occurrence of such rare complications and should educate patients when ordering stress tests. Patients should be instructed to seek immediate medical attention if they develop chest discomfort within a few hours of the test. ACS should be entertained in the differential diagnosis when a patient presents with acute chest discomfort within a few hours to days after a normal DSE.

Learning points

- ▶ Acute myocardial infarction within a few hours after dobutamine stress echocardiogram represents a very rare complication of this procedure.
- ▶ The reported cases were found to have obstructive or non-obstructive coronary plaques with overlying thrombus, which suggests plaque destabilisation and rupture as the possible underlying mechanism behind coronary occlusion.
- ▶ Physicians should be aware of this complication given its potential serious consequences and amenability to treatment on timely recognition.

Contributors PKG was involved in planning, writing and revising all sections of the article, interpretations of the tests and collecting information and data of all relevant portions of the case. AC was involved in editing/reviewing/revising all sections of the article, interpretations of the images of DSE and ECG as well as the conception of the article.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Elhendy A, Ginete W, Shurmur S, *et al*. Acute myocardial infarction after a negative dobutamine stress echocardiogram. *Eur J Echocardiogr* 2004;5:469–71.
- 2 Al-Alawi AM, Janardan J, Peck KY, *et al*. Acute antero-septal myocardial infarction after a negative exercise stress test. *Sultan Qaboos Univ Med J* 2016;2016:238–41.
- 3 Capezzuto A, Achilli A, Pontillo D, *et al*. Acute myocardial infarction shortly after a normal exercise stress test. Case reports. *Angiology* 1995;46:521–6.
- 4 Zargar PA, Dar SH, Dar IH, *et al*. Acute myocardial infarction after a normal exercise stress test: a case report. *Acta Medica Saliniana* 2009;38:91–5.
- 5 Kurata C, Sakata K, Taguchi T, *et al*. Acute myocardial infarction shortly after negative exercise test and reperfusion by intracoronary thrombolysis. *Jpn Circ J* 1989;53:1382–8.
- 6 Shah S, Parra D, Rosenstein RS. Acute myocardial infarction during regadenoson myocardial perfusion imaging. *Pharmacotherapy* 2013;33:e90–5.
- 7 Cadroy Y, Pillard F, Sakariassen KS, *et al*. Strenuous but not moderate exercise increases the thrombotic tendency in healthy sedentary male volunteers. *J Appl Physiol* 2002;93:829–33.
- 8 Andreotti F, Lanza GA, Sciahbasi A, *et al*. Low-grade exercise enhances platelet aggregability in patients with obstructive coronary disease independently of myocardial ischemia. *Am J Cardiol* 2001;87:16–20.
- 9 Hofman MS, Keighley C, Wayne VS, *et al*. False-negative myocardial perfusion scintigraphy possibly as a result of administration of low-molecular-weight heparin. *Clin Nucl Med* 2007;32:70–2.
- 10 Kardaras FG, Bonou MS, Kardara DF, *et al*. Dobutamine-induced transmural myocardial ischemia in a patient with mild coronary lesions. *Clin Cardiol* 1996;19:149–51.

Copyright 2018 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <https://www.bmj.com/company/products-services/rights-and-licensing/permissions/>
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow