CASE REPORT

Double jeopardy: two major complications of a myocardial infarction in one patient

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Accepted 19 June 2015

SUMMARY

A 62-year-old woman with no cardiac history was admitted to the hospital with an ambulant inferoposterolateral myocardial infarction. She experienced two major complications, namely, a free-wall rupture of the infarcted area, on which a bovine pericardial patch was glued surgically, and, a few days later, a posteromedial papillary muscle rupture, for which a mitral valve replacement was performed. She survived both complications and is now rehabilitating at home.

BACKGROUND

This case shows two major complications of an untreated ST-elevation myocardial infarction in one patient. It shows the importance of early reperfusion; improvements in reperfusion therapy in the recent years have resulted in a major reduction in the incidence of mechanical complications of myocardial infarctions. It also shows the value and outstanding video quality of transoesophageal echocardiography when imaging the mitral valve. Furthermore, it has educational value with regard to blood supply of the papillary muscles.

CASE PRESENTATION

A 62-year-old woman with no cardiac history was brought by ambulance to the coronary care unit (CCU) with an ambulant inferoposterolateral myocardial infarction, 3 days earlier. The ECG showed widespread ST-elevation, indicating a large area of myocardium was affected (figure 1). Coronary angiography showed an occluded right coronary artery (RCA)—1 vessel disease, segment 2. Initially, the duration of chest pain was unknown, therefore percutaneous coronary intervention of the RCA (with a drug-eluting stent) was performed. Because of persisting haemodynamic compromise, an echocardiogram was made, which showed pericardial effusion with signs of tamponade, including thrombus in the pericardial space (figure 2, videos 1 and 2).

Figure 1 ECG showing the inferoposterolateral myocardial infarction.

Figure 2 Transthoracic echocardiogram showing pericardial effusion with a thrombus on the right ventricle free wall (still frame).

Emergency surgery showed a haemopericardium with two free wall ruptures, apical inferior, on which a bovine pericardial patch was glued, with success. The patient recovered well on the ward, and after mobilising without problems, she was scheduled for discharge 7 days after admission.

On day 7, she suddenly went into shock. Transthoracic and, later, transoesophageal echocardiography showed severe mitral regurgitation due to rupture of the posteromedial papillary muscle with flail of the posterior mitral valve leaflet (P2) (figure 3, videos 3–5). The patient was admitted to the intensive care unit (ICU), and an intra-aortic balloon pump was inserted for haemodynamic support. On day 12, successful mitral valve replacement was performed (Carbomedics Optiform mechanical valve—29 mm) (videos 6 and 7). This was complicated by an aortic arch rupture during decannulation, which was successfully repaired.

Video 1 Transthoracic echocardiogram showing the short axis of the pericardial effusion with a thrombus on the right ventricle free wall.

To cite: Selder J,
Riezebos R. *BMJ Case Rep*
Published online: [please
include Day Month Year]
doi:10.1136/bcr-2015-
210222

Video 2 Transthoracic echocardiogram showing the subcostal view of the pericardial effusion with a thrombus on the right ventricle free wall.

Video 4 Colour transoesophageal echocardiogram showing the posteromedial papillary muscle rupture, with severe mitral valve regurgitation due to flail of the posterior mitral valve leaflet.

Figure 3 Transoesophageal echocardiogram showing the posteromedial papillary muscle rupture with flail of the posterior mitral valve leaflet (still frame).

Video 5 3D transoesophageal echocardiogram showing the posteromedial papillary muscle rupture, with flail of the posterior mitral valve leaflet.

After a prolonged ICU stay of 30 days, the patient was discharged to the ward with severe left ventricular dysfunction.

OUTCOME AND FOLLOW-UP

After discharge from the ICU, the patient recovered on the ward and was discharged from the hospital on day 55. Now, 3 months later, she is home and visits a specialised cardiac rehabilitation a few times per week, to improve her condition.

DISCUSSION

There are three major mechanical complications of an acute myocardial infarction: rupture of the left ventricular free wall,

rupture of the interventricular septum and mitral regurgitation; all with high mortality. Swift diagnosis and subsequent surgical treatment can be lifesaving.^{1 2}

Our patient experienced two of the three complications, in serial order, when she was admitted to the hospital with a large ambulant inferoposterolateral myocardial infarction. The proximal RCA (segment 2) was occluded in a right dominant system and the other coronaries showed only mild wall irregularities. Reperfusion was delayed due to late presentation and there was widespread ST-elevation on the presentation ECG, indicating a large area of infarction. This, in combination with a single occluded vessel with no collaterals, probably explains the free

Video 3 Transoesophageal echocardiogram showing the posteromedial papillary muscle rupture, with flail of the posterior mitral valve leaflet.

Video 6 Transoesophageal echocardiogram showing the replaced mechanical mitral valve (Carbomedics Optiform 29 mm).

Video 7 Colour transoesophageal echocardiogram showing the replaced mechanical mitral valve (Carbomedics Optiform 29 mm). No mitral regurgitation is seen.

wall rupture.³ A rupture develops due to a tear caused by the systolic pressure and shear stress in the border zone of the akinetic infarcted area, and of the normo or hyperkinetic viable area.⁴

The second rupture concerned the posteromedial papillary muscle. This sometimes multiheaded muscle is supplied by blood from a single coronary artery, the RCA. This is in contrast

Patient's perspective

- ▶ On a Thursday, 3 days before admission, I got ill and experienced chest pain with shortness of breath. I called the general practitioner, who diagnosed me with stomach ache, for which he gave me a 'stomach potion'. I went to bed, but Saturday it was even worse and my brother-in-law called the ambulance. After that it all went very fast: I got a PCI of one of my coronaries and underwent heart surgery. Recovery went extremely well, and after 6 days I was able to walk again, with the physiotherapist's assistance. After exactly a week it got bad again, apparently I had a second complication of my heart. I cannot remember much, but when I woke up in the ICU I had a new heart valve. I felt abandoned and I didn't realise the enormous loss of muscle strength and the long revalidation period that followed.
- ▶ Due to the swift action of my brother-in-law and the good work of the physicians, I am still alive to share my story.

Learning points

- ▶ Improvements in reperfusion therapy in recent years have resulted in a major reduction in the incidence of mechanical complications of a myocardial infarction.
- ▶ Free wall rupture is one of the major and potentially fatal complications of a myocardial infarction, especially when reperfusion therapy is late. Swift diagnosis by means of echocardiography can be lifesaving.
- ▶ The posteromedial papillary muscle is supplied by blood from a single coronary artery, the right coronary artery (RCA). When the RCA occludes, the chance of rupture is more likely compared to that of the anterolateral papillary muscle, which has a double coronary artery blood supply.
- ▶ Transoesophageal echocardiography is of great value when imaging of the mitral valve is needed, and it produces high video quality that is easy to interpret.

to the anterolateral papillary muscle, which has a double coronary artery blood supply, namely the left anterior descending artery and the circumflex artery. This makes rupture of the posteromedial muscle more common. In case of a RCA with no collaterals, an occlusion directly shuts off the blood supply to the posteromedial papillary muscle, which in this case resulted in a complete rupture of the posteromedial papillary muscle.⁵

It is clear from this case that early reperfusion is essential. Improvements in reperfusion therapy in recent years have resulted in a major reduction in the incidence of mechanical complications of a myocardial infarction. Our patient managed to survive, but she remains with severe systolic left ventricular dysfunction, a further complication of a large transmural myocardial infarction and late reperfusion.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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