CASE REPORT

When you hear hoofbeats, think of horses but do not forget the zebras

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SUMMARY

We report a case of a 68-year-old man who was admitted to the department of cardiology with increasing abdominal and chest pain during the day. The prehospital ECG showed clear ST segment elevation in inferior leads. The patient was routed directly to the catheterisation laboratory with acute myocardial infarction as a tentative diagnosis. The coronary angiography showed an occluded right coronary artery that was reopened with a plain old balloon angioplasty procedure. After the procedure, the patient was expected to feel better, but the abdominal pain worsened. The following bedside ultrasound examination was quite surprising.

BACKGROUND

Symptoms of myocardial ischaemia and acute myocardial infarction (AMI) vary with age and gender, and sometimes differ from classic chest pain.¹ In some patients it starts with toothache or pain in the jaw and neck. Others have shortness of breath, nausea or abdominal pain as the main symptom.^{2,3}

Prehospital ECG and point-of-care biomarkers help the cardiologist on call to ensure the correct diagnosis and triage. If the ECG shows signs of myocardial infarction and the patient presents symptoms compatible with AMI, the patient is transferred directly to the catheterisation laboratory for coronary angiography and, if needed, percutaneous coronary intervention.

On admittance, or as soon as possible after the catheterisation procedure, patients are examined with echocardiography. This is to evaluate cardiac function and to examine for pericardial effusion and valvulopathy.

The focus assessed transthoracic echocardiography (FATE) protocol provides a quick overview of the cardiac function and includes a scan of the pleurae. The FATE protocol is easy to learn, is performed quickly,⁴ and can be applied in all possible clinical scenarios,⁵ <http://www.fate-protocol.com>

This case illustrates the clinical importance of a good systematic protocol for bedside ultrasound examination of the critical ill.

CASE PRESENTATION

We present a case of a 68-year-old man with no prior cardiac history and generally healthy except for a history of ileus, for which he had been operated on 4 years earlier. After 12 hours of increasing abdominal and chest pain, he called for an ambulance.

Figure 1 ECG. Note the ST-segment elevations in inferior leads, II, III and aVF (red arrows).

INVESTIGATIONS

The prehospital ECG, transmitted wirelessly from the ambulance to the heart centre, showed clear ST segment elevation in inferior leads, II, III and aVF (figure 1). The patient was therefore routed directly to the catheterisation laboratory with AMI as a tentative diagnosis.

DIFFERENTIAL DIAGNOSIS

Any differential diagnosis to AMI should be kept in mind. However, this patient presented clinical symptoms as well as an ECG compatible with AMI.

Figure 2 Coronary angiography, pre POBA. The semi occluding thrombus is seen as a whitish matter in the right coronary artery (white arrow).

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Figure 3 Coronary angiography, post POBA. The thrombus is now fractionated (white arrow).

TREATMENT

Prehospital the patient was given full antithrombotic pretreatment according to national and international guidelines.

On arrival, the patient reported chest and abdominal pain. His abdomen was sore and tense on palpation, and he was in respiratory distress.

The coronary angiography showed an occluded right coronary artery (figure 2).

In light of a possible competing gastrointestinal problem, the coronary artery was reopened with plain old balloon angioplasty (figure 3). That way, the patient could avoid having the otherwise necessary poststenting anticoagulant medication, which would have complicated any eventual abdominal operation.

This decision proved to be wise.

OUTCOME AND FOLLOW-UP

Postprocedure, the bedside FATE examination at first glance showed a left atrium that seemed almost completely compressed or occluded (figure 4 and video 1). Owing to this compression

Video 1 Apical 4 chamber view. Note again that the left atrium (lower right corner) seems compressed or occluded.

there was only a minor passage through the left atrium, resulting in obstructed blood flow and flow acceleration.

When examining the pleurae, it was soon clear that extensive herniation of the gastrointestinal tract was pushed up through the diaphragm into the thorax, compressing the left atrium.

Pleural projection in mid axillary line in intercostal space 4–5 showed stomach where the lungs should have been found (video 2).

Arterial blood gas revealed an increased lactate level, indicating hypoperfusion or intestinal ischaemia.

Acute CT scans of the thorax and abdomen was performed, showing that most of the gastrointestinal tract, including the entire ventricle, duodenum, and transverse and ascendant colon, was pushed up into the right hemithorax (figures 5 and 6), compressing the heart and the left atrium and pushing the heart forward towards the anterior chest wall.

The patient was transferred to the operation theatre for acute abdominal surgery.

Laparoscopy showed dilated and ischaemic intestines and it was soon decided to convert to open abdominal surgery.

The small intestine and caecum were rotated and pinched in an opening formed by an adhesion between the greater omentum and the small intestine. Owing to extensive intestinal ischaemia, most of the small intestine and caecum had to be removed. Only the oral 80 cm (approximately 30 inches) of the small intestine was found vital.

Figure 4 Parasternal long axis view. Left atrium seems compressed or occluded (white arrows). AO, aorta; LA, left atrium; LV, left ventricle; RV, right ventricle.

Video 2 Ventricle in the thorax.

The patient is now discharged from hospital with a well functioning ileostomy.

However, he suffers from short bowel syndrome.

DISCUSSION

Bedside ultrasound examination alongside standard diagnostic tests is found superior to standard diagnostic testing alone for establishing a correct diagnosis.⁶

As abdominal pain can be part of the symptoms of acute myocardial ischaemia, and chest pain a symptom of hiatus hernia, the FATE examination was crucial for this patient.

On performing the FATE examination, it was immediately clear that the abdominal structures were present in the thorax and that the patient needed acute abdominal surgery.

But the fact that both conditions occurred simultaneously raises the question of whether there is actual interplay between hiatal hernia and coronary artery disease.

In this case, the CT scan showed that the intestines were pushed quite far up into the thorax. The entire heart was pushed forward towards the chest wall and left atrium was compressed by the contents of the abdomen. In theory, that could

Figure 5 CT of the thorax and abdomen. Sagittal view. Note the extensive hiatal herniation of gastrointestinal tract (white arrows).

Figure 6 CT of thorax, coronary view. Note that the hernia is pushing the heart forward towards the anterior chest wall (white arrows).

lead to compression of the coronary arteries as well. Reduced blood flow in the coronary arteries due to this mechanical compression of perhaps already atherosclerotic vessels, can have contributed to the formation of the thrombus in the coronary artery.

On the other hand, experimental studies from as early as the 1930s of dogs and frogs, as well as studies from the 1960s, suggest the existence of a viscerocardiac reflex causing cardiac irregularities such as coronary artery constriction, reflexly from visceral excitation.^{7 8}

In theory, reflex artery constriction from visceral excitation could lead to the closure of the coronary artery and thrombus formation in this present case.

According to a study from 1976, patients with oesophagitis and coexistent ischaemic heart disease can present ECG changes during oesophageal acid perfusion,⁹ and, as late as in 2014, hiatal hernia was reported to be a very rare cause of ST segment elevation in multiple leads, mimicking myocardial infarction, but with no corresponding thrombus found.¹⁰

In summary, it remains uncertain whether there was a correlation between the hiatal hernia and the AMI in this case. However, the ultrasound examination unexpectedly revealed the hernia instantly.

Learning points

- ▶ This case illustrates the value of bedside ultrasound examination as a diagnostic tool. The focus assessed transthoracic echocardiography protocol, which includes a scan of the pleurae, was crucial for this patient.
- ▶ The protocol is easy to learn, is performed quickly, and can be applied in all possible clinical scenarios.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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