

CASE REPORT

CLINICAL CASE

Cardiac Tamponade Due to Intrapericardial Hernia Mimicking ST-Segment Elevation Myocardial Infarction



Tomohiro Abe, MD, PhD,^{a,b} Hiroaki Kijima, MD, PhD,^c Jiro Ohuchida, MD, PhD,^c Yosuke Hisashi, MD,^d Shuji Tachioka, MD,^d Kenshi Iwatani, MD,^a Keisuke Sadohara, MD,^a Tatsunori Ameda, MD,^a Hidenobu Ochiai, MD, PhD^b

ABSTRACT

Intrapericardial hernia is a diaphragmatic hernia that extremely rarely causes cardiac tamponade. We present a case of a cardiac tamponade caused by an intrapericardial hernia in a 78-year-old male patient with a history of coronary artery bypass grafting, mimicking ST-segment elevation myocardial infarction, which was successfully treated by emergent laparotomy. (J Am Coll Cardiol Case Rep 2024;29:102348) © 2024 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

HISTORY OF PRESENTATION

A 78-year-old male patient visited a primary care clinic with acute lower abdominal pain and was prescribed pain reliever for the pain of unknown origin. The patient, however, presented to our hospital with 6 hours' persistent pain. When he went to the restroom for a bowel movement, he lost consciousness and was rushed to the emergency department (ED). The pain onset was acute and remained constant while radiating to the back.

The patient was confused and reported nausea. His vital signs were as follows: heart rate, 130 beats/min; blood pressure, 106/70 mm Hg; respiratory rate, 30 breaths/min; oxygen saturation, 94% on ambient air; and body temperature, 36.1 °C. Physical examination

revealed mottled skin and livedo reticularis all over the body, cold extremities with a prolonged capillary refilling time >2 seconds, and distended neck veins. Chest examination findings were unremarkable.

LEARNING OBJECTIVES

- To recognize intrapericardial hernia as a complication of CABG surgery using the right gastroepiploic artery conduit and even as a cause of cardiac tamponade.
- To avoid incorrect diagnosis and treatment resulting from anchoring on limited findings and omission of inconsistent findings.
- To diagnose the patient comprehensively when individual diagnostic clues are not consistent with a single pathology.

From the ^aDepartment of Emergency Medicine, Miyazaki Prefectural Miyazaki Hospital, Miyazaki City, Japan; ^bDepartment of Emergency and Critical Care Medicine, University of Miyazaki Hospital, Miyazaki City, Japan; ^cDepartment of Surgery, Miyazaki Prefectural Miyazaki Hospital, Miyazaki City, Japan; and the ^dDepartment of Cardiovascular Surgery, Miyazaki Prefectural Miyazaki Hospital, Miyazaki City, Japan. Dr Abe, Cardiovascular Biology Research Program, Oklahoma Medical Research Foundation, Oklahoma City, Oklahoma; Dr Kijima, Kijima Clinic, Miyazaki, Japan; Dr Hisashi, Haruyama Clinic, Miyazaki, Japan; Dr Tachioka, Department of Cardiovascular Surgery, Kagoshima University Graduate School of Medical and Dental Sciences, Kagoshima, Japan; Dr Iwatani, En Home Clinic, Nobeoka City, Miyazaki, Japan; and Dr Sadohara, Department of Internal Medicine, Chiyoda Hospital, Hyuga City, Miyazaki, Japan.

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ABBREVIATIONS AND ACRONYMS

CABG = coronary artery bypass
grafting

CT = computed tomography

ED = emergency department

The abdomen was flat, with no mass, palpation, global tenderness, or bowel sounds.

PAST MEDICAL HISTORY

The patient had a history of coronary artery bypass grafting (CABG) surgery 5 years previously, with the right gastroepiploic artery conduit to the right coronary artery and the left internal thoracic artery conduit to the left anterior descending coronary artery.

DIFFERENTIAL DIAGNOSIS

Blood gas analysis revealed a low bicarbonate level (12.8 mEq/L) and hyperlactatemia (11.6 mmol/L). Electrocardiogram revealed ST-segment elevation at II, III, and aVF and ST-segment depression at I, aVL, and V₂ to V₆ (Figure 1A), indicating ischemic heart disease. The emergency physician suspected that the patient had acute coronary syndrome and called the cardiologist. The cardiologist performed echocardiography to evaluate the ischemic heart disease; however, the results were inconclusive due to a poor echo window caused by an abnormal object compressing the lower side of the heart. The chest radiograph revealed no signs of aortic dissection or pneumothorax, although it showed free air in the heart (Figure 1B). In contrast to the electrocardiographic findings, the patient's reported symptoms, physical examination, and echocardiogram did not indicate acute coronary syndrome, which led the physicians to perform a computed tomography (CT) scan.

INVESTIGATIONS

Enhanced CT imaging revealed a herniated small intestine in the intrapericardial space through the diaphragmatic window for the right gastroepiploic artery conduit. The herniated bowel compressed the heart and restricted the venous return (Figure 2), although the blood flow in the right gastroepiploic artery conduit was maintained. A diagnosis of cardiac tamponade caused by a herniated small intestine was made. At the time of diagnosis, only the results of blood gas analysis were reported; subsequent laboratory reports revealed slightly elevated levels of troponin T at 0.121 ng/mL (normal range: <0.100 ng/mL) and those of creatinine kinase-myocardial band level at 28 IU/L (normal range: 0-12 IU/L).

MANAGEMENT

Although surgical reduction in the operating room was planned, the patient's blood pressure continued

to decrease during the waiting time, and the carotid artery pulsation became unpalpable. We decided to perform emergent reduction in the ED. An approximate 15 cm incision was made in the subxiphoid area, and the peritoneal cavity was opened. The small intestine had herniated into the intrapericardial space through the diaphragmatic window. By enlarging the window with a small incision, the reduction was successfully completed in 14 minutes from the start of the surgery (70 minutes after admission to the ED), resulting in a dramatic improvement in the circulatory status. Subsequently, the patient underwent further surgery in the operating room. The skin incision was elongated, and no bowels remained in the intrapericardial space. Although approximately 90 cm of jejunum was dark, it was not necrotized. The gastroepiploic artery conduit was intact with gross pulsation. Surgical drains were left in the intrapericardial space after washing, and the enlarged window on the diaphragm was reduced by suture.

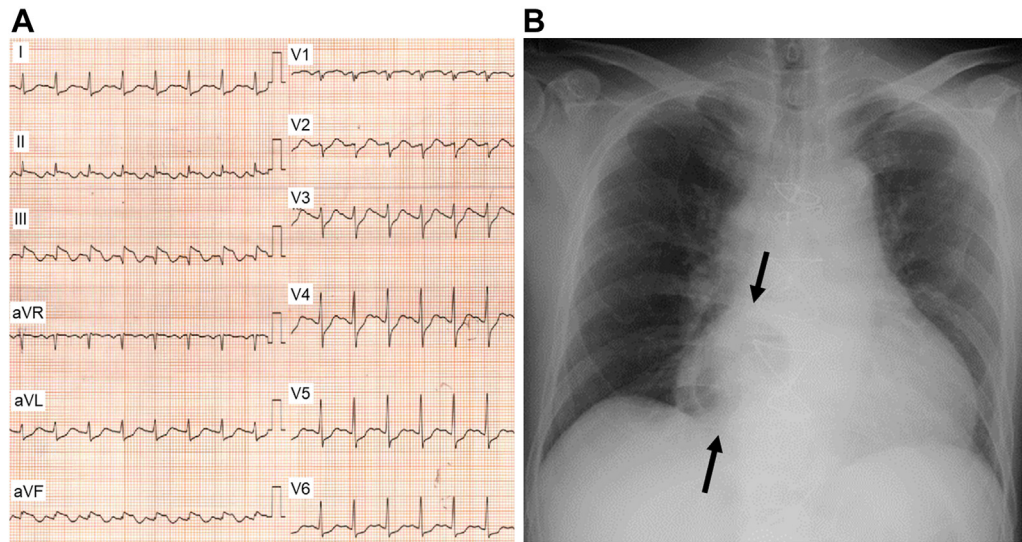
The patient was admitted to the intensive care unit after the surgery. Although cardiac enzymes and lactate levels were not followed, the patient's hemodynamic status was clearly stable. The patient was discharged from the intensive care unit on postoperative day 1.

DISCUSSION

Intrapericardial hernia is a type of diaphragmatic hernia that is congenital or can be acquired, including through trauma.^{1,2} It rarely occurs as a complication of CABG surgery, especially in cases using the right gastroepiploic artery conduit. According to the reviews of published literature,^{3,4} intrapericardial hernia related to CABG surgery can be caused by several abdominal organs, such as stomach, liver, and omentum, and intrapericardial hernia can be complicated regardless of the route and size of the window for the conduit and even later time after the surgery (8 months-9 years). Intrapericardial hernias should therefore be recognized as a potential complication in patients with a history of CABG surgery using the right gastroepiploic artery conduit. Furthermore, this case indicates that it can cause cardiac tamponade and mimic coronary artery disease.

This case illustrates the difficulty in diagnosing an intrapericardial hernia as the cause of cardiac tamponade, as none of the patient's reported symptoms, physical examinations, or diagnostic test results were conclusive of this pathology. In addition, the electrocardiogram with ST-segment changes complicated the diagnosis by mimicking primary coronary artery

FIGURE 1 Electrocardiogram and Chest Radiograph on Admission

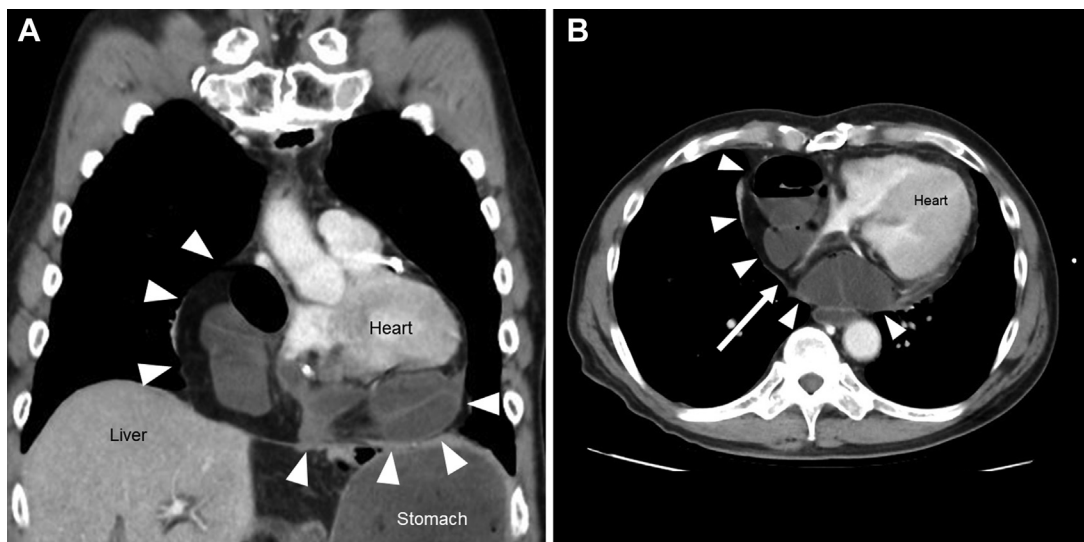


(A) The electrocardiogram shows sinus tachycardia, ST-segment elevation at II, III, and aVF and ST-segment depression at I, aVL, and V₂ to V₆.
(B) Chest radiograph shows the presence of gas in the front of the heart (black arrows).

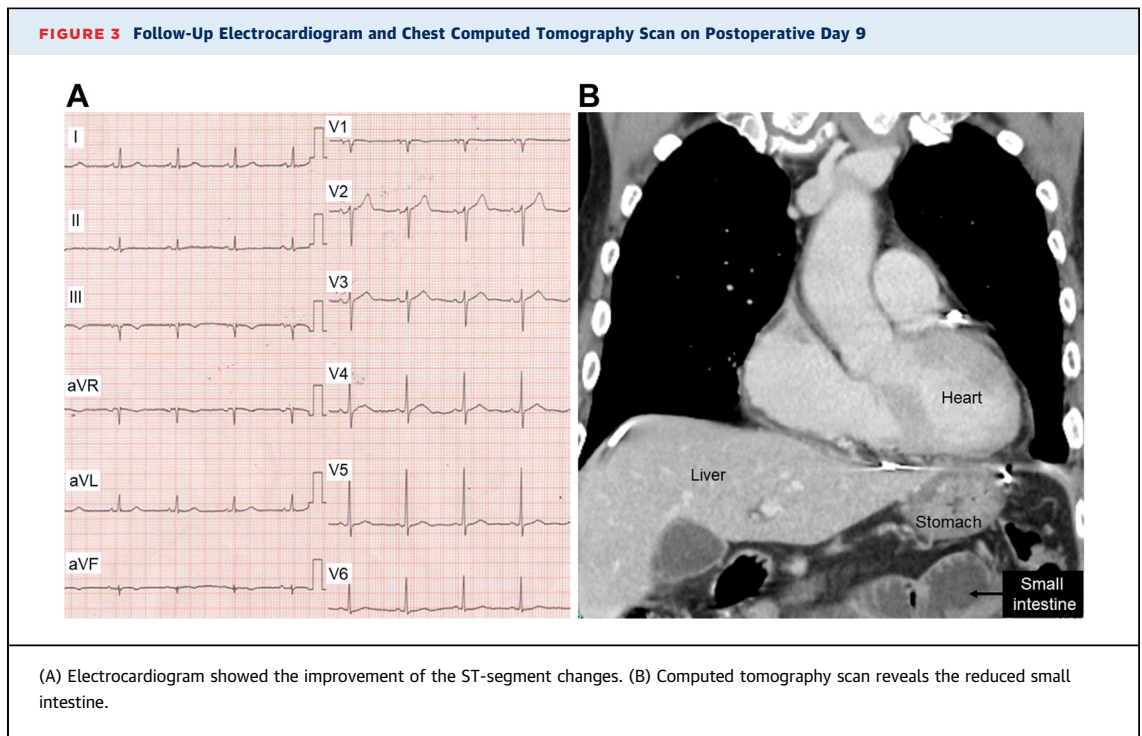
disease, which could have led to inappropriate interventions for the coronary artery. This ST-segment elevation was also observed in a case of post-traumatic intrapericardial hernia,¹ suggesting that an

incarcerated hernia may cause myocardial ischemia directly and/or indirectly via the gastroepiploic artery conduit. As seen in this case, the serum lactate level is a useful marker of shock severity and resuscitation

FIGURE 2 Chest Computed Tomography Imaging



Enhanced computed tomography coronal plane (A) and axial plane (B) imaging. The computed tomography scan shows the herniated and distended small intestines in the intrapericardial space (white arrowheads), restricting venous return to the right atrium (white arrow).



monitoring that indicates insufficient oxygen delivery to the systemic organs, causing anaerobic metabolism.⁵ The usefulness of other laboratory tests in severe shock would be limited because of the time required for measurement and their accuracy.

Imaging plays an important role in the diagnosis of shock. In this case, physicians were able to avoid incorrect intervention for coronary artery lesions based on the echocardiographic findings showing the presence of an abnormal structure in the intrapericardial space. Point-of-care ultrasound protocols have a high accuracy in the differential diagnosis of shock.^{6,7} Our case illustrates the importance of a diligent differential diagnosis, including point-of-care ultrasound, even in a patient with findings typical of a specific disease. CT scan was the most critical diagnostic examination in this case, connecting the inconsistencies in individual findings to a single pathology. Despite the procedural time and risk of radiation, a CT scan in the ED allows clinicians to understand the patient's condition comprehensively, make an accurate diagnosis, and plan definitive treatment.⁸

Importantly, intrapericardial hernia should be recognized as one of the causes of cardiac tamponade. None of the physicians recognized the free air on the chest radiograph, which is highly suggestive of an intrapericardial hernia. This cognitive error can occur because clinicians look for the diagnosis that they know.⁹ In addition, as with the ST-segment changes

on electrocardiogram in this case, findings specific to a known disease may lead the clinician to easily diagnose the disease by omitting other incompatible findings, especially in a critical setting.^{9,10} The current case thus highlights the importance of not rushing by anchoring to the initial diagnosis and omitting incompatible signs but rather taking a careful approach for successful diagnosis and treatment when physicians cannot connect the individual findings from each test to a single pathology.

FOLLOW-UP

On postoperative day 9, a follow-up electrocardiogram showed improvement of the ST-segment changes, and the chest CT scan showed a reduced small intestine (Figure 3). The drainage tubes were removed on postoperative day 14. The postoperative course was uneventful, and the patient was discharged home 25 days after surgery. At the 10-day follow-up, the patient reported no chest or abdominal symptoms. The images and laboratory tests did not show any evidence of recurrence.

CONCLUSIONS

Intrapericardial hernias can cause cardiac tamponade. The diagnosis of this pathology would be challenging for clinicians because it can mimic other serious diseases. Even in the urgent setting, a comprehensive approach is more important than a

quick diagnosis to avoid missing treatment opportunities when physicians cannot connect the individual findings from each test to a single pathophysiology.

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The authors have reported that they have no relationships relevant to the contents of this paper to disclose.

ADDRESS FOR CORRESPONDENCE: Dr Tomohiro Abe, Cardiovascular Biology Research Program, Oklahoma Medical Research Foundation, 825 NE 13th Street, Oklahoma City, Oklahoma 73104, USA. E-mail: tomohiro_abe@med.miyazaki-u.ac.jp.

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