A Case of Acute Non-ST Elevation Myocardial Infarction Later Revealed by Contrast-Enhanced Computed Tomography

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Patient: Female, 82-year-old

Final Diagnosis: Non-ST elevated myocardial infarction

Symptoms: Back pain • epigastric pain

Medication: —

Clinical Procedure: —

Specialty: Cardiology

Objective: Unusual clinical course

Background: Acute coronary syndrome is life-threatening. The diagnosis can be confirmed by electrocardiography (ECG) and serum cardiac biomarkers. Early diagnosis and treatment of non-ST segment elevation myocardial infarction (NSTEMI) is important because delayed treatment is associated with poor prognosis, especially in older adults.

Case Report: An 82-year-old woman presented to the Emergency Department (ED) with epigastric and back pain. Despite the symptoms, the electrocardiogram revealed no abnormality, and the high-sensitivity cardiac troponin (Hs-cTn) value was below the detection limit. Chest contrast-enhanced computed tomography (CT) performed to exclude fatal diseases such as aortic dissection revealed no obvious abnormalities. The patient’s symptoms improved and she was discharged. On the following day, the radiologist reviewed the CT and noted reduced cardiac uptake of contrast medium, and so suspected a subendocardial infarction. The patient was immediately recalled to the ED. She had no symptoms, but her Hs-cTn level was markedly elevated and asynergy was found on echocardiography. Emergency coronary angiography revealed complete obstruction of the left anterior descending coronary artery.

Conclusions: Similar to patients with acute ST segment elevation myocardial infarction, those with unstable angina or NSTEMI should be treated early. Delayed diagnosis and treatment of acute coronary syndrome is associated with poor prognosis, especially in older adults. Therefore, in patients presenting to the ED with chest pain, careful attention should be paid to myocardial staining in addition to the aorta, pulmonary arteries, and abdominal organs, when performing contrast-enhanced CT.

Keywords: Contrast Media • Delayed Diagnosis • Multidetector Computed Tomography • Non-ST Elevated Myocardial Infarction

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Background

Chest pain is a common concern in emergency departments (ED). Acute coronary syndrome (ACS) is one of the life-threatening causes of chest pain [1]. ACS includes unstable angina (UA), acute non-ST segment elevation myocardial infarction (NSTEMI), and acute ST segment elevation myocardial infarction (STEMI). The diagnosis of STEMI can be confirmed by electrocardiography (ECG) and elevation of serum cardiac biomarkers. In contrast, patients with UA present with ischemic symptoms and no elevation in troponins, with or without ECG changes. Patients with NSTEMI may not have ECG changes, but their troponin levels are usually elevated. However, the elevation in troponins may not be detectable for several hours, so UA and NSTEMI are frequently indistinguishable during the initial evaluation. Older adults tend to have NSTEMI rather than STEMI. In patients with NSTEMI, appropriate treatment is associated with lower in-hospital mortality [2]. Therefore, it is important to diagnose NSTEMI and to provide the recommended treatment without delay. We report a case of NSTEMI in which the initial ECG and troponin level were normal, but acute non-ST elevation myocardial infarction was later revealed by contrast-enhanced computed tomography (CT).

Case Report

An 82-year-old Japanese woman developed sudden epigastric and back pain when she stood up from the couch and took a few steps. The symptoms continued for 2 min; therefore, she called an ambulance, which transported her to the ED. She had a medical history of uterine sarcoma and appendicitis and was prescribed analgesic agents for osteoarthritis of the left knee. She had no history of smoking and drank alcohol on occasion. After arrival at the ED, her symptoms continued. Her blood pressure was markedly elevated (197/92 mmHg). We suspected ACS and performed ECG and echocardiography; however, no abnormalities were detected. Laboratory tests revealed high-sensitivity cardiac troponin (Hs-cTn) and creatine kinase MB values <10.0 pg/mL and <1.0 ng/mL, respectively. The levels of D-dimer, a fibrin degradation product, was slightly elevated to 1.3 μg/mL, although the amylase level was normal. We performed contrast-enhanced CT to rule out aortic dissection, pulmonary embolism, and acute pancreatitis, which can be fatal. No obvious abnormalities were detected. The patient’s symptoms improved and she was discharged with an analgesic agent.

The following day, a radiologist reviewed the contrast-enhanced CT and suspected a subendocardial infarction due to poor contrast uptake by the myocardium on the endocardial surface from the septum to the apex (Figure 1A, 1B). The patient was asked to return to the hospital immediately. She had had experienced no further symptoms since returning home. However, her Hs-cTn level was markedly elevated (25 098 pg/mL) and echocardiography revealed asynergy from the anterior wall to the apex. She underwent emergency coronary angiography, and her left anterior descending coronary artery was found to be completely obstructed (Figure 2). Percutaneous transluminal coronary angioplasty was performed, which restored the blood flow. The patient was discharged 7 days after the operation and resumed her normal activities.

Figure 1. Contrast-enhanced computed tomography from the chest to the pelvis on arrival in the Emergency Department. (A) Early phase (55 s after contrast agent administration), (B) Late phase (110 s after contrast agent administration) showing poor contrast agent uptake by the myocardium on the endocardial surface of the heart (arrowhead) from the septum to the apex.
Discussion

Patients with ongoing chest pain without ECG changes or elevated troponin values may have UA or an NSTEMI. ECG is an immediately available tool for detecting ACS, but its sensitivity for diagnosing acute myocardial infarction (AMI) is low. Therefore, it is recommended that the ECG be repeated if the initial ECG is not diagnostic but the patient remains symptomatic [3]. Cardiac troponin is the preferred test for diagnosing AMI and usually becomes elevated within 3 h. Highly sensitive cardiac troponin (Hs-cTn) assays become elevated more rapidly and elevations are found even in UA [4]. However, some patients have ischemic symptoms for >2 h and their Hs-cTn level remains below the detection level, so it is possible to rule out AMI based on a single normal value [5]. Our patient was transferred immediately. We presume that the ECG did not show obvious changes due to the subendocardial location of the AMI. Moreover, the time from onset to collecting blood for testing was insufficient for the Hs-cTn level to become elevated. Considering her advanced age, we should have performed a follow-up ECG and retested her Hs-cTn level a few hours later, despite the improvement in her symptoms.

Contrast-enhanced CT can be useful for ruling out life-threatening diseases in the ED. In our patient, we excluded pulmonary embolism and aortic dissection using contrast-enhanced CT. If attention is paid to myocardial staining, contrast-enhanced CT can diagnose NSTEMI early.

Conclusions

As with STEMI, patients with UA or NSTEMI should be treated early. Delay in diagnosis and treatment of ACS is associated with poor prognosis, especially in older adults [6]. Therefore, in patients who present to the ED with chest pain, careful attention should be paid to myocardial staining, as well as the aorta, pulmonary arteries, and abdominal organs, when contrast-enhanced CT is performed.

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Declaration of Figures’ Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

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