

A case of myocardial involvement in lung cancer that mimics ST segment elevation in myocardial infarction

Kye Hun Kim, Myung Ho Jeong, Hyun Ju Yoon, Youngkeun Ahn, Jeong Gwan Cho, Jong Chun Park, and Jung Chae Kang

The Heart Center, Chonnam National University Hospital, and Research Institute of Medical Sciences, Chonnam National University Medical School, Gwangju, Korea

To the Editor,

Cardiac involvement commonly occurs in lung cancer with a reported incidence of 25% to 30% in an autopsy study [1]. However, it is often difficult to diagnose due to the absence of obvious symptoms. The pericardium is the most common site of cardiac involvement in lung cancer, while myocardial involvement is rare [2]. Neoplasms that involve the myocardium can cause various electrocardiographic abnormalities; however, it is unusual to observe ST segment elevation in more than two contiguous leads mimicking myocardial infarction (MI) without coronary artery occlusion [3]. Here, we report a case of a 62-year-old male with lung cancer invasion of the myocardium that presented with chest pain and electrocardiography (ECG) findings mimicking acute ST segment elevation MI.

A 62-year-old male was transferred to the cardiovascular department following the onset of chest pain. The patient had undergone a left pneumonectomy due to stage IIIA squamous lung cancer 18 months prior and had received chemotherapy several times in the pulmonology department. Chest pain developed 3 days prior and was described as squeezing

and pressing in nature, lasting more than 25 minutes. It was not associated with exercise and not relieved by nitroglycerin. Moreover, the levels of cardiac-specific troponin-I (0.12 ng/mL) and high sensitivity C-reactive protein (11.4 mg/dL) were elevated. ECG at admission showed newly developed ST segment elevations in leads I and aVL, and reciprocal ST segment depressions in leads II, III, and aVF with sinus tachycardia of 150/min (Fig. 1B) compared with the ECG obtained 6 months prior (Fig. 1A). Chest X-ray showed increased haziness in the entire left lung fields due to the previous pneumonectomy (Fig. 2A). Transthoracic echocardiography revealed limited and decreased wall motion of the basal and mid-lateral segments of the left ventricle with abnormal marked thickening (Fig. 2B). Emergency coronary angiography (CAG) was performed with the clinical suspicion of acute MI. CAG revealed no significant stenosis in both coronary arteries that explained the abnormalities in this patient and only diffuse mild stenosis of the proximal left circumflex coronary artery (Fig. 3). Computed tomography also showed an abnormally thickened lateral left ventricular wall caused by direct inva-

Received: July 24, 2008
Revised : August 18, 2008
Accepted: September 8, 2008

Correspondence to
Myung Ho Jeong, M.D.
The Heart Center, Chonnam National University Hospital, 42 Jebong-ro, Dong-gu, Gwangju 501-757, Korea
Tel: +82-62-220-6243
Fax: +82-62-227-3105
E-mail: myungho@chollian.net

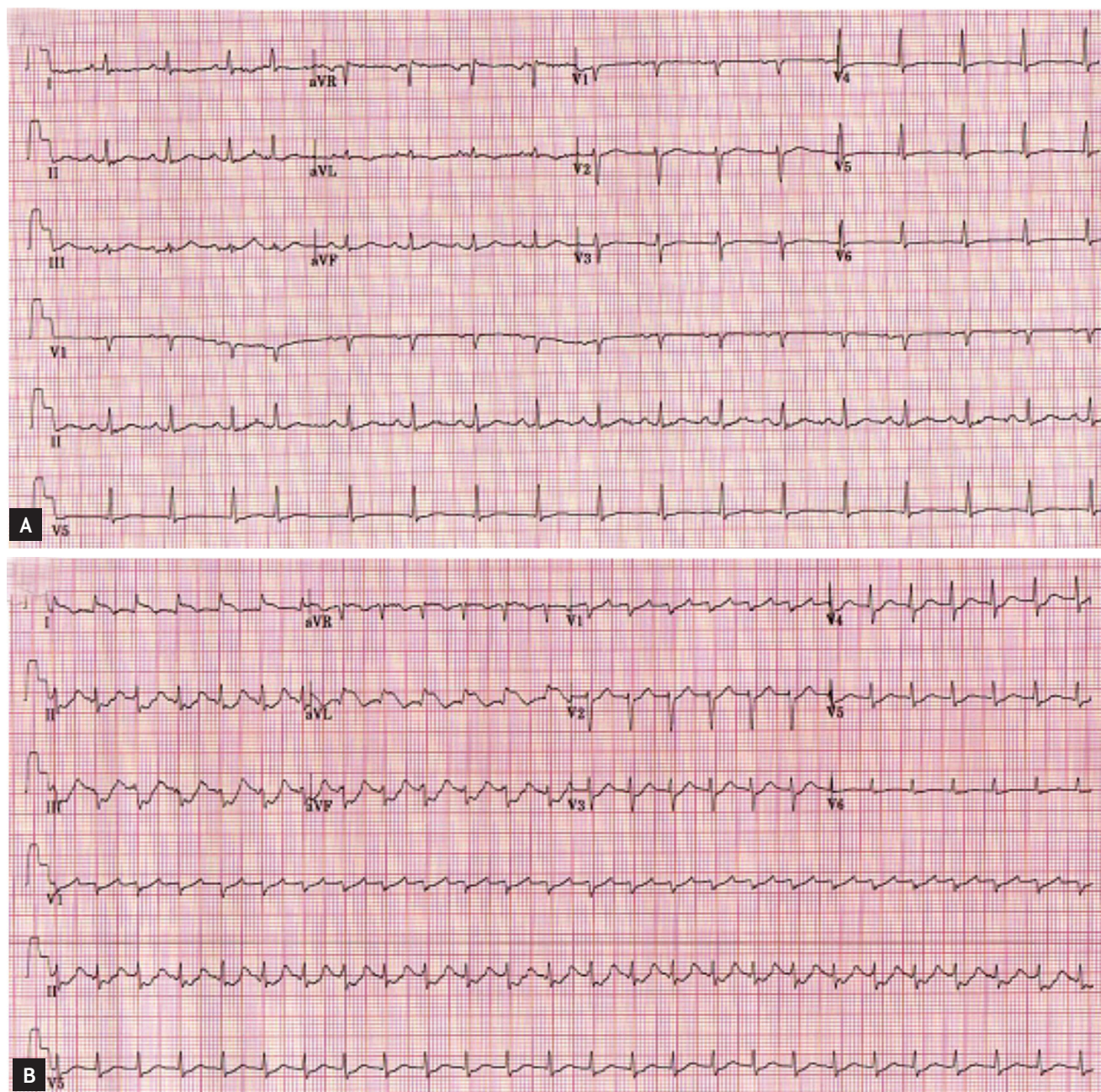


Figure 1. (A) Electrocardiography (ECG) 6 months prior to admission showed no abnormal ST-T wave changes. (B) The ECG at admission showed newly developed significant ST segment elevations in leads I, aVL, as well as reciprocal ST segment depressions in leads II, III, and aVF with sinus tachycardia. These results suggested lateral wall acute myocardial infarction.

sion of recurrent lung cancer (Fig. 2C). The patient was treated with conservative medical management and his symptoms improved, although the abnormal ST segment elevation was unchanged during a follow-up ECG 1 month later.

The present case is clinically significant because the abnormal ST segment elevation mimicking acute

MI on the ECG was not caused by coronary occlusion, but was rather a representative manifestation of myocardial invasion by the lung cancer. Therefore, health care providers should consider myocardial metastasis in the differential diagnosis, particularly in a cancer patient who presents with symptoms mimicking acute coronary syndrome with abnormal newly developed

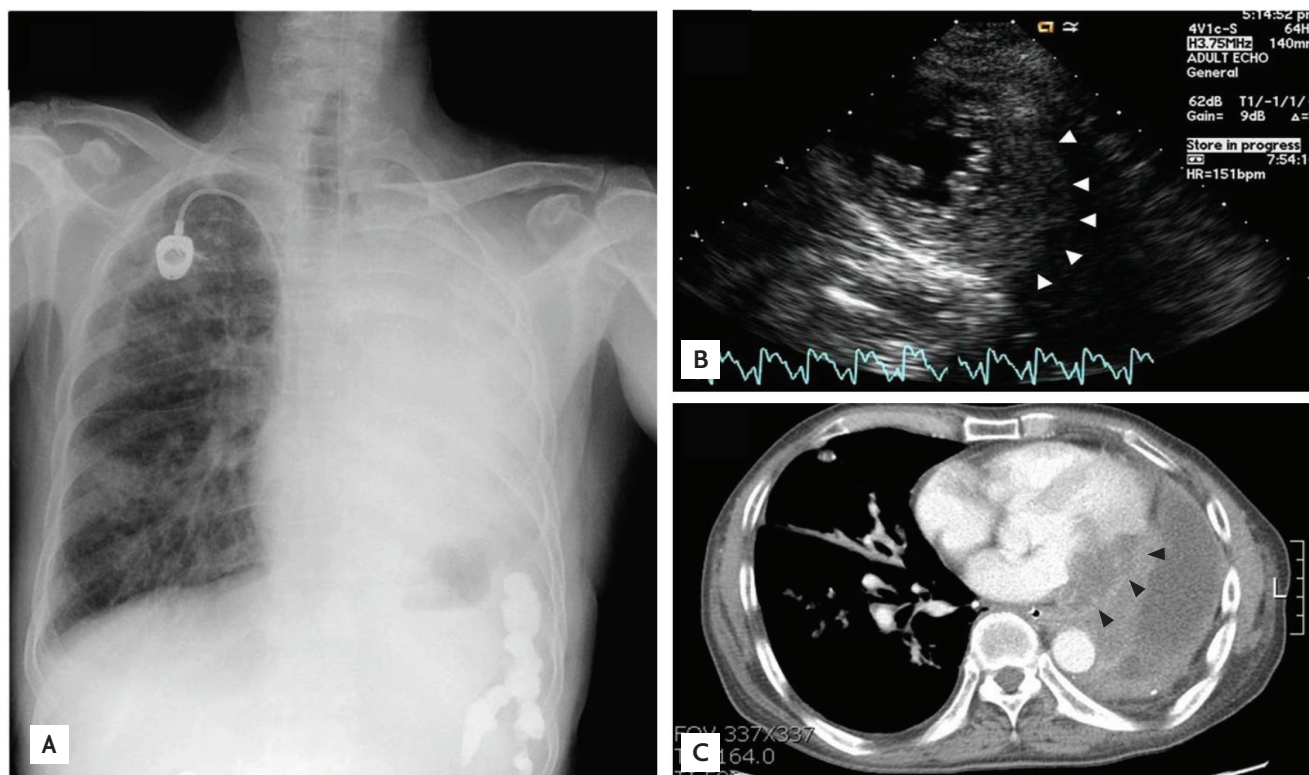


Figure 2. (A) Chest X-ray at admission showed diffuse increased haziness in the entire left lung fields due to a previous left pneumonectomy. (B) Echocardiography revealed thickening of the lateral wall of the left ventricle (arrowheads) with a heterogeneous echo-texture. (C) Computed tomography revealed abnormal heterogeneous thickening of the lateral wall of the left ventricle (arrowheads) infiltrating the left lung mass.

ECG changes and no history of ischemic heart disease.

Different types of tumor can metastasize to the heart, although tumors of the lung or breast, malignant melanoma, leukemia, or lymphoma are reported in the heart more frequently [1]. Lung cancer is the most frequent cause of metastatic tumor of the heart with a reported incidence of up to 25% at autopsy, although an antemortem diagnosis is made in < 5% of patients. The most frequently involved site within the heart is the pericardium and the most frequent mode of metastasis is via the lymphatic pathway, followed by hematogenous spread. Myocardial involvement by direct lung cancer invasion is unusual [2] and is often clinically silent, although it can cause malignant pericardial effusion with or without symptoms of pericarditis, arrhythmias, heart failure, and rarely acute MI [3-5]. Acute MI might be caused by tumor embolization on the coronary arteries or direct tumor compression of the coronary arteries. The present case was initially misdiagnosed as acute MI due to the presence of

ST segment elevations on ECG accompanied by an elevation in cardiac troponin. However, CAG did not reveal any significant coronary lesions to explain the ECG abnormalities and the follow-up ECG one month later showed persistent ST segment elevations in the same leads. Therefore, it was concluded that the abnormal ST segment elevation in this patient was not a manifestation of acute MI, but possibly caused by an alteration in the myocardial electrical properties associated with tumor invasion. There have been few previous reports of abnormal ST segment elevation on ECG mimicking acute MI caused by direct myocardial invasion of metastatic tumors without coronary occlusion [3-5], and lung cancer was the underlying primary tumor in most of these cases. Matana et al. [5] reported a case of prolonged and progressive ST elevation on ECG mimicking acute MI caused by collecting duct carcinoma of the right kidney and myocardial metastasis.

Abe et al. [3] and Cates et al. [4] reported that tumor

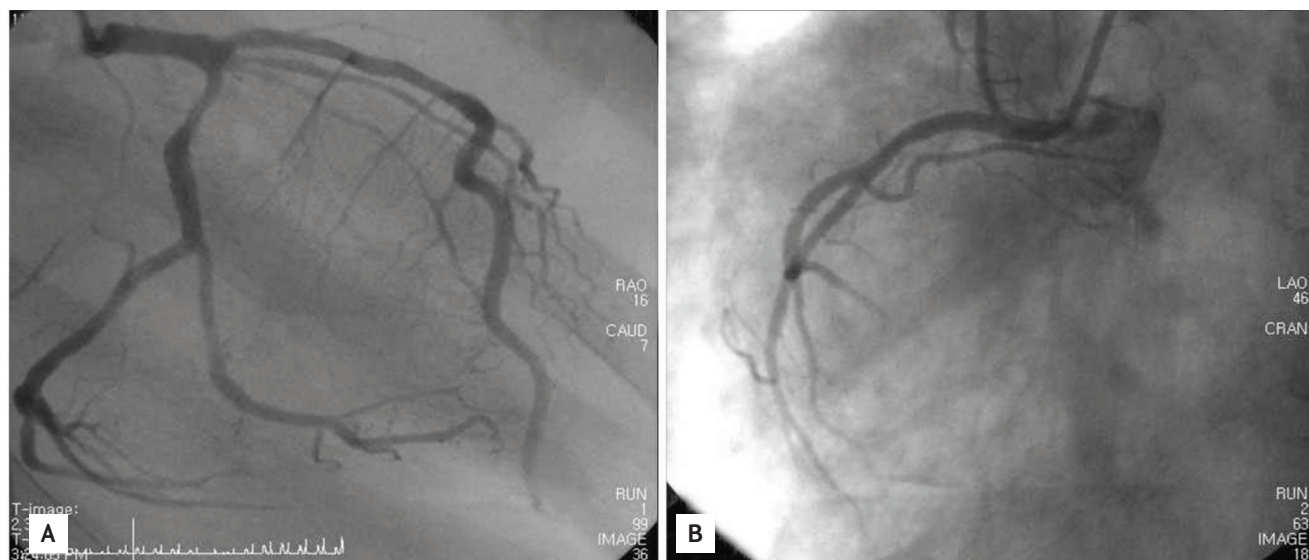


Figure 3. Coronary angiography revealed no significant stenosis in (A) left anterior descending and circumflex coronary artery, and (B) right coronary artery.

invasion of the heart produced a variety of ECG abnormalities such as ST-T segment changes and rare ST segment elevations, arrhythmias, conduction disturbances, and low-voltage QRS complexes. Cates et al. [4] suggested that any new ECG changes in clinically stable patients with cancer and no cardiac symptoms suggestive of ischemia should raise suspicion of cardiac metastasis, but there were no specific findings predictive of myocardial invasion in their study. Furthermore, Abe et al. [3] reported that pronounced and persistent ST segment elevation in patients with cancer and no history of ischemic heart disease, such as that seen in the case reported here, are more specific signs of myocardial metastasis.

In conclusion, we report an unusual case of persistent ST segment elevations mimicking acute MI on ECG in a patient with myocardial invasion of recurrent lung cancer.

Keywords: Neoplasms; Myocardial infarction; Electrocardiography

Conflict of interest

No potential conflict of interest relevant to this article was reported.

REFERENCES

1. Reynen K, Kockeritz U, Strasser RH. Metastases to the heart. *Ann Oncol* 2004;15:375-381.
2. Tamura A, Matsubara O, Yoshimura N, Kasuga T, Akagawa S, Aoki N. Cardiac metastasis of lung cancer: a study of metastatic pathways and clinical manifestations. *Cancer* 1992;70:437-442.
3. Abe S, Watanabe N, Ogura S, et al. Myocardial metastasis from primary lung cancer: myocardial infarction-like ECG changes and pathologic findings. *Jpn J Med* 1991;30:213-218.
4. Cates CU, Virmani R, Vaughn WK, Robertson RM. Electrocardiographic markers of cardiac metastasis. *Am Heart J* 1986;112:1297-1303.
5. Matana A, Zaputovic L, Lucin K, Kastelan ZM. Persistent and progressive ST segment elevation caused by myocardial metastasis. *Tumori* 2006;92:452-454.