

## A Transient Inferolateral ST-Segment Elevation on the Electrocardiogram Due to an Iatrogenic Left-Sided Pneumothorax After an Urgent Tracheostomy in a Patient with Metastatic Hypopharynx Cancer

Metastatik Hipofarenks Kanseri Olan Bir Hastada Acil Trakeostomi Sonrası Gelişen İyatrojenik Sol Taraf Pnömotoraksına Bağlı Gelişen Geçici Akut Inferolateral ST-Segment Elevasyonu

CASE REPORT  
OLGU SUNUMU

### ABSTRACT

The presence of ST-segment elevation on the electrocardiogram alerts physicians in patients with chest pain. Emergency coronary angiography is usually performed in these patients. However, there are many conditions that cause ST-segment elevation on the electrocardiogram, such as pericarditis, hyperkalemia, Brugada syndrome, hypothermia, and early repolarization. Pneumothorax is a rare complication of tracheostomy and its symptoms are sudden chest pain and dyspnea. Also, it has been known that pneumothorax may cause ST-segment changes on the electrocardiogram. We presented a transient inferolateral ST-segment elevation on the electrocardiogram due to an iatrogenic left-sided pneumothorax after an urgent tracheostomy in a patient with metastatic hypopharynx cancer and normal coronary angiogram.

**Keywords:** Electrocardiography, pneumothorax, ST-segment elevation, tracheostomy

### ÖZET

Göğüs ağrısı olan hastalarda elektr okar diyografide (EKG) ST-segment yükselmesi varlığı hekimler için uyarıcıdır. Bu hastalara genellikle acil koroner anjiyografi yapılmaktadır. Bununla birlikte, EKG'de ST-segment yükselmesine neden olabilecek perikardit, hiperkalemi, Brugada sendromu, hipotermi ve erken repolarizasyon gibi birçok klinik durum mevcuttur. Pnömotoraks, trakeostominin nadir bir komplikasyonudur ve semptomları ani gelişen göğüs ağrısı ve nefes darlığıdır. Ayrıca pnömotoraksın EKG'de ST-segment değişikliklerine neden olabileceği bilinmektedir. Biz de metastatik hipofarenks kanseri ve normal koroner anjiyografisi olan bir hastada acil trakeostomi sonrası gelişen iyatrojenik sol taraflı pnömotoraksa bağlı geçici akut inferolateral ST-segment yükselmesini sunduk.

**Anahtar Kelimeler:** Elektrokardiyografi, pnömotoraks, ST-segment yükselmesi, trakeostomi

ST-segment elevation is one of the most important electrocardiographic (ECG) findings that should be evaluated urgently by physicians.<sup>1</sup> This ECG finding, especially with reciprocal changes, indicates acute ST-segment elevation myocardial infarction (STEMI) in a patient with typical anginal pain and/or cardiac arrest.<sup>1</sup> However, a large number of clinical conditions can cause false-positive ST-segment elevation on the ECG, such as acute pericarditis, hyperkalemia, Brugada syndrome, Takotsubo cardiomyopathy, hypothermia, early repolarization, left bundle branch block, and left ventricular hypertrophy.<sup>2,3</sup> However, they all have distinctive clues for differential diagnosis.<sup>3</sup> Here, we present a transient inferolateral ST-segment elevation case due to an iatrogenic left-sided pneumothorax after an urgent tracheostomy in a patient with metastatic hypopharynx cancer.

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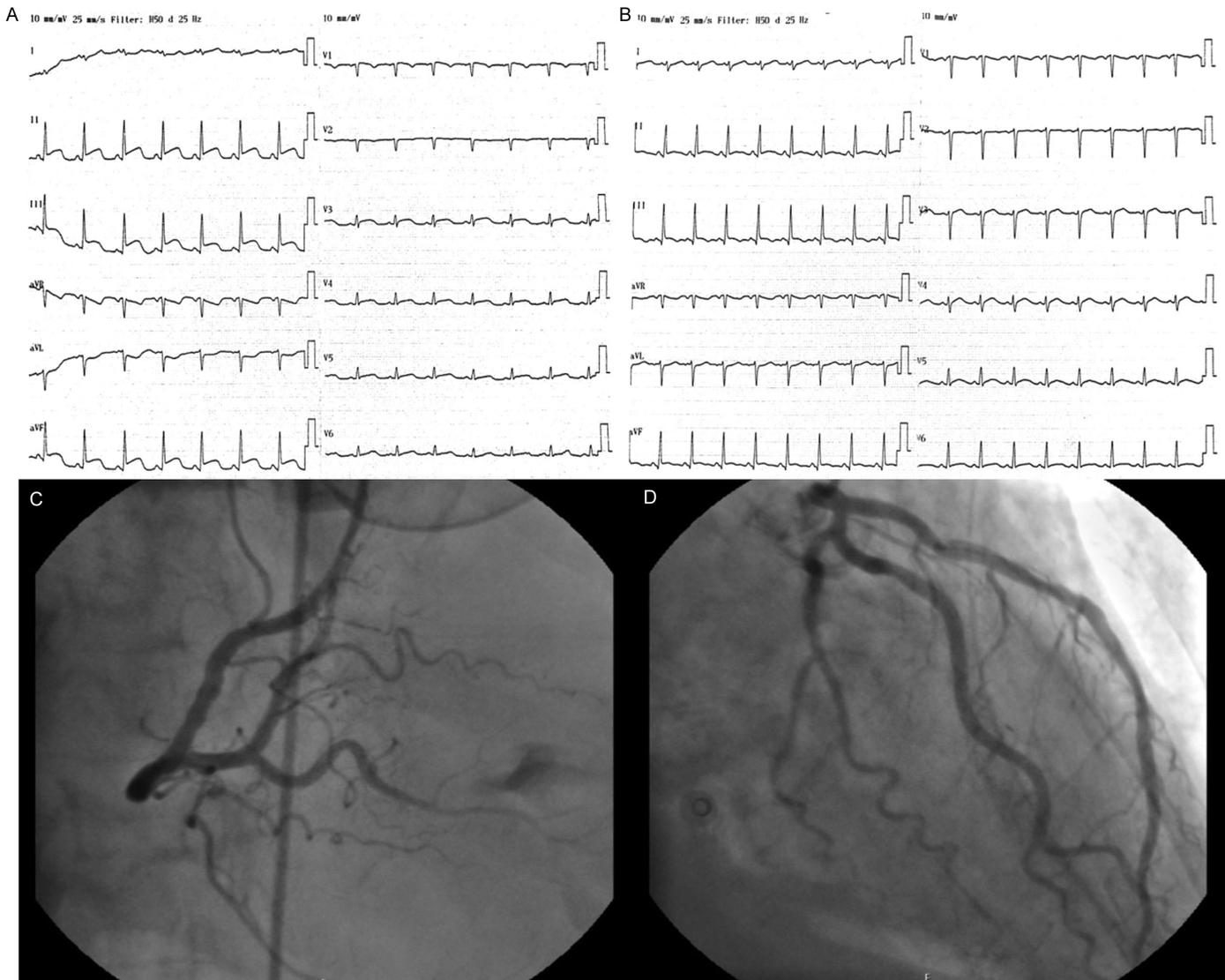
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**Figure 1. A-D. (A) Electrocardiogram shows ST-segment elevation in leads II, III, aVF, and V3-V6 with reciprocal changes in lead I and aVL. (B) The resolution of ST-segment elevation after chest tube placement. (C) There is no obstructive disease in the right coronary artery and (D) in the left coronary artery system.**

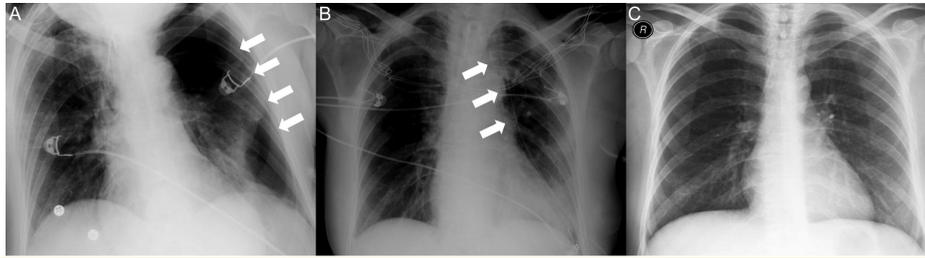
### Case Report

A 57-year-old female patient with a history of metastatic hypopharynx cancer was admitted to our emergency department with the complaints of progressively increasing shortness of breath, hoarseness, and cough for 1 week. The patient was alert and oriented with a Glasgow coma scale of 15. Her vital signs on admission were heart rate of 96 beats/min, blood pressure of 156/84 mmHg, respiratory rate of 38 breaths/min, oxygen saturation of 89%, and body temperature of 36.4°C. On physical examination, stridor could be heard easily and bilateral

breathing sounds were coarse in the lungs. Cardiac auscultation was unremarkable. Basal ECG showed normal sinus rhythm with non-specific ST-T segment changes. The patient consulted to the otorhinolaryngology department and was diagnosed with bilateral vocal cord paralysis due to hypopharynx mass. An urgent tracheostomy was planned to ameliorate the symptoms. In pre-operative emergency cardiology consultation, transthoracic echocardiography (TTE) showed a normal left ventricular ejection fraction (LVEF) with no wall motion abnormalities. Soon after the tracheostomy operation, the patient's respiratory distress worsened and new chest pain developed. The hemodynamic status of the patient suddenly deteriorated, and blood pressure decreased to 68/42 mmHg. Also, prominent ST-segment changes were observed on the bedside monitor. A second ECG was obtained, which showed ST-segment elevation in leads II, III, aVF, and V3-V6 with reciprocal ST-T segment changes (Figure 1A). A preliminary diagnosis of acute inferolateral STEMI

### ABBREVIATIONS

ECG	Electrocardiographic
LVEF	Left ventricular ejection fraction
STEMI	ST-segment elevation myocardial infarction
TTE	Transthoracic echocardiography



**Figure 2. A-C. (A) Chest x-ray after tracheostomy shows left-sided tracheostomy and white arrows indicate the edge of collapsed left lung. (B) Chest x-ray shows re-expansion of the left lung after needle decompression and white arrows indicate the chest tube line. (C) Chest x-ray on discharge shows nearly normal lungs.**

was made and preparations were started for urgent angiography. In the meantime, a quick physical examination revealed that the breath sounds on the left lung were markedly decreased compared to the initial physical exam. Imaging with bedside TTE was attempted before the coronary angiography, but no cardiac view could be obtained. These findings were deemed highly suggestive of an iatrogenic pneumothorax. Indeed, the diagnosis of left pneumothorax was confirmed with a portable chest x-ray (Figure 2A). Needle decompression followed by 18F chest tube placement was performed urgently. After acute decompression (Figure 2B), the clinical status of the patient improved and ST-segment elevation on ECG was resolved (Figure 1B). Therefore, the urgent coronary angiography was postponed. Twenty-four-hour troponin I peaked at 128 ng/L (normal range: 0-23 ng/L) and LVEF was normal on control TTE. A coronary angiography was performed 2 days after chest tube placement and tracheostomy. It showed no significant obstructive disease in major epicardial coronary arteries (Figure 1C and D). The patient's clinic improvement continued, and the chest tube was successfully removed after 9 days. The patient was discharged from the hospital with tracheostomy with nearly normal lungs after 4 weeks (Figure 2C).

## Discussion

Tracheostomy is the gold standard therapy to open the airway in patients with advanced-stage larynx or pharynx cancers. Pneumothorax is a rare complication after percutaneous tracheostomy and ECG changes are seen in approximately 25% of pneumothorax cases.<sup>4,5</sup> Common ECG changes associated with pneumothorax include right axis deviation, reduced R-wave amplitude in precordial leads, QRS alterations, and T-wave inversions.<sup>6</sup> Klin et al<sup>7</sup> retrospectively reviewed ECG changes in young patients with spontaneous pneumothorax and reported that the ECG was abnormal in 12 patients (21%) and showed ST-segment elevation in 5 patients, inverted T waves in 2 patients, incomplete right bundle branch block in 2 patients; poor R wave progression, left axis deviation, and low QRS voltage in 1 patient.<sup>7</sup>

There are a few reports of ST-segment elevation that mimics acute myocardial infarction in patients. Although most of these reports are in older patients with a medical history of coronary heart disease and chronic lung disease, ST-segment elevation mimicking STEMI was also reported in young patients without any medical history.<sup>5,7,8</sup> In a case series, 1 patient was even misdiagnosed as acute anterior STEMI and received thrombolytic

treatment.<sup>8</sup> The mechanism of ST-segment elevation is not fully elucidated. It has been suggested that these changes result from myocardial ischemia secondary to hypotension and reduced coronary blood flow resulting from increased pulmonary vascular resistance with acute right ventricular strain.<sup>5,9,10</sup>

Our case did not have any cardiovascular or respiratory disease history. Although pneumothorax-induced ST-segment elevation was usually seen in anterior derivations in previously reported cases, inferolateral ST-segment elevation was observed in our patient. We considered that this may have developed due to coronary hypoperfusion triggered by low diastolic pressure resulting from decreased venous return and increased intrathoracic pressure. Correspondingly, ST-segment elevation resolved with the decompression of pneumothorax. In conclusion, this case illustrates that pneumothorax may mimic STEMI and ST-segment elevation due to pneumothorax should be considered in patients with a suggestive clinical picture.

**Informed Consent:** Informed consent was obtained from the patient for the publication of the case report and the accompanying images.

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