

## 症 例

## ST depression during thoracic cavity irrigation in a patient undergoing fistula closure for pneumothorax

Masayuki Oshima\*, Yoichi Shimada\*,  
Atsuhiko Sakamoto\*, Ryo Ogawa\*

We present here a patient who experienced ST depression during thoracic cavity irrigation under general and epidural anesthesia.

## Case report

A 74-year-old man, 160cm tall, and weighing 34kg, underwent bullectomy and fistula closure for right pneumothorax after unsuccessful conservative ther-

apy. His surgical history included gastrectomy at the age of 46 for gastric ulcer and two times of aorto-femoral bypass for ASO at 70 and 71 years. Preoperative ECG showed a q wave in leads II, III, aVf (Fig. 1). Preoperative laboratory examinations were all within normal limits.

Atropine 0.4mg was intramuscularly administered prior to anesthesia. With standard ECG monitoring,

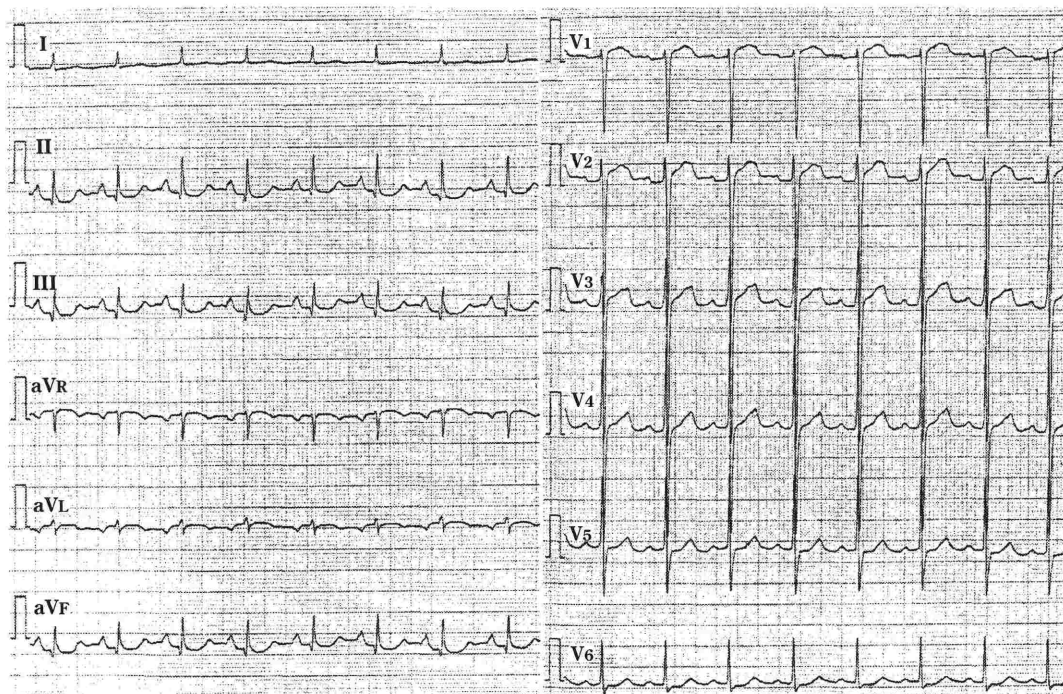


Figure 1 Preoperative 12-lead electrocardiogram showing a q wave in II, III aVf lead.

\*Department of Anesthesiology, Nippon Medical School,  
Kanagawa, Japan

epidural puncture was performed at the T6-7 interspace by the loss-of-resistance method using physiological saline. A catheter was inserted 5cm into the epidural space via a Tuohy needle. A bolus 5ml of 2% mepivacaine provided analgesic region at T3-10. Thereafter, a left-sided double lumen tube was placed after induction of general anesthesia with 34mg of propofol and 3mg of vecuronium. Anesthesia was maintained with intermittent epidural anesthesia, and

infusion of propofol and vecuronium.

After closure of the fistula, a surgeon irrigated the right thorax with warm physiological saline to assess the integrity of the right upper lobe stump suture line. The temperature of the irrigation solution was not directly measured. Immediately after starting irrigation, ST segment on ECG decreased significantly (maximum:  $-1.66\text{mV}$ , lead II) (Fig. 2). A bolus 0.5mg of nitroglycerine (NTG) was administered fol-

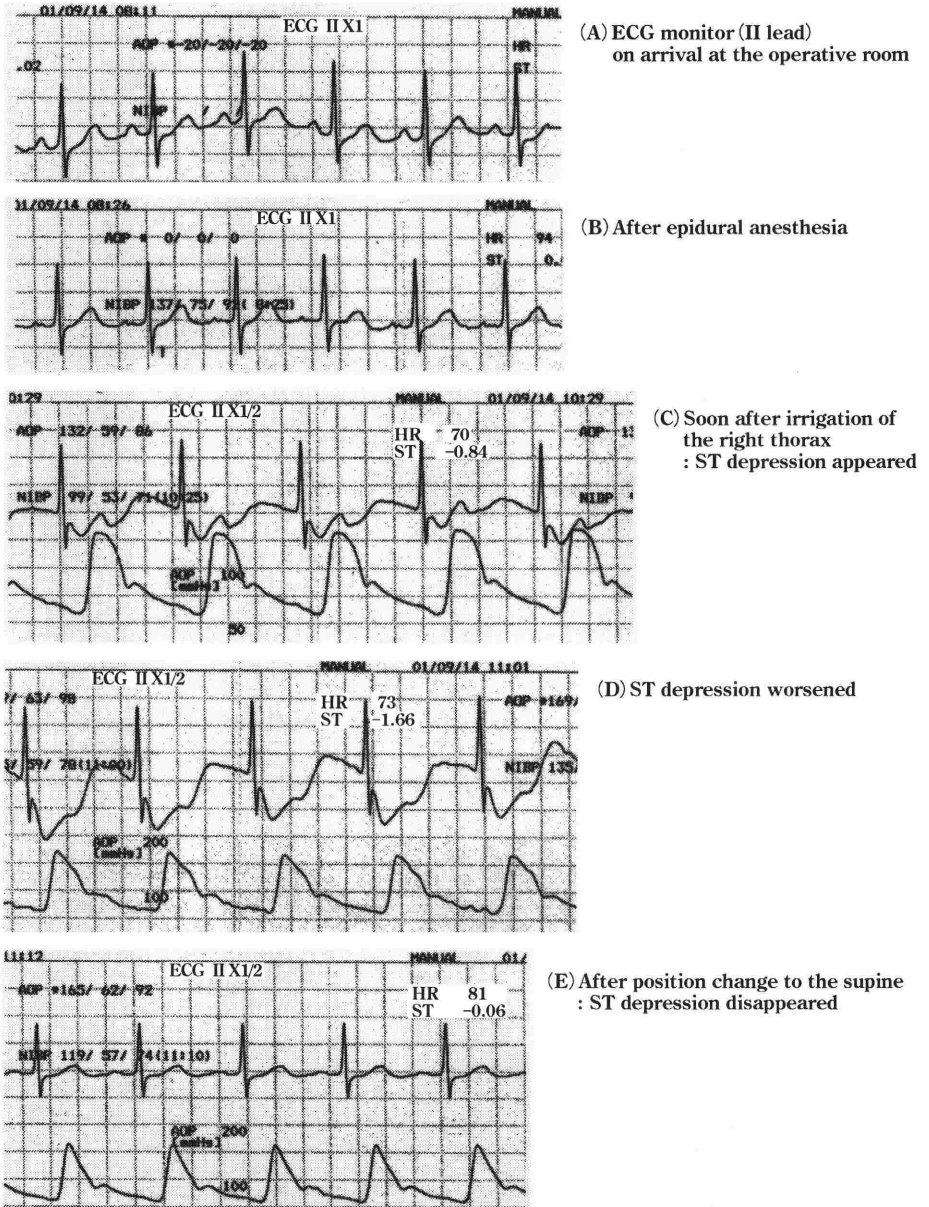


Figure 2

lowing a continuous administration of 0.3–0.5  $\mu\text{g}/\text{kg}/\text{min}$ . Also, a continuous administration of 3  $\mu\text{g}/\text{kg}/\text{min}$  dopamine was started. No reduction in the degree of ST segment depression occurred in response to NTG. However, hemodynamic variables did not change. We requested the surgeon to complete the operation as early as possible, but an air leak was identified, so he resutured the fistula again. The irrigation fluid was then removed from the right thoracic cavity, but ST depression continued. The operation was completed 40 minutes after the ST depression, and the position was changed to the supine. Thereafter, ST depression returned to the preoperative level. A standard 12-lead ECG showed similar findings to preoperative ECG. The patient was referred to the Intensive Care Unit (ICU), and discharged uneventfully two days after the operation from the ICU. No increase in CK-MB (maximum, 15 IU/l), and negative Troponin-T, were observed. Coronary angiography performed two weeks after the operation showed normal findings.

### Discussion

Abnormal ST segment and T wave changes are the most common ECG abnormalities, accounting for approximately one-half of abnormal recordings in hospitalized patients<sup>1)</sup>. ECG changes in the ST segment have been noted in both ischemic and non-ischemic states. Thus, it is important to consider the nonischemic causes of ST segment changes.

Nonischemic ST segment changes may occur at various conditions, such as cor pulmonale, hyperkalemia, and cerebrovascular temperature changes. Systemic hyperthermia is also associated with ST segment depression<sup>2)</sup>. We did not measure esophageal temperature in this patient, but bladder tem-

perature did not change. The reason of the ST depression observed in our patient is possibly that the irrigation fluid may have been warmer than the patient's body temperature and may have caused ST depression.

Katz<sup>3)</sup> suggested that the lungs behave as electrical insulators, whereas vessels containing blood act as conducting wires. There are several reports on interference with the conductance of cardiac electrical impulses by intracardiac blood, pericardial effusion, and air in the lungs and mediastinum in association with QRS, ST segment, and T wave changes<sup>4–6)</sup>. In the present patient, there may be a large variance in cardiac impedance associated with irrigation or removal of the irrigation fluid.

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### References

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