

Pacemaker-Induced Pectoral Muscle Stimulation in Post-Anesthesia Care Unit - A Case Report

Seong Soo Hong¹, In-Jung Jun¹, Hye Young Lee², Sangseok Lee¹, Wooyong Lee¹, Kye-Min Kim¹

¹Department of Anesthesiology and Pain Medicine, Inje University Sanggye Paik Hospital, Seoul, Korea

²Department of Internal Medicine, Inje University Sanggye Paik Hospital, Seoul, Korea

***Corresponding author**

Kye-Min Kim

Email: kyemin@paik.ac.kr

Abstract: Meticulous care is required in the perioperative management of patients with cardiac pacemakers to prevent and resolve the adverse events associated with pacemakers. Extracardiac stimulation is one of the complications that may arise. It should be treated promptly, as it may lead to anxiety, discomfort, and hemodynamic instability. There have been few reports on extracardiac stimulation in the perioperative period. Here, we report a case of pectoral muscle stimulation that occurred in the post-anesthesia care unit. Immediate and appropriate management of the complication was required, in cooperation with the cardiac electrophysiology team.

Keywords: Complication, Extracardiac stimulation, Pacemaker, Pectoral muscle.

INTRODUCTION

The perioperative management of patients with cardiac pacemakers calls for special considerations in order to prevent adverse events, such as pacemaker malfunctions related to electromagnetic interference (EMI) [1-4]. Aside from detrimental outcomes, other complications may occur. Pacemaker-induced extracardiac stimulation involves the diaphragm or the pectoral or intercostal muscles[5]. It should be managed immediately, as it may lead to anxiety, discomfort, or hemodynamic instability.

Although the incidence of extracardiac stimulation has been reported to be about 2% in patients with cardiac implantable electronic devices [6], there have been few reports of pacemaker-induced extracardiac stimulation in the perioperative period. The present report describes the case of a patient with a cardiac pacemaker who underwent radical prostatectomy and experienced unexpected pectoral muscle stimulation in the post-anesthesia care unit. The way the complication was managed is discussed.

CASE REPORT

A 64-year-old man diagnosed with prostate cancer was scheduled for radical prostatectomy under general anesthesia. He had received a pacemaker implantation (model: Identity ADx XL DR 5386, St. Jude Medical, St. Paul, MN, USA) for a 2:1 A-V block six years prior. He had been experiencing intermittent palpitations in the left lateral decubitus position – which were relieved in the right lateral decubitus position – for two years. The patient showed no other symptoms. 24-

hour Holter monitoring and a transthoracic echocardiography were performed for preoperative evaluation. No abnormalities were found from the Holter monitoring and echocardiography. The pacing mode was changed from DDDR to DOO (a lower tracking heart rate of 65 bpm) preoperatively. It was confirmed that the pacemaker was working properly.

General anesthesia was induced with propofol and rocuronium. Desflurane, remifentanyl, and rocuronium were used for maintenance of the anesthesia. The vital signs during the surgery were stable. The pacemaker (in DOO mode) worked normally and the heart rate was maintained at 65 beats/min. For postoperative pain control, 0.1mg/kg of oxycodone was administered intravenously 30 minutes before the end of the surgery. The patient recovered from the anesthesia without any events. Following tracheal extubation, he was transferred to the post-anesthesia care unit (PACU).

The patient's vital signs were stable and the postoperative pain was managed through IV PCA (intravenous patient controlled analgesia) with fentanyl and propacetamol. The patient occasionally rolled over his body from side to side due to postoperative pain. Fifty minutes after arrival in the PACU, the patient suddenly became very anxious and complained of discomfort and pain in the left chest. Rhythmic contraction of the left pectoral muscle synchronous with his heart beats was observed. The patient's vital signs were stable, with a blood pressure of 150/70 mmHg, a heart rate of 65 beats/min, and a respiratory rate of 15

breaths/minute. We calmed him down and administered intravenous fentanyl 30- 50 μg as required. A 12 lead ECG was taken to evaluate the function of the pacemaker, which appeared to be normal in the DOO mode. Chest AP was taken. When comparing his chest X-ray at PACU with the preoperative one, the pacemaker location seemed to have shifted laterally (Fig. 1). We made contact with the cardiac electrophysiology team to examine the pacemaker. The atrial and ventricular lead impedances in the bipolar configuration were measured as 287 and 357 Ω , respectively. The pacemaker mode was changed from DOO to DDDR and the pulse amplitude was lowered from 2.50V to 2.25V. The lower tracking heart rate was also changed from 65 to 60 bpm. Subsequently, the chest pain with the rhythmic contraction of the left pectoral muscle disappeared. The patient was transferred to the general ward. Pectoral stimulation did not recur afterwards. In a pacemaker interrogation carried out months later, the pacemaker was working properly and the atrial and ventricular lead impedances in the bipolar configuration were measured as 343 and 370 Ω , respectively.

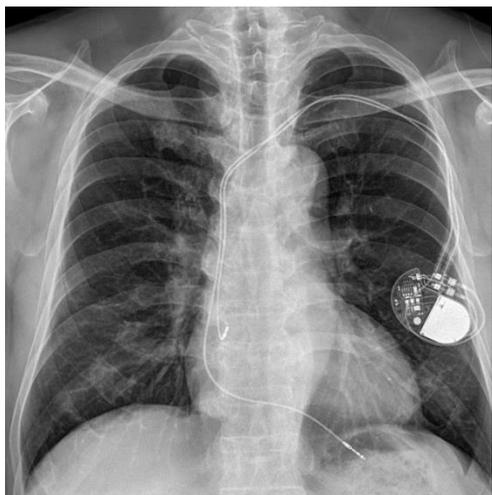


Fig 1(A):. Chest x-ray: Preoperative chest PA shows the proper position of the pacemaker.



Fig 1(B): Chest x-ray :Chest AP taken at PACU shows lateral shifting of the pacemaker compared to the preoperative chest x-ray.

DISCUSSION

Extracardiac stimulation is a rare perioperative complication that may lead to serious discomfort and detrimental outcomes. Pacemaker-induced pectoral stimulation may be caused by lead insulation defects, connector problems, defective coating of the pacemaker can, or displacement or incorrect orientation of the pacemaker causing its active surface to come into contact with the muscle [5,7-9]. As pectoral stimulation may be accompanied by pacemaker dysfunction [5], ECG monitoring is required. In addition, a chest x-ray should be taken to detect pacemaker complications such as displacement of the leads or generator [9,10]. A pacemaker interrogation should be conducted as soon as possible.

In the case of our patient, the lead impedance had not decreased significantly, which suggested no abnormalities in the lead insulation. As the generator appeared on the chest AP taken in the PACU to have shifted laterally with an incorrect orientation (Fig. 1), the displacement of the generator might have been a factor in the extracardiac stimulation of the patient. It is speculated that a minor connector problem or contact of the active surface of the generator with the muscles as a result of the displacement may have been responsible for the extracardiac stimulation. This was in line with the patient's past history of experiencing palpitations in the left lateral decubitus position. The displacement of the generator found in the PACU may have been caused by a semi-lateral position, as the patient rolled over from side to side in the PACU. It is known that rotation or twisting of the generator may be caused by mobility of the implanted generator within a relatively large pocket, or by manipulation of the pocket [8]. In severe cases, this can bring about lead dislodgement and pacemaker dysfunction [11].

As treatment for extracardiac stimulation, reprogramming of the pacemaker by lowering the output parameters or changing the mode may relieve the symptoms [8,12]. If the problem persists, repositioning or replacement of the leads is necessary to resolve the defects or the displacement of the leads [5,13]. Adequate pain control and reassurance are also needed as the rhythmic contraction of the muscles induces pain, discomfort, and anxiety.

In this case, extracardiac stimulation was resolved by reprogramming of the pacemaker. We changed the pacemaker mode from DOO to DDDR, and the pacemaker atrial output was lowered from 2.5V to 2.25V. The lower rate was decreased from 65bpm to 60bpm in order to reduce the paced beats causing the extracardiac stimulation. After several months of post-surgery follow-up, the palpitations did not reappear.

CONCLUSION

Pacemaker-induced extracardiac stimulation may be accompanied by pacemaker dysfunctions or displacements of the pacemaker leads or generators. Therefore, interrogation of the pacemaker is essential. Reprogramming of the pacemaker, repositioning or replacement of the leads may be needed.

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