

## Case Report

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# Migration of a Temporary Epicardial Pacing Wire to the Main Pulmonary Artery Trunk During the Acute Phase After Cardiac Surgery

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## Abstract

A 60-year-old man was referred to the emergency room of our hospital with back pain. During examination, he suffered a cardiopulmonary arrest. Suspecting acute coronary artery syndrome, emergency coronary angiography was performed. During percutaneous coronary intervention to the proximal left circumflex artery, cardiac tamponade occurred, and the patient was transferred to the operating room for an emergency repair of a left ventricular rupture. Before closing his chest, a Temporary Epicardial Pacing Wire (TEPW) was placed on the right ventricle. This wire was cut flush with the skin surface on postoperative day 7. On POD 28, the patient experienced an inflammatory reaction, and on POD 30, computed tomography revealed that this TEPW had migrated into the pulmonary artery. Under fluoroscopic guidance, the wire was extracted from the right ventricle and pulmonary artery using a gooseneck snare. After extraction, the patient's recovery was uneventful.

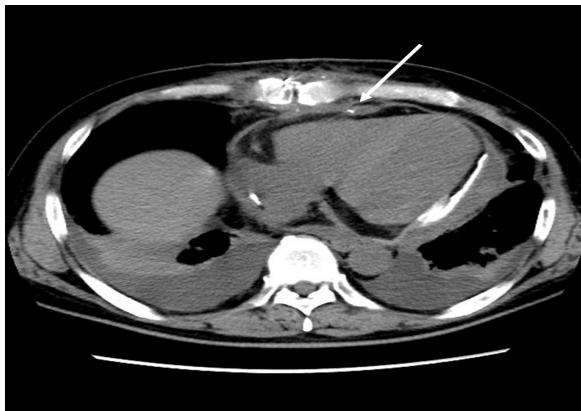
Temporary pacing wires are widely used for postoperative care after many types of cardiac surgeries. We report a case wherein a temporary pacing wire migrated to the pulmonary artery via the right ventricle. The wire was successfully removed with a loop basket catheter.

## Clinical Summary

The patient was a 60-year-old man who was admitted to our emergency department with acute back pain. A chest Computed Tomography (CT) scan revealed no evidence of acute aortic dissection. However, slight hematoma around the ascending aorta and failure of contrast in the area of the Left Circumflex Branches (LCX) were observed. During the acquisition of contrast-enhanced CT, the patient suffered cardiopulmonary arrest requiring Cardiopulmonary Resuscitation (CPR). The electrocardiogram showed ST segment elevation. The biomarkers had also increased. Suspecting acute coronary artery syndrome, an emergency coronary angiography supported by an Intra-Aortic Balloon Pump (IABP) was performed. During percutaneous coronary intervention to the proximal LCX, cardiac tamponade occurred, resulting in hypotension. The patient was placed on percutaneous cardiopulmonary support, and pericardial drainage using a puncture kit was performed. This was insufficient to control the bleeding; therefore, the patient was transferred to our operation room for open drainage and hemostasis.

A median sternotomy was performed under general anesthesia. When the pericardium was opened, injury to the LCX coronary artery and a possible blow-out type left ventricular rupture near the proximal LCX were detected. After establishing a cardiopulmonary bypass, cardioplegic arrest was induced, and the ruptured lesion was repaired with mattress stitches reinforced by Teflon felt. The patient was weaned off the bypass without any trouble, and the chest was closed in the usual manner. Because of the patient's acute coronary syndrome and an epicardial hematoma on the right ventricle due to the blow-out type left ventricular rupture, a suture-type Temporary Epicardial Pacing Wire (TEPW) was placed on the inferior wall of the right ventricle on the diaphragm side. The patient required temporary continuous hemodialfiltration and prolonged respiratory management because of preoperative shock. He was extubated, and IABP was discontinued on Postoperative Day (POD) 5. On POD 10, he was transferred to his ward to initiate cardiac rehabilitation. However, on POD 28 he experienced inflammatory reaction, with a fever of 39°C, leukocytosis, and a blood culture positive for *Enterococcus faecalis*. Mediastinitis was suspected due to preoperative CPR, and therefore, his condition

was regularly monitored with chest CT (Figure 1a).



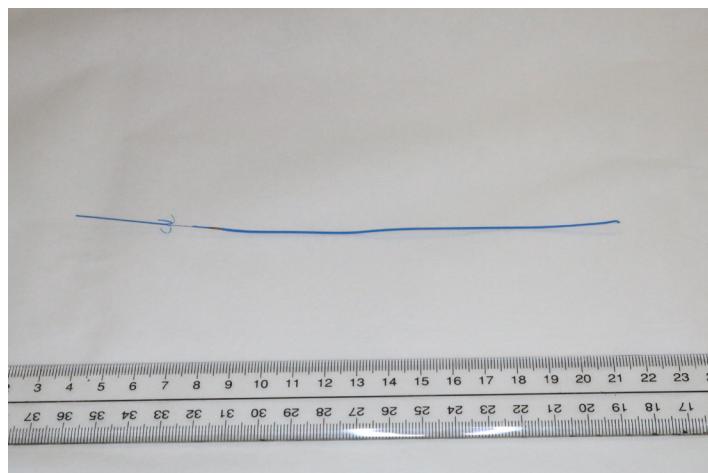
**Figure 1a:** CT image of the chest. The epicardial pacing wire was still placed on the right ventricle (the arrow).

On POD 30, a high-density foreign body was detected in his main pulmonary artery. Clinical manifestation revealed no evidence of an acute embolic process. However, a linear opacity was observed in the left pulmonary artery, originating in the right ventricle and terminating in a proximal branch of the left pulmonary artery (Figure 1b).



**Figure 1b:** CT image on 30POD showing the pacing wire migrated into the right pulmonary artery (the arrow).

This did not appear to be causing any flow disruption. Further, it was not found to be associated with a visible thrombus. Because of concerns regarding further migration, infection, and perforation of the lung parenchyma, we elected to remove the foreign body. Under fluoroscopic guidance, the right femoral vein was cannulated, and the foreign body was extracted from the pulmonary artery using a 35-mm Amplatz Goose Neck Snare (AGA Medical Corp, Plymouth, Minn). The foreign body was found to be an 18-cm segment of the TEPW that had been inserted 30 days previously (Figure 2).



**Figure 2:** The extracted pacing wire.

This had been cut at the surface of his abdominal skin on POD 7 because it had proved difficult to withdraw. After the extraction, the patient's recovery was uneventful, and cultures from the wire showed negative results.

### Comment

TEPWs are routinely used for the treatment of postoperative bradycardia to maintain hemodynamic condition after cardiac surgery; usually, they are extracted before discharge [1,2]. Their safety and efficacy in routine cardiac surgery are widely accepted, and complications related to TEPWs placed during cardiac surgical procedures are rare [3]. However, catastrophic complications sometimes occur following extraction of the wires, with reports of cardiac arrhythmia, injuries to coronary artery bypass grafts, and atrial or ventricular lacerations resulting in cardiac tamponade [4]. Therefore, the wire should be removed by gentle traction, and it can be cut flush with the skin if the surgeon experiences any resistance for its removal [5]; this has been recognized as an adequate maneuver.

However, there have been several case reports of complications arising due to the migration of retained epicardial wires to the right or left side of the heart. Kondo and colleagues reported a rare case of epicardial pacing wire migration to the jaw [6]. In the present case, our resident tried to remove the wire on POD 7 but was unable to pull it out smoothly. He cut the wire flush with the skin under appropriate pulling tension. Chest CT on POD 6 retrospectively revealed that the tip of the wire was in the right ventricle although more than 80% of the length was in or on the myocardium of the right ventricle. This case is important for demonstrating that a temporary pacing wire on the right ventricle can sink into the right ventricle myocardium in an acute process following surgery and may then migrate to the pulmonary artery. We speculated that the mechanism of this case can be; 1. when our

resident cut the wire while pulling it up, a part of the tip of the wire might enter the right chamber lumen. 2. Squeezing effect by the contraction power of the right ventricle might bring forward the wire beat by beat.

Temporary epicardial pacing remains an important and reliable treatment for postoperative bradyarrhythmia. Bethea and colleagues noted that if patients with these risk factors were excluded, only 2.6% of patients were found to have required pacing [7]. The routine use of TEPWs should be considered carefully. Additionally, surgeons should be mindful of retained TEPWs even when patients present with no symptoms. The potential complication of migration of the wire should be suspected and excluded, and all TEPWs should be completely removed whenever possible.

## Conclusion

The complications due to the retention of a cardiac pacing wire should be communicated to all physicians responsible for the patient's care because of the potential for issues that may arise many decades after surgery.

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