

# A Mislocation of Double-lumen Catheter Guidewire in Right Atrium Successfully Retrieved with Loop-wire Snaring: A Case Report

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## ABSTRACT

*The increasing rate of central vascular access use especially for hemodialysis access in Indonesia carries risk of retention of the guidewire to the heart resulting in a condition known as heart foreign bodies. We described a case of mislocation of double-lumen catheter guidewire to the right atrium in a patient planned to perform hemodialysis. The patient complained of dyspnea and swelling of extremities but the symptoms had already appeared before the insertion of the catheter due to the patient's underlying kidney disease arising conclusion that the foreign bodies itself are asymptomatic. The wire was found on chest x-ray and then confirmed on fluoroscopy during the retrieval procedure. Loop-wire was used to snare the guidewire. The wire was successfully evacuated and the patient was stable. The rare nature of the condition could become a challenge in recognizing the condition. Percutaneous retrieval is the preferred management of the condition.*

**Keywords:** heart foreign bodies, double-lumen catheter guidewire, right atrium, snaring.

## INTRODUCTION

The rate of central vascular access use for either central venous line or hemodialysis is always on the rise. In the United States, almost 150 million central venous catheters are used every year.<sup>1</sup> In Indonesia, there is no available data yet. Moreover, Indonesia Renal Registry recorded 132.142 patients actively performing hemodialysis until 2018, which part of the number received central access for the short-term hemodialysis.<sup>2</sup> However, the use of central vascular access carries risk of dislodged catheters or wires to the heart which lead to complications putting the patients into fatal outcomes.

Here, we report a case of double-lumen catheter guidewire, originally intended to give access for short-term hemodialysis, dislodged

to the right atrium which then was successfully retrieved with the percutaneous loop-wire snaring. The aim of this report is to report the case with rare nature to give readers a new perspective.

## CASE ILLUSTRATION

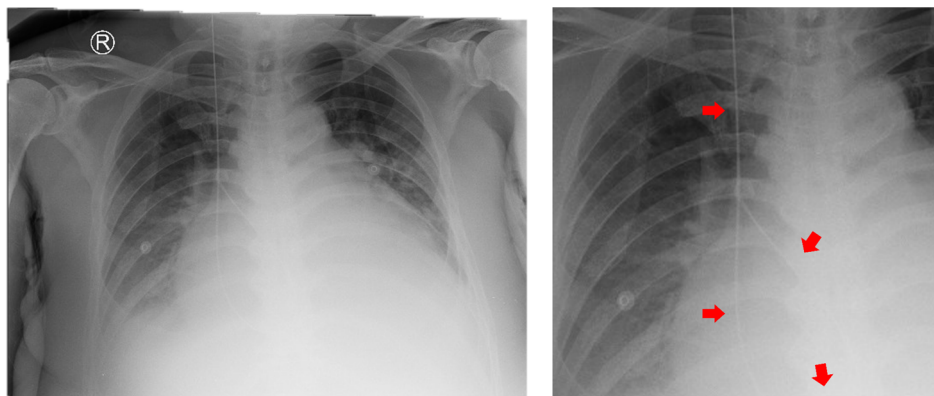
A 62 year-old man was referred by fellow anesthesiologist from RS Adhyaksa to the RS Cipto Mangunkusumo emergency department (ER) with the plan to evacuate a double-lumen catheter guidewire that was being misplaced in the right atrium. Previously, the patient presented to RS Adhyaksa with severe dyspnea since the day before. Since the beginning of the week, he reported dyspnea that was exacerbated by moderate activity. He also had a productive

cough, yet fever was denied. He reported swelling of arms and legs without redness and pain. The day before admission to hospital, he complained that the swelling had increased and he had not urinated yet for the day. At Adhyaksa Hospital, furosemide was administered and the urine production was 1.1 liters for twelve hours, nonetheless the dyspnea were getting severe. Therefore, the internist in charge consulted the patient to anesthesiologist to perform hemodialysis access. The anesthesiologist inserted the double-lumen catheter, but the guidewire jumped in deeper in the vessel and in radiograph evaluation, the wire was displaced in the right atrium. No symptoms such as chest pain were reported. The patient had never performed hemodialysis before. He had a history of type 2 diabetes mellitus 19 years earlier and routinely consumed gliquidone and acarbose. Hypertension was diagnosed one year earlier, coinciding with the patient's declining kidney function. No history of cardiac catheterization reported.

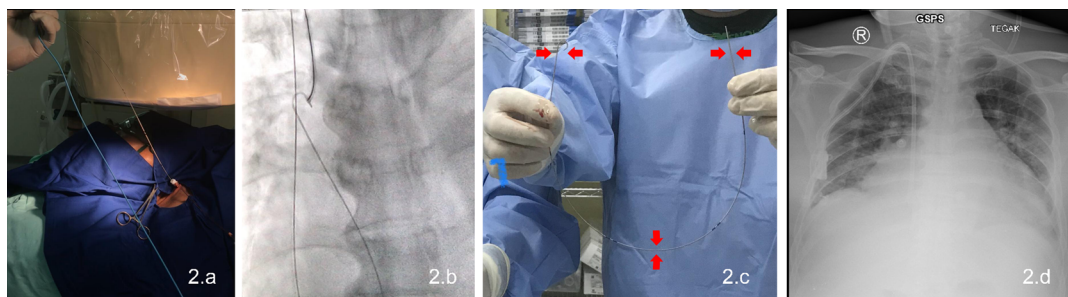
On physical examination, the patient was alert. Blood pressure was 147/74 mmHg, heart rate 78 bpm, respiratory rate 23 times/min and pulse oximeter 99% saturation on 10 lpm simple mask oxygen supplementation. Conjunctiva were anemic, rales were heard on the lung bilaterally, and both upper and lower extremities were edema bilaterally. Other remaining physical examinations were normal. Laboratory results revealed anemia (Hb 6.8 mg/dL), left shift of white blood cells, marked decreasing kidney function (blood urea nitrogen 224 mg/dL and serum creatinine 5.4 mg/dL), hypoalbuminemia

(albumin 2.4 g/dL) and electrolytes imbalance including hyponatremia (sodium 130 mEq/L), hypercalcemia (total calcium 7.7 mEq/L; ionized 1.14 mEq/L), hyperphosphatemia (phosphorus 4.9 mEq/L), and hypermagnesemia (magnesium 2.88 mEq/L). Electrocardiogram revealed sinus rhythm, heart rate 75 bpm, left axis deviation, PR interval 0.12 s, QRS complex 0.08 s, inverted T wave on V5-V6, no ST segment changes, no ventricular hypertrophy, and no branch blocks. Chest x-ray showed cardiomegaly, suspected pericardial effusion, pulmonary congestion, and minimal bilateral pleural effusion as shown in **Figure 1**. The suspicion of pneumonia could not be ruled out from radiography. However, the radiologist failed to recognize the foreign body in their expertise' report. The patient then was being referred to us for identification of the foreign body, its location, and plan to evacuate it.

The patient was given oxygen supplementation, electrolyte correction solutions, blood transfusion, diuretics, anti-hypertension, and antibiotics while waiting for the scheduled evacuation in the ER. The next day, the evacuation was done in the cath lab. The patient was locally anesthetized within the area of the access near the right jugular vein with 200 mg lidocaine 2%. Then, a fluoroscopy was performed to confirm the exact location of the guidewire. The wire was found to be lying from the jugular vein to the right atrium. The procedure of the extraction as shown in **Figure 2A** began with the insertion of sheath in the right jugular vein. 6-French Judkins Right 3.5 catheter then inserted and MemoPart™ Snare -20 entered the catheter lumen to perform the



**Figure 1.** Chest x-ray of the patient



**Figure 2.** A. Procedure of the guidewire extraction, B. Snaring of the guidewire with MemoPart™ Snare -20, C. The undamaged extracted guidewire, D. Post-procedure chest x-ray.

snaring. The MemoPart™ Snare -20 could locate the guidewire without difficulty as shown in **Figure 2B**. The wire then was successfully snared and extracted. The extracted wire was intact as shown in **Figure 2C**. A long-term double-lumen catheter then was tunneled from jugular vein to superior vena cava. The patient was stable after the procedure, no complication occurred except minimal bleeding on the site of the access. Chest x-ray was done to evaluate the patient post-procedure and revealed normal condition as shown in **Figure 2D**. Subsequently, heparin lock was administered through the newly established catheter access. Finally, emergent hemodialysis was performed.

## DISCUSSION

The cases of foreign bodies in the heart are rare, however no data currently available on the prevalence of heart foreign bodies. The most common foreign bodies encountered are different catheters and wires (16%), followed by vena cava filters (14%) and stents (11%).<sup>3</sup> The increasing use of these devices nowadays provides risks of the increasing rate of the iatrogenic retention of heart foreign bodies. A retrospective study with around 5000 participants who received intracardiac catheters for treatment modalities reported 0,07% incidence on iatrogenic retention.<sup>4</sup> The approximate number for the retention or misplacement of wires, specifically double-lumen hemodialysis catheter guidewires as presented in this paper is unknown, though several cases were reported.<sup>5,6</sup> Other commonly encountered foreign bodies are ventriculo-atrial shunts, VP shunts, pacemaker leads, and non-iatrogenic objects namely bullets, needles, tattoos, staples, and pieces of metal.<sup>3</sup>

Regardless of the limited cases, heart foreign bodies impose major risk for complications related to the heart. Several complications reported caused by these objects are fatal notably thromboemboli, infective endocarditis, valve regurgitation, sepsis, arrhythmia, and even cardiopulmonary arrest<sup>3,7-9</sup> with mortality rate ranging from 24 to 60 percent<sup>10</sup>, while another study reported mortality of 4 percent.<sup>3</sup> Except for a small number of cases with the complications, heart foreign bodies are generally asymptomatic. Therefore, it becomes a challenge to identify heart foreign bodies from clinical appearance. Radiograph evaluation like chest x-ray is usually required. Symptoms associated with heart foreign bodies are dyspnea, arrhythmia, chest pain, infection, and tamponade or pericardial effusion.<sup>3</sup> However, in the case presented, the symptoms complained by the patient namely dyspnea and swelling of extremities are likely due to the underlying condition of the patient which is the chronic kidney disease. In fact, after the insertion of the double-lumen hemodialysis catheter and the displacement of the guidewire, the patient did not report worsening dyspnea nor swelling. Hence, the patient was asymptomatic in relation to the heart foreign bodies.

The most frequent location of heart foreign bodies is in the right ventricle, while the right atrium as in the patient in this report is the second most frequent location.<sup>3</sup> Looking at the common objects to be the foreign bodies, it came to no surprise that the right side of the heart is the common site. Catheters and their following guidewires are usually inserted at the peripheral vein including jugular vein and subclavian vein that lead to superior vena cava and finally to the right atrium and ventricle. Likewise, filters are

inserted in the vena cava that leads to the right atrium. Other frequent locations are pulmonary artery (18%), left ventricle (7%), pericardium (7%), and left atrium (3%).<sup>3</sup>

The patient in this report is managed with percutaneous retrieval with loop-wire snaring technique. The loop-wire was inserted through the sheath to the location of the mislocated guidewire and snared it before it was pulled out. Percutaneous endovascular approaches are now the preferred management for the heart foreign bodies, especially those with the form of catheters and wires. It is considered to be effective and safe compared to the previously adapted open surgery, specifically thoracotomy. The successful rate of percutaneous approach in retrieving foreign bodies is above 90 percent, while no injury to the vascular or heart wall is recorded.<sup>10</sup> Moreover, the other study reported the successful rate up to 100 percent with no complications being recorded.<sup>11</sup> The varied devices to be used to retrieve the foreign bodies is also an advantage. Some of the forms of the snare are goose-snare, dormia basket, forceps, pigtail catheter, and balloon.<sup>10</sup> On the other hand, thoracotomy possesses a risk of post surgery mortality up to 4 percent. In addition, the patients need antibiotics for 10 to 14 days after the surgery. The open surgery is now only performed in the foreign bodies located in the peripheral vein.<sup>12,13</sup>

## CONCLUSION

Foreign bodies in the heart such as double-lumen hemodialysis catheter guidewire retained in the right atrium which presented in this report is a rare case. Furthermore, the condition is asymptomatic in most of the cases. However, it carries risk of fatal complications. Therefore, rapid recognition of the condition from the available data including chest x-ray is important. The object is preferably retrieved with the percutaneous technique, in this case, loop-wire snaring.

## REFERENCES

1. Jarvis WR, Murphy C, Hall KK, et al. Health care-associated bloodstream infections associated with negative- or positive-pressure or displacement mechanical valve needleless connectors. *Clin Infect Dis.* 2009;49(12):1821–7.
2. PERNEFRI. 11th Report of Indonesia Renal Registry. PERNEFRI. 2018;
3. Leitman M, Vered Z. Foreign bodies in the heart. *Echocardiography.* 2015;32(2):365–71.
4. Santini F, Gatti G, Borghetti V, Oppido G, Mazzucco A. Routine left atrial catheterization for the post-operative management of cardiac surgical patients: is the risk justified? *Eur J Cardiothorac Surg.* 1999;16(2):218–21.
5. Leite TF de O, Pazinato LV, Bortolini E, Pereira OI, Nomura CH, Filho JM da ML. Endovascular Removal of Intravascular Foreign Bodies: A Single-Center Experience and Literature Review. *Ann Vasc Surg.* 2022;82:362–76.
6. Adulla M, Chan MR, Hermesen JL, Tefera G, Yevzlin AS. Stent migration and folding in the subclavian vein during subclavian hemodialysis catheter placement. *Semin Dial.* 2009;22(1):81–3.
7. Balbi M, Bertero G, Bellotti S, Rolandelli ML, Caponnetto S. Right-sided valvular endocarditis supported by an unexpected intracardiac foreign body. *Chest.* 1990;97(6):1486–8.
8. Suárez-Peñaranda JM, Guitian-Barreiro, Concheiro-Carro L. Longstanding intracardiac catheter embolism. An unusual autopsy finding. *Am J Forensic Med Pathol.* 1995;16(2):124–6.
9. Denny MA, Frank LR. Ventricular tachycardia secondary to Port-a-Cath fracture and embolization. *J Emerg Med.* 2003;24(1):29–34.
10. Gabelmann A, Kramer S, Gorich J. Percutaneous retrieval of lost or misplaced intravascular objects. *AJR Am J Roentgenol.* 2001;176(6):1509–13.
11. Lyu T, Cao S, Wang J, Song L, Tong X, Zou Y. Endovascular removal of foreign bodies: Single center experience. *Indian J Surg [Internet].* 2022 Apr 18; Available from: <https://doi.org/10.1007/s12262-022-03395-3>
12. Gschwind CR. The intravenous foreign body: a report of 2 cases. *J Hand Surg Am.* 2002;27(2):350–4.
13. Song M, Wei M, Song Z, Li L, Fan J, Liu M. A foreign body in the cephalic vein: A case report. *Medicine.* 2018;97(25):e11144.