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Removal of a pulmonary artery foreign body during pulse ablation in a patient with atrial fibrillation: A case report

Yan R *et al.* Pulmonary artery foreign body removal

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Abstract

BACKGROUND

Foreign bodies in the pulmonary circulation have been documented in the literature, mostly caused by interventional procedures. However, reports of pulmonary artery foreign bodies during femoral vein puncture are rare and there is no description of such complication from the guidewire surface flows into the pulmonary artery during a pulse ablation in a patient with atrial fibrillation.

CASE SUMMARY

We describe a case in which a linear foreign body suddenly appeared on fluoroscopy image during pulsed ablation of atrial fibrillation. Multiposition angiography showed that the foreign body was currently lodged in the pulmonary artery but was hemodynamically stable. We then chose to use an interventional approach to remove the foreign body from the pulmonary artery. This foreign body was subsequently confirmed to be from the hydrophilic coating of the guidewire surface. This may be related to the difficulties encountered during the puncture of the femoral vein. This is a rare and serious complication of femoral vein puncture. Therefore, we report this case in order to avoid a similar situation.

CONCLUSION

Mismatches between interventional devices from different manufacturers used for femoral venipuncture may result in pulmonary artery foreign bodies.

Key Words: Femoral vein puncture; Atrial fibrillation; Guide wire; Complication; Pulmonary artery foreign body; Case report

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Core Tip: A case of pulmonary artery foreign body removal during pulsed atrial fibrillation ablation is reported. This is a rare and serious complication of femoral vein puncture. Therefore, we report this case in order to avoid a similar situation.

INTRODUCTION

Foreign bodies in the pulmonary circulation have been documented in the literature, mostly caused by interventional procedures^[1]. During the diagnosis and treatment of cardiovascular intervention, vascular sheath or catheter breakage may occasionally occur, and the residue in the vessel is easy to float to various parts of the organ along the blood flow.¹ Despite the low incidence, foreign body embolization can trigger serious and potentially fatal complications. Therefore, the removal of these foreign bodies, whenever possible, is recommended^[2]. We describe a case in which a linear foreign body suddenly appeared on imaging during pulsed ablation of atrial fibrillation. Multiposition angiography showed that the foreign body was currently lodged in the pulmonary artery but was hemodynamically stable. We then chose to use an interventional approach to remove the foreign body from the pulmonary artery. This is a rare and serious complication of atrial fibrillation ablation. Therefore, careful manipulation of guidewire is essential to prevent a similar situation.

CASE PRESENTATION

Chief complaints

A 63-year-old male with a history of paroxysmal atrial fibrillation was referred to our hospital for pulse ablation.

History of present illness

For 3 years ago, the patient had palpitations and shortness of breath during intermittent activities such as fast walking and uphill, which could be relieved by rest. On July 14, 2022, the patient felt dizzy and palpitation. The dynamic electrocardiogram showed paroxysmal atrial fibrillation, so he came to our hospital for diagnosis and treatment.

² *History of past illness*

The patient had a 3-year history of hypertension and was currently treated with antihypertensive drugs with ideal blood pressure control. There was no other medical history. Previous carotid ultrasound indicated carotid plaque formation.

Personal and family history

He was born in the original place, had not been to the epidemic area, had no history of smoking, drinking, and family genetic history.

Physical examination

The blood pressure was 136/72 mmHg, the respiratory rate was 18 beats per minute, the pulse was 70 beats per minute, and the temperature was 36.4 °C, and MBI was 25.7. Physical examination of the heart, lungs, and abdomen showed no positive signs.

Laboratory examinations

Laboratory tests showed no positive results.

Imaging examinations

Echocardiography showed normal cardiac morphology and structure, mild valvular regurgitation, normal left ventricular systolic function, and reduced diastolic function.

computed tomography scan of the left atrial and pulmonary vein showed enlargement of the left atrium without abnormal density in the left atrial appendage cavity.

FINAL DIAGNOSIS

The patient was diagnosed as paroxysmal atrial fibrillation.

TREATMENT

The procedure was as follows: After all the preparations were in place, we prepared the femoral venipuncture. Different from the previous puncture, we used another 11F puncture needle sheath (11F, Terumo, Japan) from another manufacturer for the first time. This sheath has its own guide wire and puncture needle, and the surface of the guide wire is covered by a plastic film. Although we observed the difference in the guide wire, we did not pay attention to it. During the puncture process, the plastic trocar (a part of 11F puncture needle sheath, Terumo, Japan) became deformed due to the tortuosity of the vein and could not be smoothly delivered into the vein. We were forced to use an ordinary puncture needle (7F, Medtronic, United States), and then to deliver the 11F sheath into the femoral vein through the guidewire exchange. After atrial septal puncture and a series of preoperative preparations, pulse ablation was initiated. At the beginning of the ablation, we used imaging to guide the position of the ablation catheter, and there was no obvious abnormality. However, when we started to ablate the right inferior pulmonary vein, X-ray showed a linear foreign body in the field of view of the right inferior pulmonary vein, which was fixed and moved in place with the heart contraction (Figure 1A and B). During the operation, sufficient heparin was given to maintain the ACT in the normal range, and the patient's hemodynamics was stable. Therefore, we successfully completed the right pulmonary vein ablation under X-ray, and repeated multi-angle fluoroscopy could still clearly see the foreign body without obvious abnormal movement. After excluding the interference of external substances, we immediately performed pulmonary arteriovenous angiography, which confirmed that the foreign body was from the right pulmonary artery (Supplementary

material). Then he received percutaneous intervention for a foreign body removal. It was successfully retrieved with a trap (Shanghai Shape Memory Company, China) (Supplementary material). It was a linear substance about 15 cm in length (Figure 1C). The patient returned safely to the ward and was discharged 2 d later.

Finally, all the instruments used in the operation were retained and tested, and it was confirmed that the foreign body came from the plastic coating on the surface of the new guide wire (Figure 2A). The foreign body entered the femoral vein and followed the circulation to the pulmonary artery.

Fortunately, the foreign body was found in time during the operation and treated promptly without more serious complications, such as pulmonary embolism. After operation, low molecular weight heparin was injected subcutaneously to prevent thrombosis.

OUTCOME AND FOLLOW-UP

Pulse ablation of atrial fibrillation was successfully completed, and no atrial fibrillation occurred during postoperative follow-up.

DISCUSSION

The reason why the plastic coating was able to enter the femoral vein was recalled repeatedly. It was considered that the mismatch between the traditional metal puncture needle and the new guide wire used at that time might be related. When the ordinary metal puncture needle and the guide wire were at an Angle in the blood vessel and the blood return was not smooth and needed to be withdrawn, the surgeon chose to withdraw the guide wire first, so that the tip of the needle cut off the plastic coating on the surface of the guide wire, resulting in foreign body (Figure 2B-D, Supplementary material). With the blood flow through the venous system, it gradually entered the right atrium and right ventricle, and then flowed into the pulmonary artery. However, these events may have been avoided if the needle had been withdrawn first.

The formation of foreign body in the pulmonary artery during atrial fibrillation ablation has not been reported in the domestic and foreign literature. In the previous literature, the formation of foreign body in the pulmonary artery is mostly related to trauma or interventional^[3]. Although small foreign bodies may not cause complete pulmonary embolism temporarily, they can lead to intimal thickening and fibrosis and gradually lead to severe embolism. Therefore, once the diagnosis is clear, it should be treated^[4]. ¹ Percutaneous extraction of embolized catheters using femoral venous access is the gold standard, preferably the right femoral venous access as it has a high success rate^[5]. Although our case was successful, we should know that it is essential for beginners to be good at observing, understanding the characteristics of each type of puncture needle sheath, reading the instructions carefully and complying with the operating procedures strictly.

CONCLUSION

Although our case was successful, we should know that it is essential to be good at observing, understanding the characteristics of each type of puncture needle sheath, reading the instructions carefully and complying with the operating procedures strictly. Besides, mismatches between interventional devices from different manufacturers used for femoral venipuncture may result in pulmonary artery foreign bodies

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Figure Legends

Figure 1 Please add a title. A: A foreign body appeared in the right lower lung field; B: Pulmonary angiography showed a foreign body inside the right lower pulmonary artery; C: The foreign body is a line-like substance about 15 cm long.

Figure 2 Please add a title. A: Needle sheath system (11F, Terumo, Japan); B-D: The formation of foreign body.

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PRIMARY SOURCES

1

Túlio Fabiano de Oliveira Leite, Lucas Vatanabe Pazinato, Edgar Bortolini, Osvaldo Ignacio Pereira et al. "Endovascular removal of intravascular foreign bodies: A single-center experience and literature review", Annals of Vascular Surgery, 2021

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