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Dislodged Watchman Device Retrieved Using Double Transseptal Sheaths Technique and Reinstalled with LAmbre Device

CASE REPORT

INTRODUCTION

In patients with persistent atrial fibrillation (AF) with a high risk of bleeding, left atrial appendage closure (LAAC) has gradually become the best alternative to long-term oral anticoagulant therapy in preventing stroke.[1] However, in some patients, the occlusion device falls off because of various reasons, such as improper selection or unstable preinstallation, and constitutes one of the most serious complications of LAAC.[2] Here, we report a case of an elderly patient with AF. On the second day after the surgery, her Watchman device fell off. The detached device was retrieved using the double transseptal sheaths technique, and the LAmbre device was installed.

CASE REPORT

A 61-year-old woman was diagnosed with persistent AF 2 years ago (CHA2DS2-VAsc score of 6 and HAS-BLEED score of 2). Her medical history included a diagnosis of cerebral infarction, mitral and tricuspid valve replacement, and implantation of a permanent pacemaker because of acquired third-degree atrioventricular blockage after the valve replacement. She was referred to our hospital for percutaneous LAAC on account of a large left atrium [anteroposterior diameter of 60 mm on transesophageal echocardiography (TEE)], thrombophilia (protein C activity of 94% and protein S activity of 54.8%), and high risk of embolization.[3] Multiangle assessment using transesophageal ultrasound showed that the diameter of the (LAA) opening at an angle of 135° was 28 mm (Figure 1A, J). Meanwhile, fluoroscopy images indicated that the LAA was cauliflower type (the ostium diameter was 29 mm) (Figure 1D). A 33-mm Watchman device (Boston Scientific, Minneapolis, Minn, USA) was selected and released from the delivery system after proper and steady implantation.[4] There was no residual leakage (Figure 1E, K). The Watchman device was evaluated after the implantation as per the P.A.S.S. principle and found to be safe and effective.[4]

On the second day after the surgery, transthoracic echocardiography (TTE) showed that the LAAC device had fallen off; however, the patient felt no discomfort except for intermittent chest tightness (Figure 1B). The detached Watchman device was very likely to cause heart rupture and hinder the closure of the biovalve. Hence, we decided to perform a second surgery immediately. Figure 1F shows the fluoroscopy images of the detached Watchman device at the top of the left atrium. Two FlexCaths (81 cm, 15 Fr; Medtronic Cryocath, Minneapolis, Minn, USA) were used for the double transseptal sheaths technique. However, it was difficult to grasp the Watchman device with two gooseneck snare loops (length: 125 cm, diameter: 15 mm; Huayishengji, Beijing, China) guided by a 7Fr EBU 3.5 catheter (Medtronic) (Figure 1G). Therefore, the pig-tail catheter (6Fr; TERUMO, Kyoto, Japan) was introduced through the 15Fr sheath, and the dislodged Watchman device was stabilized against the left atrium roof. The dislodged device was dragged using a snare loop from the same 15Fr sheath until it was near the opening. Another gooseneck snare was used to grasp the proximal end screw of the

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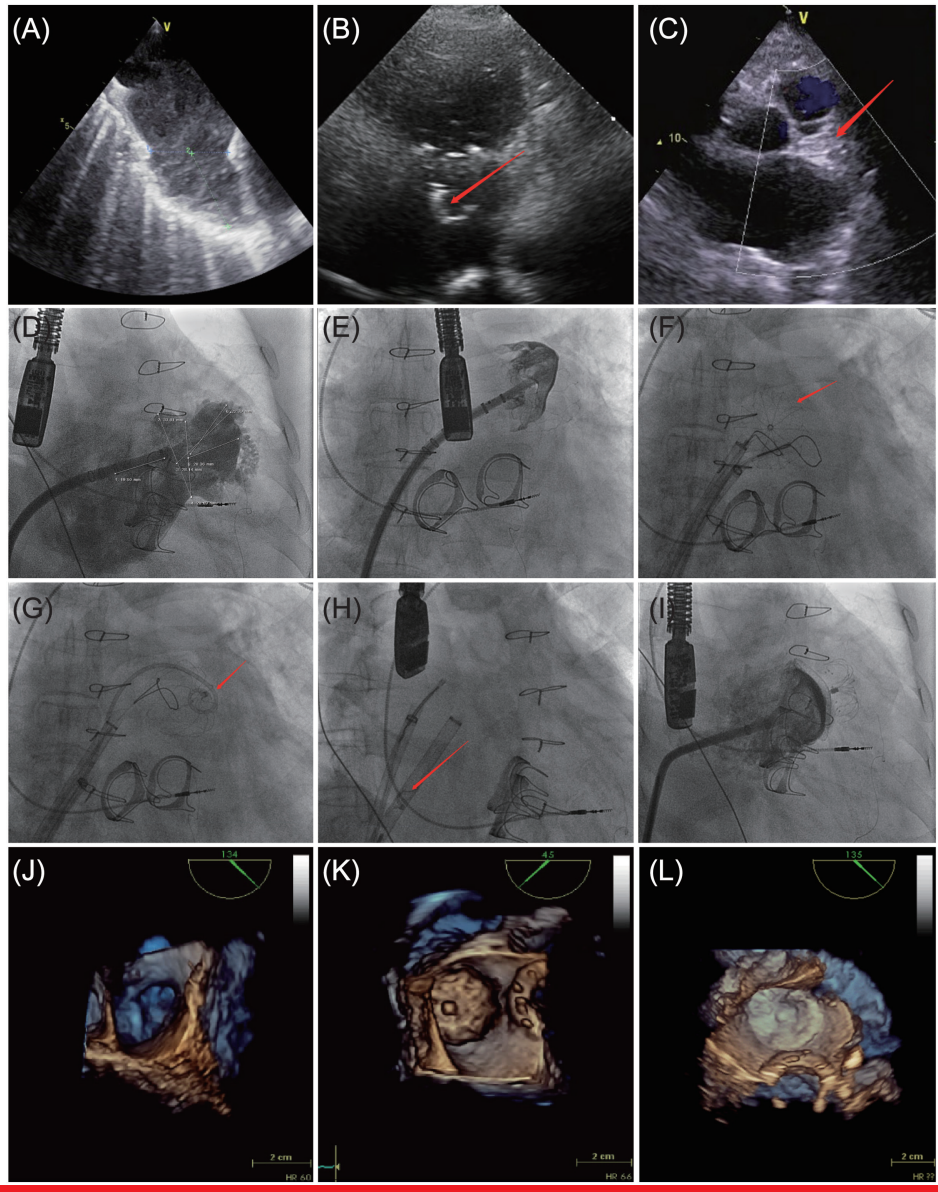

Figure 1. (A, J) Transesophageal echocardiography (TEE) image of left atrial appendage (LAA) before surgery. (B) The Watchman device installed by the LAA was detached from the mitral valve opening (arrow). (C) Transthoracic echocardiography of LAA a year after implantation with the LAmbre device (arrow). (D) Fluoroscopy image of orifice measurement. (E, K) Fluoroscopy and 3D TEE image of detached Watchman device at the top of the left atrium. The orifice was completely closed, and no residual leakage was observed. (F, G, H) Fluoroscopy images of the operation procedure. (I, L) Fluoroscopy and 3D TEE image of the detached LAmbre device at the top of the left atrium. The orifice was completely closed, and no residual leakage was observed.

Watchman device from the other sheath (Figure 1G). In our attempts to retrieve Watchman device on the bench (outside the body), the device was found to be highly sensitive to temperature. When it comes in contact with cold water (approximately 4°C), it becomes very soft (Figure 1H). After grasping tightly, 300 mL of ice water was added quickly along the 15Fr sheath, and the device was promptly pulled out. Finally, a LAmbre 26/38 mm (lobe/disc) device (Lifetech Scientific, Shenzhen, China) was selected and released from the delivery system. The device was evaluated using fluoroscopy and 3D TEE images to determine whether it complied with the C.O.S.T principle before release.[4] There was no residual leakage (Figure 1I, L). The patient was followed up at 1, 3, 6, and 12 months after the surgery, during which the device was observed to be in good condition, and TTE indicated no residual leakage (Figure 1C).

DISCUSSION

According to research reports, in patients with nonvalvular atrial fibrillation (NVAF) and thromboembolic stroke, over 90% of the thrombus originates from the LAA.[5] Therefore, theoretically, LAAC significantly reduces the risk of embolism and, thus, the incidence of stroke.[6] In 2019, the ACC/AHA/HRS listed LAAC as a Class B recommendation for stroke prevention in patients with NVAF who are at high risk for stroke but cannot tolerate long-term anticoagulant

therapy.[4] The Watchman device is the most commonly used LAAC in clinical practice. The device was approved in China in March 2014 and is presently the most well-documented LAAC, with a success rate of over 95%. This device is mainly applied to the LAA without stenosis and with a deep cavity.[7] The LAmbre device is a LAAC manufactured in China and is suitable for several LAA types. The device has no specific depth requirements and is a special model with a large cover and a small umbrella.[8] Preliminary studies have shown that the implant success rate is close to 100%.[9] Huang et al[9] observed that the safety and effectiveness of the LAmbre device are not inferior to those of similar foreign products.

Although the success rate of LAAC implantation is very high, some patients face complications such as pericardial effusion, air embolism, and closure loss. In pivotal and large multicenter trials, the Watchman device exhibited a 0.2–0.7% chance of requiring removal because of embolism or detachment.[6,10] When the LAAC is detached into the thoracic aorta or the abdominal aorta, there is no clinical presentation. If the occlusive device falls off into the left atrium or left ventricle, it can result in mitral valve dysfunction or left ventricular outflow tract obstruction. The symptoms include palpitations and chest tightness, and life-threatening ventricular arrhythmias may also occur in severe cases. According to the 2019 expert consensus, the size of the sealing device being too small, placing it too far out, not fixing it firmly, and so on are the main reasons for falling off.[4] In our patient, the Watchman device was implanted strictly in accordance with PASS. However, the opening of the LAA was lobed in this patient. The outer diameter of the closure is too small in comparison with the actual diameter of the LAA cannot be ruled out, which could result in the failure of the stabilizing device of the closure to hook into the LAA wall completely. With the heart beating and the autonomous activity, the risk of the closure falling off increases. Therefore, we theorized that the small size of the closure relative to the LAA might be the main factor that could have caused the prolapse of the Watchman device in this patient.

In general, angiography and multiangle TEE examination (0°, 45°, 90°, and 135°) should be performed to assess whether the release of any type of closure meets the criteria (e.g., "PASS" and "COST") prior to its release. After the complete release of the occlator, TEE should be repeated to assess the effect of displacement, residual shunt, and surrounding structures to minimize the complications.[4] If the closure is detached, the location of the detachment will determine the clinical symptoms and the technical difficulty of the percutaneous removal of the device. The most technically challenging location is the left ventricle, followed by the left atrium and finally the aorta.[11] In addition, successful removal of the closure is related to the patient's hemodynamic status and the operator's experience. Percutaneous removal usually involves the use of a trap device or foreign-body forceps to fix or adjust the removed sealing device to a relatively safe and easy to grasp heart cavity (e.g., left atrium), grab the device, and inject cold normal saline along the sheath tube to soften it, and then withdraw it into the sheath tube.[11] To reduce the difficulty in equipment recovery, it is very important to stabilize the plugging device. Hence, in order to avoid iatrogenic injury of valve blood vessels and important organs, we used a double transseptal sheaths technique for recovery, with one casing to stabilize the packer equipment and the other casing to capture and recover the equipment. Upon examination, this technique was found to be feasible to remove the Watchman and install the LAmbre device. When removing the closure by the interventional method is expected to be risky or difficult, cardiac surgery is recommended.

This report is about a case in which a LAAC was removed and a different device was installed in a patient with a high risk for stroke after mitral and tricuspid valve replacement. The implication of this case is that for LAAs with undersized closures or cauliflower lobulates at the opening, the LAmbre outer cap type closure may be considered.[8] Furthermore, because the LAmbre(lobe/disc) device is installed primarily at the LAA opening, the depth of the LAA is not strictly required. At the same time, the sealing disc (outer disc) of the outer cap closures is larger, which can easily affect the surrounding tissues, such as the pulmonary vein and the mitral valve. Therefore the Lambre (lobe/disc) device may be suitable for left atrial enlargement in patients with NVAF, but this conclusion needs to be confirmed by further clinical studies.

CONCLUSION

It is feasible to use the double transseptal sheaths technique to retrieve the dislodged Watchman device and install the LAmbre device.

Informed Consent: All authors guarantee that they have obtained the patient consent form. Notably, the patient agreed for the use of her images and other clinical information for publication in the journal. The patient understands that her name and initials would not be published and due efforts would be made to conceal her identity, although anonymity could not be guaranteed.

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