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Case Report

Shed Atrial Septal Occluder Removed by Gastric Biopsy Forceps: A Case Report

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Abstract

Atrial septal defect (ASD) is a common congenital heart disease, and can be treated with occluders. However, occluder detachment remains one of the most urgent complications to be resolved. This paper reported a case of ASD occluder detachment, which was successfully resolved with gastroscopic biopsy forceps. A 57-year-old woman complained chest distress for over one week, and was admitted to cardiovascular department of Sir Run Run Shaw Hospital. Based on echocardiography, the patient was diagnosed as ASD, mitral and tricuspid valve regurgitation. On the second day after percutaneous closure of residual ASD, routine chest radiographs showed the occluder detached into the abdominal aorta. After a thorough evaluation and examination, we decided to use gastric biopsy forceps to remove occluder. As a result, the patient recovered well and discharged from the hospital. For postoperative patients with ASD, when occlusion devices detached and conventional strategies could not extract the occluders, gastric biopsy forceps would be appliable. Compared to conventional strategies, gastric biopsy forceps have better grasping force, and provide secure fixing for disconnected or detached occlusion devices in cardiac interventional surgeries.

Keywords

atrial septal defect; gastric biopsy forceps; occluder dislodgement; case report

Introduction

Atrial septal defect (ASD) is one of the common congenital heart diseases. 60% to 70% of ASD patients can be cured by interventional closure [1]. Occluder shedding is a serious complication during interventional closure, which is most common in ASD closure, with an incidence of 0.24% to 2.3% [2–4]. The occluder shedding in atrial septal occurs mostly during 1 to 3 days after surgery [5]. The detached occluder can damage the heart valve, lead to intravascular thrombosis, and in more severe cases, it would be life-threatening.

Typically, the detached occluder can be extracted by surgeries and interventional strategies. However, due to the various location of dislodgement, conventional strategies tend to be inapplicable [6]. Endoscopic biopsy forceps have smaller diameter, which match most of the interventional sheath tube. Furthermore, the operator can not only manipulate the biopsy forceps outside the patient, but also precisely grasp the front end of biopsy forceps. In this case report, we presented the practical use of gastrointestinal biopsy forceps to resolve occluder detachment in a patient with ASD. The CARE checklist was used when writing this case report in **Supplementary Table 1**.

Case Presentation

A 57-year-old female was admitted to our hospital with chest tightness for over one week. In addition, the patient had a history of syphilis, and hypertension for 15 years, with no treatment history or any other comobidities. Echocardiography after hospitalization revealed ASD, mitral and tricuspid valve regurgitation (Fig. 1). Real-time three-dimensional echocardiography (RT3D-TEE) showed an oval defect of 6.79 $\times$ 6.36 mm in the middle of the atrial septum (Fig. 2). The middle part of the atrial septum showed a pouch-shaped convex toward the right atrium, with a basal width of 16.0 mm and a height of 8.58 mm. As a result, the patient was diagnosed with ASD and prepared for occluder closure operation of atrial septal defect. During the operation, a catheter was inserted into the right atrium with the assistance of intracardiac echocardiography (ICE), when ICE showed no residual shunt, the distance between the occluder and the other structures was normal, then the occluder (diameter 12 mm) was released and the system was withdrawn. After releasing, ICE showed no pericardial effusion, the sheath was withdrawn and the local bandaging was compressed.

On the second day after surgery, the patient complained chest tightness and palpitation, postoperative conventional chest X-ray suggested that the occluder fell to the

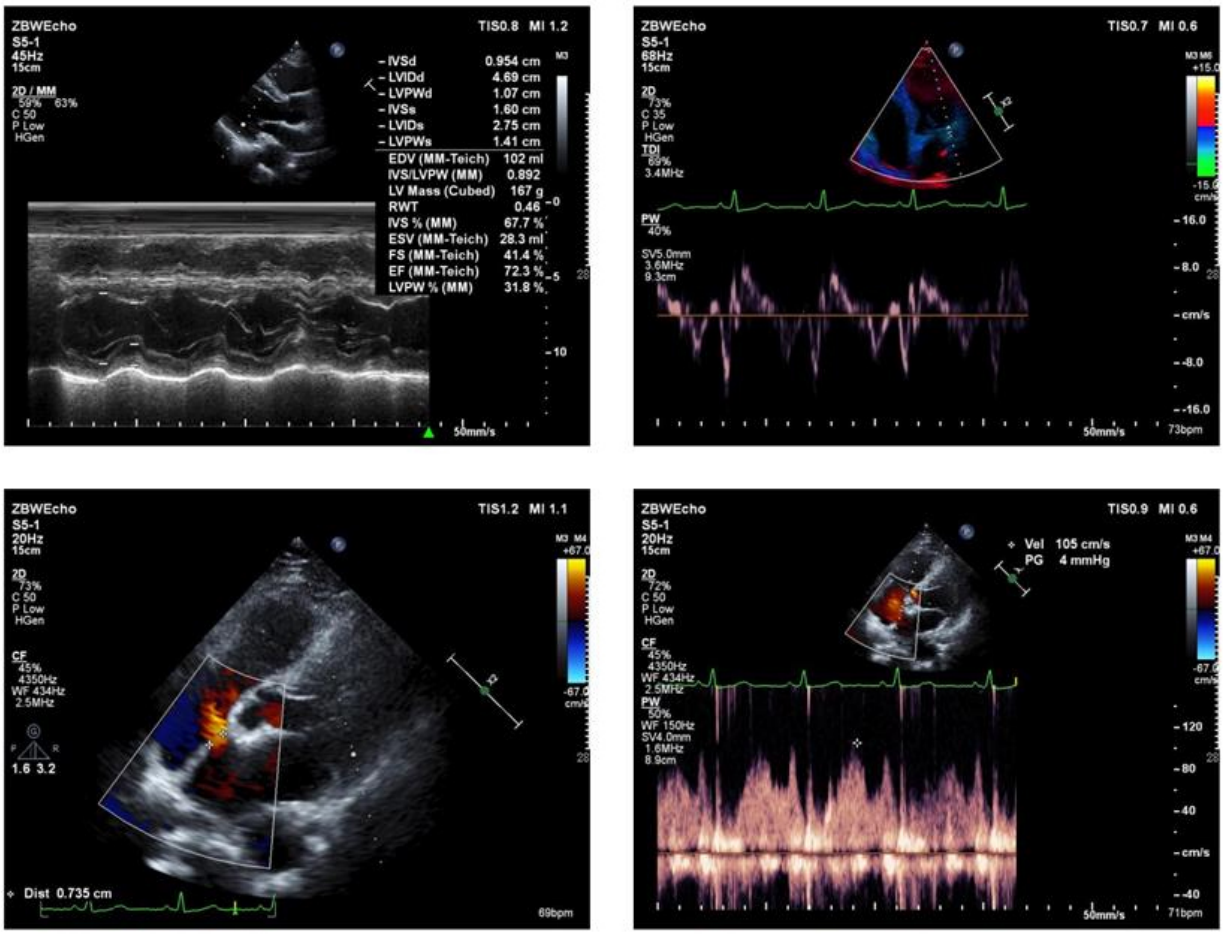

Fig. 1. Preoperative echocardiography revealed atrial septal defect.

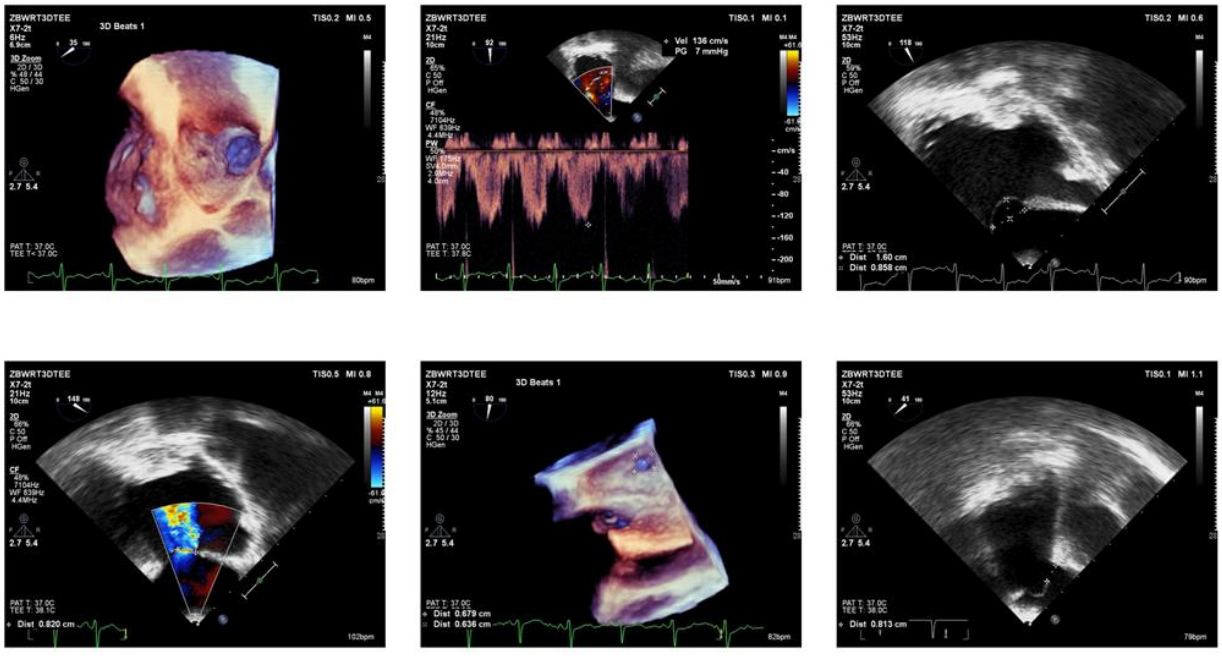

Fig. 2. Preoperative real-time three-dimensional transesophageal echocardiography revealed showed an oval defect of 6.79 × 6.36 mm in the middle of the atrial septum.

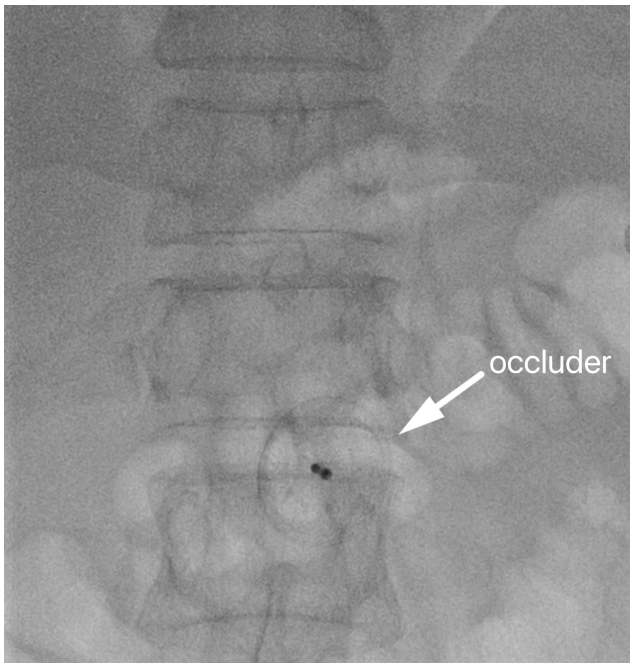

Fig. 3. Chest X-ray suggested that the occluder fell to the abdominal aorta.

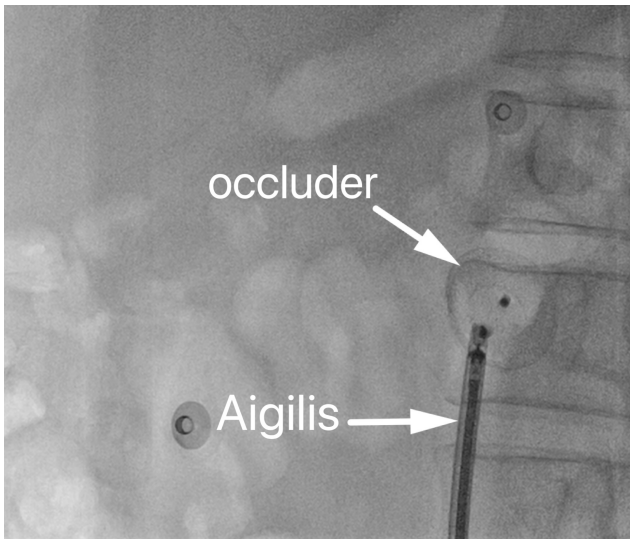

Fig. 4. Aigilis sheath and occlude.

abdominal aorta (Fig. 3). After completing the preoperative examination, we used 2% lidocaine dilution to do local infiltration anesthesia, then we punctured the left femoral artery, and placed in a large curved Aigilis sheath (Fig. 4), then placed in the gastric biopsy forceps. Considering the diameter of the Aigilis sheath and the size of the tip on both sides of the occluder, we used gastric biopsy forceps to clamp occluder's small head (Fig. 5), then the occluder was successfully recovered into the lumen of Aigilis sheath tube and exited together (Fig. 6). After that, we punctured the right femoral vein, inserted the right JR4 catheter into the left atrium under the guidance of J-type guide wire,

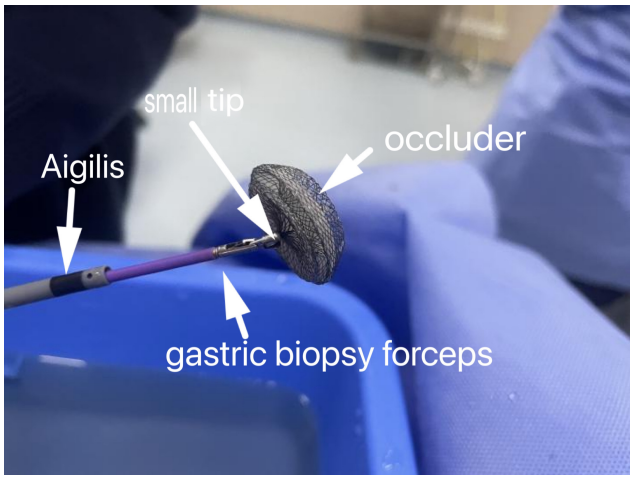

Fig. 5. Gastric biopsy forceps to clamp occluder's small tip.

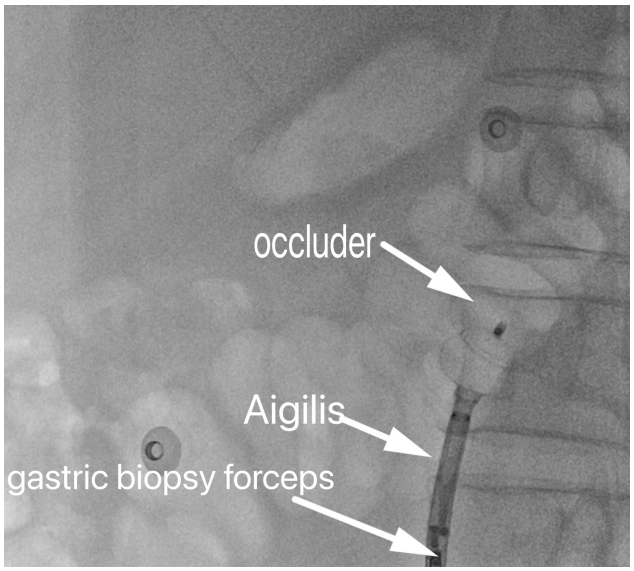

Fig. 6. Intraoperative clamping occluders using gastric biopsy forceps.

then withdrew the JR4 catheter, retained the J-type guide wire, and placed a long sheath along the long wire, and selected a 16 mm diameter occluder, the occluder was delivered to the left atrium and was released under left-sided fluoroscopy. The bedside echocardiography suggested there was no residual shunt (Fig. 7), then we exited the delivery system, and used local bandage compression. Finally, the patient was safely returned to the ward in a flat car.

At postoperation, the patient recovered well, without chest distress, palpitation, fever or other discomfort. Patient's vital signs were stable, no bleeding, swelling or pain at the groin puncture site, and postoperative electrocardiogram showed sinus rhythm. During follow-up, the echocardiography suggested no residual shunt in atrial, mild tricuspid valve and mitral regurgitation (Fig. 8). The cardiac ejection fraction was 66.1%, and the fraction shortening was 36.2%.

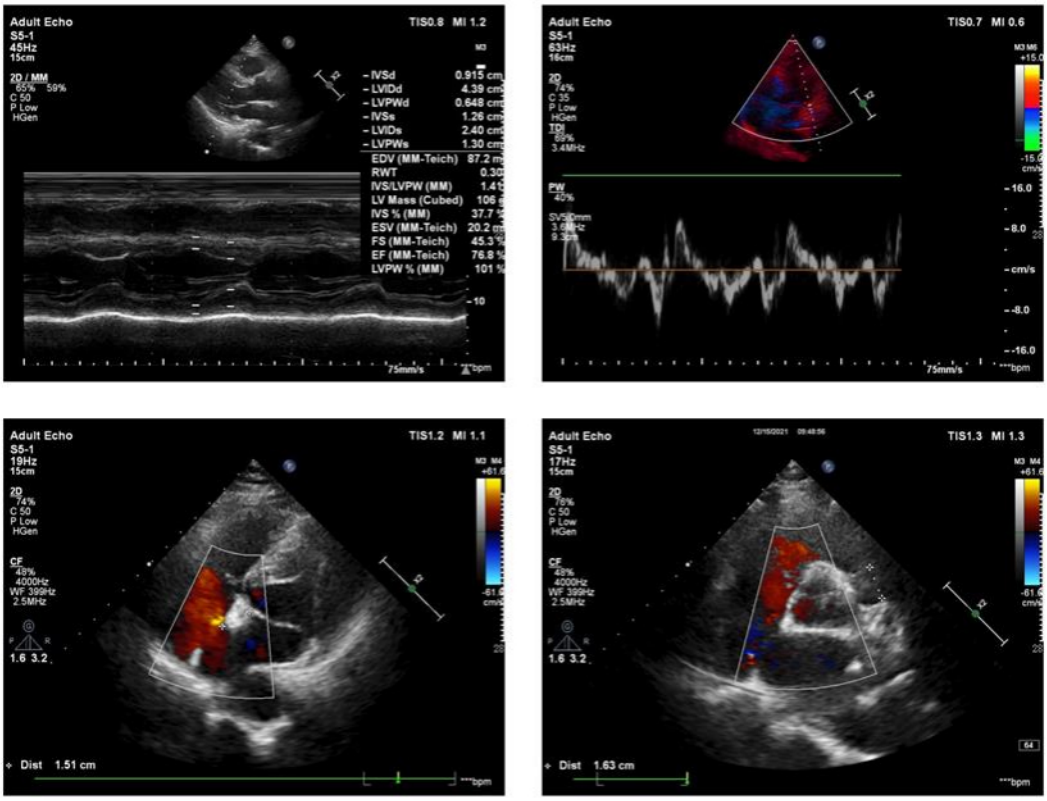

Fig. 7. Bedside echocardiography after operation suggested no residual shunt.

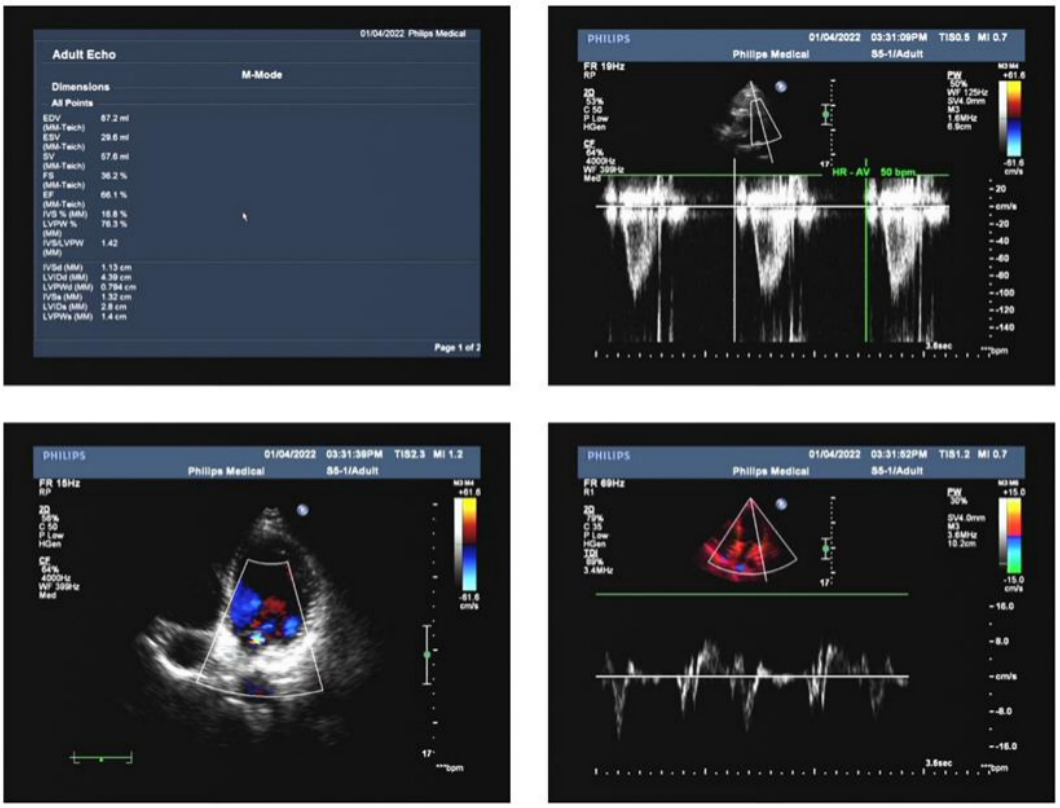

Fig. 8. Echocardiography at follow-up suggested no residual shunt.

Discussion and Conclusion

Occluder detachment rarely occurs to the aorta and its branches. There are rare reports on the treatment cases of detachment to the aorta. Our hospital has successfully resolved a case of disconnection between the occluder and the connecting cable [7]. At first attemptation, we failed using the snare mentioned in the previous report, and then successfully removed using gastric biopsy forceps. Considering this case, the tip of occluder was small and short, the common snare could not grasp firmly, and there was a risk of falling off again. Gastric biopsy forceps could provide a flexible grip and could grasp the tip of occluder firmly. Therefore, this case decisively selected gastric biopsy forceps based on the previous treatment experience of our hospital.

Gastric biopsy forceps can firmly bite the residual tube or smooth tip, pull out the residual tube or occluder directly from the vascular sheath without damaging the vascular wall, which is a very ideal tool for removing foreign bodies in the blood vessel [8]. However, this tool is relatively hard, if the occluder needs to be delivered to the vessel on the right side of the aortic arch, it is difficult to use the forceps. Therefore, in the clinical practice, we could consider firstly selecting a microguidewire loop to drag the residual tube or occluder to the aorta or straighter artery, and then switching to gastric biopsy forceps for removal. The tips of occluders are smooth, usually, microguidewire loops are difficult to snare securely, and more clinical cases are needed to give more support. To avoid the risk of detachment removal under direct vision in cardiac surgery, the gastric biopsy forceps are a suitable tool that can be tried.

This case suggests that preoperative echocardiography of atrial septal defect type, size, soft edge and relationship with the surrounding tissue is the key to prevent the device from falling off. It is very important for routine examination and complication observation in patients after atrial septal closure. When the occluder falls off, gastric biopsy forceps is a good choice.

Availability of Data and Materials

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request. The image information is shown in the attachment.

Author Contributions

KLW and YYL conceived and wrote this case report. KLW, YM and WHZ participated in the surgical procedure of this case. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

Ethics Committee of sir run run shaw hospital, zhejiang university school of medicine. Approval number(s)/ID(s): Scientific research 2023-0686. The patient signed the informed consent form.

Acknowledgment

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Conflict of Interest

The authors declare no conflict of interest.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.59958/hsf.6909.

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