

## Impacted Cera Septal Occluder Device in Right Ventricular Outflow Tract (RVOT): A Potential Challenge for the Anesthesiologist

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### Abstract

Atrial septal defects are amenable to management by surgical and transcatheter device (TC) closure. Though, TC closure has several advantages it is fraught with many complications, such as device embolization (DE), arrhythmias and thrombus formation to name a few. DE is uncommon in experienced hands, but it can occur right from the immediate post-procedure period to after a few months or even years. DE has been reported from a multitude of locations and retrieval is possible percutaneously in majority of cases. However, there are instances where an embolized device may result in potentially life threatening complications, thus necessitating surgical intervention and pose a challenging scenario for the anaesthesiologist.

**Keywords:** Atrial septal defect; Transcatheter closure; Device embolization

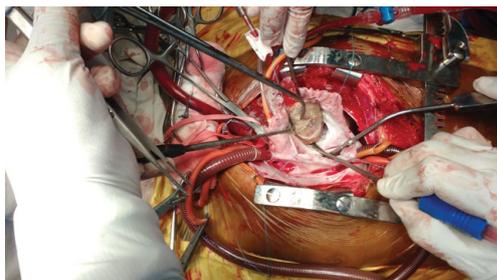
### Case Report

Ostium secundum atrial septal defects (OS- ASDs) are one of the commonest congenital heart defects (CHD); with an estimated prevalence of 75/100,000 live births [1]. In 1976, the first transcatheter (TC) closure of ASD, using a double umbrella device in human beings was reported [2].

Although it is a simple procedure and avoids the need for cardiopulmonary bypass (CPB), it has its share of complications; device embolization (DE) being the commonest reason for emergent surgical intervention which often presents a challenge for the anaesthesiologist [1].

Here, we report the case of a patient who underwent successful surgical retrieval of an ASD occluder device embolized to the right ventricular outflow tract (RVOT) four months after placement. A 9-years-old girl was diagnosed as a case of OS ASD (28 mm) with left to right (L→R) shunt and underwent ASD closure with Cera ASD occluder (LT-ASD-30). After the procedure, chest infections subsided but palpitation persisted; transthoracic echocardiography (TTE) revealed that the device had embolized to the RVOT which was confirmed in right ventricle (RV) angiogram. Fluoroscopy guided retrieval with 20 mm snare was unsuccessfully attempted. She was asymptomatic and haemodynamically stable; physical examination revealed no abnormal findings. Since the device seemed impacted and risk of RVOT obstruction or perforation was significant, she was referred to cardiothoracic operating room (CTVS OR) for further management.

Standard ASA monitors were attached; a 16 G IV line and arterial



**Figure 1:** RV Angiogram showing device obstructing RVOT.

line were secured under local anaesthesia. General anaesthesia (GA) was induced with fentanyl (5 µg/kg), thiopentone (2 mg/kg) and pancuronium (0.1 mg/kg) for endotracheal intubation. A central venous line was placed in right internal jugular vein (IJV). Anaesthesia was maintained with fentanyl, pancuronium, midazolam and sevoflurane; haemodynamic parameters remained stable. CPB with moderate hypothermia was instituted after systemic heparinisation. The device was found impacted in RVOT with partial fibrosis around it and retrieved safely. ASD was closed with pericardial patch and the patient weaned off CPB with nitroglycerine (1 µg/kg/min) and adrenaline infusion (0.04 µg/kg/min). After reversal of anticoagulation



**Figure 2:** Intraoperative image: Removal of the device.

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and securing haemostasis, the patient was shifted to intensive care unit (ICU) for elective mechanical ventilation. The postoperative course was uneventful and she was discharged with full recovery on the 6<sup>th</sup> day (Figures 1 and 2).

## Discussion

Transcatheter closure of ASDs has gained popularity due to a short learning curve, cosmetic benefits, avoidance of complications of CPB, reduced morbidity and hospital stay [3]. Rapid progress has followed the development of Dacron covered stainless steel devices and expert use of echocardiography for septal assessment, sizing and post-procedural evaluation.

Percutaneous ASD closure is possible in isolated OS-ASD, normal pulmonary venous drainage, L→R shunt 1.5:1, maximum size <35 mm in any plane and adequate rims [4].

A series of 417 patients reported 8.65% complications [3]. Major complications are DE (0.01-0.55% in expert hands), arrhythmias, most commonly atrial fibrillation, thrombosis (1.2%), cardiac erosion (0.1%-0.3%), pericardial effusion, transient heart block and sepsis (0.8%) [5,6].

Common reasons for DE are very large defect, undersized device, small left atrium (LA) to accommodate the device, inadequate or floppy rim and operator inexperience [7]. DE can occur within the first few days as well as few years after the intervention, since endothelialisation may not be complete and predisposing factors like infections, may favor thrombus formation and embolization, even months after the procedure [8].

Percutaneous retrieval is successful in 50-75% cases, pulmonary artery and aorta being the easiest sites from which to retrieve. Another database reported 77.2% cases of surgical retrieval and 16.7% by percutaneous technique [9,10].

DE can precipitate potentially life threatening complications like arrhythmias, hypotension and hypoxia due to flow obstruction in the left ventricular outflow tract or RVOT leading to an extremely challenging scenario for the anaesthesiologist, should these patients land up in the OR following a failed percutaneous retrieval attempt.

Guarded premedication, wide bore I/V and arterial access, opioid based induction technique, availability of inotropic support, blood and blood products, in the event of haemodynamic collapse, should be ensured.

## Conclusion

Postoperatively, a joint decision with the surgical team should be taken regarding early versus delayed extubation. In our case, though the device was lodged in RVOT, patient remained asymptomatic, probably because fibrosis rendered the device immobile and prevented dynamic RVOT obstruction.

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