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CASE REPORT

Successful Retrieval of Embolized Amplatzer Septal Occluder from Descending Thoracic Aorta: A Surgical Emergency.

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Abstract:

Amplatzer septal occluder is widely used by the cardiac interventionists as an effective alternative to traditional surgery for atrial septal defects. However, although rare, device may embolize during or after procedure due to several reasons. We report a case of device embolization into the descending thoracic aorta during percutaneous closure of ASD in a 14-year-old girl which was successfully retrieved by emergency surgery at Department of Cardiac Surgery, University Cardiac Centre, Bangabandhu Sheikh Mujib Medical University, Bangladesh.

Keywords: Amplatzer, Septal occluder, ASD, Device closure, Device embolization.

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Introduction:

Ostium secundum type is the most common form of atrial septal defect (ASD) accounting for 70% of all ASDs. [1] Since introduction in 1974, percutaneous transcatheter closure of ASD is being favored due to its proven safety and efficacy over the traditional surgical repair. [1, 2] Amplatzer septal occluder (ASO) is widely used due to its easy application, retrieval and availability of different sizes (4-40mm). [3] Despite nearly 70% of all ASDs are amenable topercutaneous closure, technical or device related complications can arise, some may endanger life and warrant surgery. [3, 4, 5] We report a case of device embolization into the descending thoracic aorta (DTA) during percutaneous closure of ASD in a 14-year-old girl which was successfully retrieved by emergency surgery.

Case Report:

A 14-year-old girl was transferred emergently to cardiac surgery with proper referral and a history of attempted percutaneous transcatheter closure of ASD secundum (15x10mm) with slippage of the released ASO (10mm) into the left atrium (LA) and failure to retrieve the embolized device percutaneously. On arrival, her hemodynamics was stable and the peripheral pulses were normal. She was heparinized prior to transfer. Emergency retrieval alongside the septal repair was opted to prevent lethal complications (incident to incision time was approximately 1 hour). On cardiopulmonary bypass, a large perforated ASD secundum was found. Even though, the ASO was in the LA before the transfer as evident by Transthoracic echocardiography (TTE), it was nowhere inside the heart or within the roots of the great vessels when searched. However, migration further down the circulatory tree was suspected and on-table portable X-ray was done. X-ray showed the lost device is inside the DTA (*Fig-1, 2*). As the heart and greats vessels were

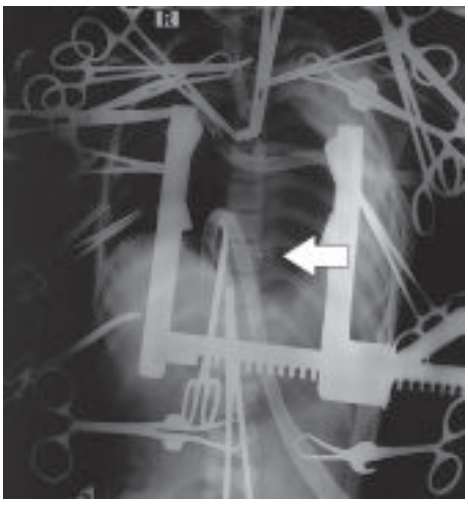

Fig.-1: *On-table portable X-ray shows embolized ASO device in the descending thoracic aorta (arrow)*

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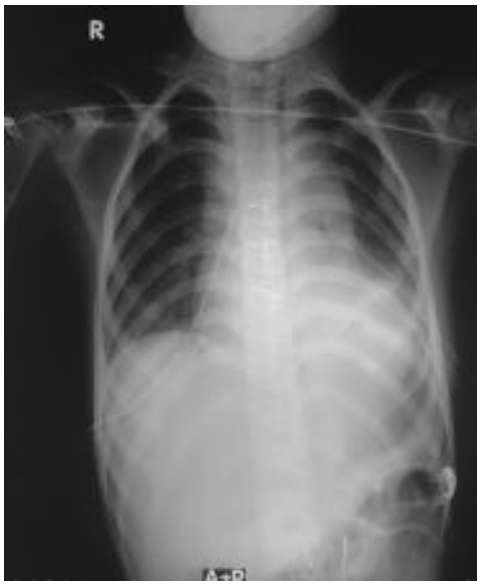
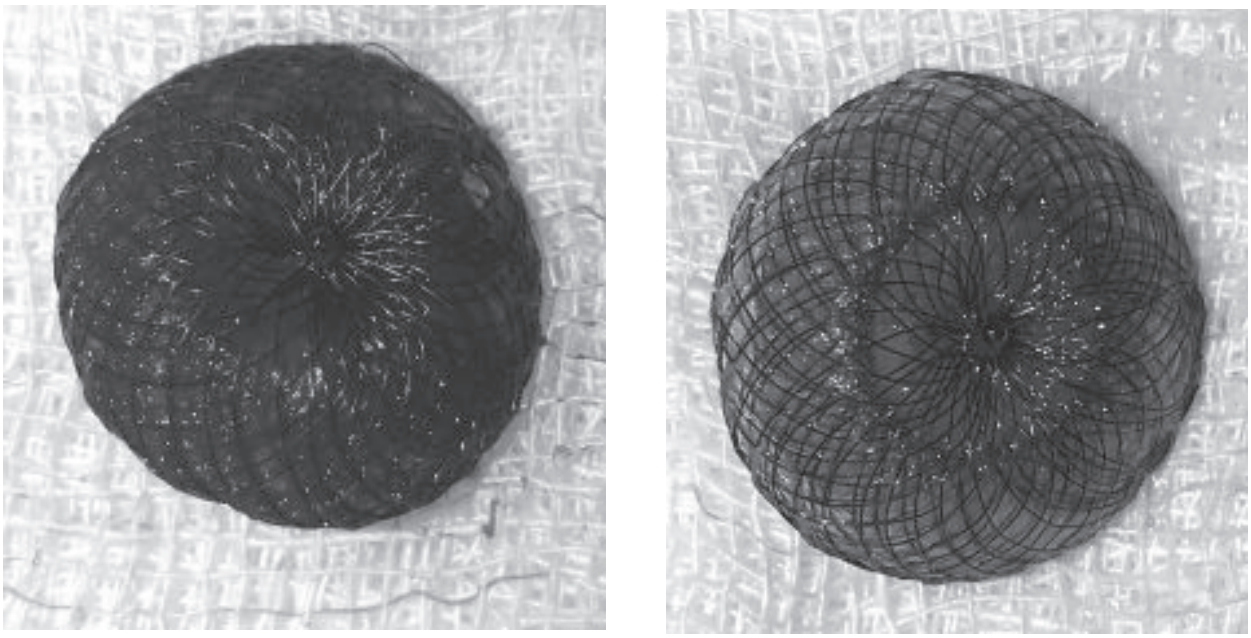


Fig.-2: *Immediate post-operative X-ray shows complete removal of the device (no radio opaque shadow of ASO device or any part of it is seen)*

already been searched and the device was not there, chest X-ray AP view was enough to locate the device. Therefore, lateral view was not taken. With provision of one lung ventilation, the DTA was approached and ASO was retrieved by aortotomy after applying clamps proximal and distal to the location suspected (Fig- 3a,b). However, the clamping time was kept minimum(17 minutes) to prevent ischemic insult to the distal organs. On exploration of DTA, ASO was found inside the distal DTA (at T9 level), stuck vertically on lateral walls keeping the lumen almost unaffected.This explains why she had stable hemodynamics and normal peripheral pulses. Closure of ASD was done by autologous pericardial patch after the retrieval. The patient had uneventful recovery and discharged to home on 10th POD. She was found alright at follow up a month later.



(a) (b)

Fig.-3: (a) Retrieved ASO device covered with recent red thrombus, (b) Retrieved ASO device after removal of thrombus.

Discussion:

Although a popular choice with immediate success rate of 95-98%, percutaneous closure of ASD may experience perilous events. Arrhythmia, cerebral embolism, cardiac tamponade and device embolisms are potentially dangerous events that may occur immediately or within several days post-procedure. Among these, although rare, device embolism is the most serious condition occurring in about 0.01-0.55% of the procedures and could be higher in less skilled hands. [6] Poor patient and/or device selection, inadequate experience, device related failure, unfavorable anatomy (poor rim to hold the device, floppy septum, small left atrium to accommodate the device), inadvertent septal injury during procedure contributes to acute failure of ASO devices. The device can embolize partly or as a whole in any of the chambers of the heart or anywhere within pulmonary or systemic circuits necessitating emergency retrieval either percutaneously or surgically. [5, 6] After deployment of ASO from its cable, it becomes difficult to retrieve and depending on location it can be lethal. During procedure, device embolism occurs mostly due to malposition or incorrect size, latter being the most common. [5]

Transesophageal echocardiography (TEE) is superior to TTE for evaluating favorable anatomy, selecting appropriate patient, detecting presence of intracardiac thrombi and most importantly, judging appropriate device size. Even three-dimensional TEE or cardiac multidetector CT scans are at times required for accurate morphologic consideration.[6]

In present case, large defect size and undersized ASO device could be the reason for device embolism. TTE missed the perforated septum and it was revealed during surgery. This condition could be another possible cause. TEE could have outlined this unfavorable anatomy; regrettably, it was not done before the procedure.The device was confined within the left atrium (LA) prior to transfer. However, it was later discovered stuck inside distal DTA as the natural tapering of the aorta did not allow further migration. Migration of the device from LA to DTA occurred probably during the time elapsed prior to surgery. On-table TEE or fluoroscopy or simply, portable X-rays (AP and lateral views) can exactly locate the device and immediate surgery could minimize chances of further migration.

Conclusion:

Careful patient selection, considering the favorable anatomy by proper preoperative imaging and skilled deployment of ASO can minimize the device embolism. The embolized device may migrate anywhere within the circulatory tree with time therefore, locating the device by on-table imaging and immediate surgery is recommended for safe and uncomplicated retrieval.

Conflict of interest statement

The authors declare no conflict of interest.

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