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Case Report

Aortic Valve Endocarditis Post Ventricular Septal Defect Device Closure: Case Report

Yasser Mubarak, MD.

Assistant Professor of Cardiothoracic Surgery, Minia University, Egypt.

***Corresponding Author:** Yasser Mubarak, Cardiothoracic Surgery Department, Faculty of Medicine, Minia University, El-Minya, Egypt.

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Abstract

Ventricular septal defect (VSD) is a common congenital heart disease (CHD) in childhood, and its incidence is about 20% of CHD. Surgical closure or repair is safe with acceptable results. Transcatheter VSD closure offers excellent results. Coil system is developed for transcatheter VSD occlusion. Infective endocarditis (IE) post device implantation is very rare; however, it is possible. IE represents a surgical challenge associated with perioperative mortality [1].

Keywords: ventricular septal defect; device closure; congenital heart disease; infective endocarditis; aortic valve endocarditis.

Introduction

Ventricular septal defect (VSD) is one of the most common types of congenital cardiac disease (CHD) in children especially perimembranous variant [2]. Surgical closure of VSD carries a low risk of morbidity and mortality, however transcatheter closure is less invasive, has a faster recovery and requires less hospital stay period [3]. Transcatheter VSD closure has been developed in order to reduce surgical complications [4]. Transcatheter VSD closure avoids extracorporeal circulatory support of surgical approach and has the benefit of shorter recovery time [5]. The coil system is developed specifically for transcatheter occlusion of congenital heart defects. The incidence of IE after device closure of VSD is extremely rare [3].

The aortic valve is the most common site in IE, and its incidence is about 40% - 67%. Surgical intervention for native aortic valve IE is about 60% -72%. Aortic valve replacement (AVR); is recommended as a standard surgical procedure [6].

The risk of IE is increased. In the past, antibiotic prophylaxis was recommended in risk situations for transient bacteremia. Nowadays, prevention of IE focuses on prevention measures like good dental health. In addition, IE is a rare occurrence with decreasing mortality [7].

Case Report

A 25-year-old male patient has history of previous device closure of perimembranous VSD during childhood. The transcatheter VSD closure was successful with no residual shunt, intraoperative or postoperative complications. He presented by a persistent fever of up to 40°C which failed to respond to one week course of antibiotics. The patient was admitted to the cardiology for additional investigation. The temperature was 39°C, heart rate was 140 bpm, respiratory rate was 30 bpm, and blood pressure was 100/60 mm Hg on admission. A new diastolic murmur (4/6) was detected in the aortic area with no organomegaly, no splinter hemorrhages or Roth's spots detected. Laboratory investigations showed an elevated erythrocyte sedimentation rate (ESR) of 140 mm/h, C-reactive protein (CRP) of 98 mg/dl, a total leucocytic count (TLC) of 30,000/mm^3. Three sets of blood cultures were taken, and all grew Pseudomonas aeuroginosa. Echocardiography revealed vegetation of 20 mm × 5 mm attached to VSD device and aortic and moderately severe aortic insufficiency (AI). The VSD was completely closed by the coil with no residual shunt. The diagnosis of IE was based on the results of echocardiography and blood cultures, and made according to the Duke criteria. The patient was diagnosed with IE and started empirically on vancomycin. He showed no improvement and continued to develop intermittent fever; blood tests showed persistent leukocytosis, a high ESR, and high CRP. Also, he developed anemia, dyspnea, and signs of heart failure. Urgent surgical intervention underwent on cardiopulmonary bypass (CPB). Aortotomy and right atriotomy revealed a destroyed aortic valve (right coronary cusp) with vegetation and necrotic tissues around the coil. Before surgery, brain imaging is reasonable because ischemic/hemorrhagic stroke or mycotic aneurysm will delay surgical intervention and may require treatment. During surgery, care must be taken to avoid contamination of the field with infected tissue, and complete removal of foreign body is necessary before replacement with a valve. Infected leaflet and surrounding infected tissue were carefully inspected, entirely removed and sent to the laboratory for culture examination. The coil was extracted, ***Fig.(1)*** and the VSD was closed by Dacron patch using a continuous Prolene suture. Aortic valve replaced by

size 23 bioprosthetic valve. Tricuspid valve tested and repaired. The bypass and cross clamp time were 37min. and 15 min, respectively. He required moderate doses of inotropes (adrenaline, dopamine, and dobutamine) and was continued on antibiotics. Cultures obtained from surgical specimens were sent.

Figure (1): - *Transcatheter VSD closure coil with infected tissue, aortic leaflets, and tip of central venous cannula extracted*

Discussion

Transcatheter VSD closure is reported to be a safe and effective method, and has 94.8% a success rate. The early complications include heart block, device embolization, aortic insufficiency, tricuspid insufficiency, hemolysis, and residual shunts. However, Device closure is a foreign body; IE is considered a rare complication. Only a few cases with Amplatzer-device associated endocarditis have been reported in children after closure of atrial septal defects and two cases were reported after VSD closure [3].

In our case report, IE started at site of coil device and extended to aortic valve. Large vegetation, presence of foreign body, and developed of severe AI required urgent surgical intervention.

Surgical closure has been the standard method of VSD closure. However, although it is generally a safe procedure, it does have some potential risks: complete AVB in 1-5 % of the patients, significant residual VSD in 1-5 % with the necessity to re-operate in 2 %, and perioperative death in 0.5 %. Furthermore sternotomy, general anesthesia and cardiopulmonary bypass may initiate significant co-morbidities, such as infection, arrhythmias, and neurologic complications. Pediatric cardiologists have been interested in closing VSDs interventionally for several years. Moderate success was achieved with initially large delivery systems and devices, where residual shunting, induction of regurgitation of the valves (tricuspid and aortic valve), as well as arrhythmia and hemorrhage were dangers. A transcatheter approach for the treatment of congenital heart diseases is appreciated by patients and their parents because of its lesser psychological impact (absence of a skin scar), shorter hospital time, less pain and discomfort, and avoidance of admission to an intensive care unit. Therefore, in the current era, transcatheter closure of perimembranous VSD provides a valuable alternative to surgery [5].

So, our case report reached old age with perimembranous VSD without any complications, and he and his family preferred transcatheter device closure to avoid any surgical co-morbidities.

AV repair for active endocarditis seems to lead to better survival compared with replacement, however, the use of large patches in combination with bicuspid anatomy results in increased risk of late failure [8].

We preferred replaced aortic valve with bioprosthetic valve to avoid long CPB time during trail of repair with lack our experience especially in critical sick patient.

Conclusion

Transcatheter VSD device closure is safe and avoids complications of surgical closure, however its complications are serious and may need urgent surgical intervention.

Abbreviations: - VSD**:** ventricular septal defect, CHD: congenital heart disease, IE: infective endocarditis, AVR: aortic valve replacement, ESR: erythrocyte sedimentation rate, CRP: C-reactive protein, TLC: total leucocytic count, CPB: cardiopulmonary bypass, AI: aortic insufficiency.

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