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Metal Allergy to Amplatzer Occluder Device Presented as Severe Bronchospasm

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Percutaneous closure of an atrial septal defect has become increasingly popular among interventional cardiologists. With this relatively new technology being more widespread, it is important to acknowledge any device-related complications. We report a case of severe bronchospasm secondary to a metal allergy after an atrial septal defect device closure requiring device removal.

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Advances in catheter-based technologies have allowed successful closure of atrial septal defects by a percutaneous approach. Meanwhile, there are certain limitations and contraindications to this relatively new technique that should be acknowledged.

A 27-year-old woman with a known history of atrial septal defect (ASD) presented with a cerebrovascular accident manifested by aphasia. During her evaluation, a secundum-type ASD with shunting at rest was documented. She was referred for percutaneous closure of her defect. The ASD was closed using an Amplatzer Septal Occluder (ASO) device (AGA Medical, Golden Valley, MN) under echocardiographic guidance. The patient

noted shortness of breath immediately after recovering from anesthesia. Her respiratory symptoms became increasingly worse during the next 2 months after the procedure, despite aggressive medical management. Retrospectively, she reported a severe metal allergy since childhood, to the extent that wearing any metal jewelry resulted in severe contact dermatitis. Her respiratory symptoms continued to worsen and resulted in a hospital admission and endotracheal intubation. She was subsequently extubated but continued to experience severe bronchospasm.

After an extensive workup, reaction to the ASO device (AGA Medical) was presumed to be the primary cause of her respiratory symptoms. She subsequently underwent uncomplicated ASO device removal 4 months after her ASD closure with the ASO device. Surgery was performed through a standard median sternotomy approach. After removal of the device, the defect in the atrial septum (1.2×2.0 cm) was closed with a pericardial patch. Postoperatively she experienced dramatic improvement of her symptoms. She remains symptom-free now at 11 months after her operation.

Comment

Percutaneous closure of an ASD was described by King and Mills [1] in 1976. However, it was not until the mid-nineties when device closure of an ASD became an established alternative to surgical closure. A number of different transcatheter ASD closure devices are available. The ASO device has gained popularity among interventional cardiologists due to its short learning curve and ease of use. Based on the results of the clinical trial in the United States that enrolled more than 1,000 patients, the ASO was the first device to receive Food and Drug Administration approval for closure of the ostium secundum ASD [2]. After Food and Drug Administration approval of the ASO device in 2001, approximately 35,000 patients have undergone implantation of the ASO device in the United States alone.

Although device closure of an ASD has been reported to be safe, it has been associated with serious complications that required emergent or urgent surgical intervention. The most common adverse events involved device malposition and migration. Arrhythmias, residual shunts, cardiac perforation, atrioventricular valve regurgitation, infectious endocarditis, thrombus formation on the device, and sudden death have all been reported [3].

A metal allergy severe enough to require device removal is a rare complication of the ASO device. Nitinol, an alloy composed of 55% nickel and 45% titanium is used in the device to provide its super-elasticity and shape memory properties [4]. It has been documented that blood and urine nickel levels increase after implantation of the device [5, 6]. The nickel level gradually returns to baseline within 4 to 6 months post-implantation. Although high nickel levels may not be a concern in most patients receiving the device, patients with a metal allergy may present with an allergic reaction. This reaction to the device has been documented as

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dermatitis or pericardial effusion [7, 8]. We present a case of severe bronchospasm and respiratory insufficiency caused by an allergic reaction to the ASO device in a patient with prior history of a metal allergy. It is reasonable to consider a metal allergy as a contraindication to percutaneous closure of an ASD. The clinical significance of nickel release after ASO device implantation in patients without metal allergy is unclear and is subject to further studies.

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Stentless Bioprosthesis in a Valved Conduit: Implications for Pulmonary Reconstruction

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Pulmonic valve reconstruction is required for various congenital heart diseases and in concert with aortic valve autograft replacement (ie, the Ross procedure). Current techniques using homografts and autografts are often associated with significant morbidity and mortality, and are technically challenging. Furthermore, the long-term durability of these repairs has been questioned, leading to more frequent use of synthetic valved conduits. We report a case

of pulmonary valve replacement and right ventricular outflow tract reconstruction using a stentless bioprosthetic aortic valve and polyester graft as a novel approach after radical pulmonary artery sarcoma resection.

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Pulmonic valve reconstruction is required for various congenital heart diseases and in concert with aortic valve autograft replacement (ie, the Ross procedure). Current techniques using homografts and autografts are often associated with significant morbidity and mortality, and are technically challenging. We report a case of pulmonary valve replacement and right ventricular outflow tract (RVOT) reconstruction using a stentless bioprosthetic aortic valve and polyester graft as a novel approach after radical pulmonary artery sarcoma resection. A 29-mm 3F valve was inserted into a 30-mm Valsalva graft and sewn to its base. The valved conduit was subsequently sewn directly to the RVOT and pulmonary artery. Postoperative echocardiography demonstrated a graft peak and mean gradient of 8 mm Hg and 3 mm Hg, respectively. This technique may offer advantages in comparison with current RVOT reconstruction methods.

The patient is a 73-year-old man who carried the diagnosis of pulmonary embolism (PE) 3 months prior to presentation. A computed tomographic angiographic scan revealed a large filling defect in the main pulmonary artery (PA), proximal left PA, right ventricular outflow tract, and in the distal right PA, suggestive of worsening PE. A transthoracic echocardiographic scan demonstrated large mobile masses in the RVOT and main PA, which produced a peak gradient of 50 mm Hg and severe right ventricular dilatation. The patient was taken to the operating room with a presumptive diagnosis of a PA malignancy versus massive pulmonary embolism. After a sternotomy, a large mass was identified, extending from the RVOT, (including the pulmonic valve) to the bifurcation of the PA. The pericardium, pleura, and lung were grossly negative for metastasis, and the decision was made to proceed with a resection.

After standard bi-caval cannulation, cardiopulmonary bypass was instituted, while the valved conduit was prepared simultaneously as follows. A 30-mm Valsalva graft (Gelweave Valsalva; Vascutek Terumo Cardiovascular Systems Inc, Ann Arbor, MI) was selected and sized with a 3F sizer. A 29-mm 3F valve (3F; ATS Medical Inc, Minneapolis, MN) was selected and washed with saline. The valve was inserted into the Valsalva portion of the graft with the felt tabs of the valve in alignment with the black marking lines of the graft. The cuff of the valve was sewn to the base of the Valsalva portion of the graft with a continuous 5-0 polypropylene suture. The valve tabs were then retracted cephalad and sewn to the superior aspect of the Valsalva graft (Gelweave Valsalva) with a figure-of-eight suture (4-0 polypropylene). The inferior skirt of the graft was then cut at a 30° angle to allow for

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