Transcatheter Closure of a Patent Ductus Arteriosus in an Elderly Patient with the Gianturco-Grifka Vascular Occlusion Device

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Summary: This paper reports the unusual case of a 76-year-old woman who was discovered to have a hemodynamically significant patent ductus arteriosus following uneventful mitral valve replacement, utilizing cardiopulmonary bypass. The shunt was successfully eliminated using a new transcatheter device, thereby obviating the need for further surgery. The patient did not have calcification within the ductus, making diagnosis prior to surgery more difficult.

Key words: patent ductus arteriosus, device closure, Gianturco-Grifka vascular occlusion device

Introduction

Use of transcatheter therapy for treatment of patent ductus arteriosus (PDA) has become common practice in the pediatric population. While a number of devices have been reported to result in effective closures of small PDA, closure rates have been less satisfying for moderate- and large-sized vessels.^{1–3} Recently, the Gianturco-Grifka vascular occlusion device (GGVOD) (Cook, Inc, Bloomington, Ind.) has become available in the United States.⁴ This device consists of a nylon sack attached to the tip of an endhole catheter. The sack is expanded against a vessel wall by advancing a soft, releasable filler wire through the catheter lumen. The system is delivered through an 8F Mullins sheath and is repositionable and/or re-

movable following deployment, prior to release from the delivery catheter. Recent reports have identified the GGVOD as effective therapy for closure of moderate-sized PDA in children.^{5,6} In this report, we describe successful transcatheter PDA closure utilizing the GGVOD in a septuagenarian with concomitant significant acquired heart disease.

Case Report

A 76-year-old woman presented with complaints of dyspnea and fatigue and was found to have physical signs consistent with mitral regurgitation, pulmonary hypertension, and congenital heart failure. Echocardiography confirmed severe mitral regurgitation, mild mitral stenosis, and diminished left ventricular function (ejection fraction = 40%). Cardiac catheterization revealed pulmonary arterial pressures to be at systemic levels, and no left-to-right shunt was detected. A ductus arteriosus was not suspected and could not be visualized because of the absence of calcifications. Several weeks after successful mitral valve replacement, the patient developed symptoms of dyspnea and pulmonary congestion. A prominent continuous murmur was auscultated, and subsequent transesophageal echocardiography demonstrated a significant PDA with left-to-right shunting. Prosthetic mitral valve function appeared normal. The patient was taken to the cardiac catheterization laboratory where hemodynamic evaluation revealed moderate pulmonary hypertension (pulmonary arterial pressure = 69/21 mm = 39), diminished cardiac index (1.3 l/min/m²), and a moderate left-to-right shunt (Q_p/Q_s = 1.5) via a 4.2 mm tubular PDA (Fig. 1). The PDA was crossed from an antegrade approach with a 0.035" Amplatz extra-stiff interventional guide wire (Meditech, Watertown, Mass.) positioned with the tip in the descending aorta. An 8F Mullins sheath was advanced over the wire and positioned across the PDA into the aortic isthmus. A 5 mm GGVOD was implanted through the sheath and retained on the delivery catheter until aortography confirmed proper positioning with cessation of PDA flow. Following GGVOD release, angiography and oximetry confirmed complete ductal occlusion (Fig. 2) and the patient was discharged within 24 h. Symptoms im-

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FIG. 1 Lateral aortogram demonstrating a long tubular patent ductus arteriosus with filling of the pulmonary artery. Minimal ductal diameter measured 4.2 mm.

FIG. 2 Lateral aortogram following patent ductus arteriosus occlusion with the Gianturco-Grifka vascular occlusion device. Note the device completely positioned within the ductal lumen and absence of any residual shunt.

proved quickly, and at 1-year follow-up repeat physical examination and echocardiography confirmed persistent, complete ductal occlusion.

Discussion

Patent ductus arteriosus is a relatively uncommon lesion in the elderly population and may be particularly difficult to diagnose in the setting of increased pulmonary arterial resistance when a continuous murmur and/or typical color Doppler flow findings may be absent. Elderly patients with abnormal hemodynamics and diminished cardiac function may tolerate even a modest left-to-right shunt poorly. Such patients are less than optimal surgical thoracotomy candidates and may greatly benefit from catheter-based therapy. Large multi-institutional experiences with a variety of transcatheter PDA closure techniques in children have demonstrated that most of these vessels (particularly those < 3.5 mm) can be effectively treated without surgery. The GGVOD appears to be a safe device for closure of larger PDA.^{5,6} Device design allows for excellent operator control, easy retrievability, and complete closure with a single device. The resulting decrease in morbidity, absence of discomfort, and shortened hospitalization transcends age groups. Technically, implantation of the device into this elderly patient was no different than that in a small child, with the exception of the requirement of a stiff guide wire to advance the sheath into the descending aorta. This case dem-

onstrates that the GGVOD is an effective tool for nonsurgical closure of moderate-sized PDA and should be considered in the therapeutic decision making for any patient with this lesion, regardless of age.

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