state may potentially damage surrounding structures. As these devices are relatively new, a consensus regarding the management of migrated devices has yet to be formed. The method of retrieval is decided on a case by case basis taking into account the anatomical site of the displaced device, clinical state of the patient, and the clinician's experience with percutaneous retrieval.

There was no structural damage to the internal structure of the heart for our patient; however Stollberger et al.⁵ reported a case in which the Watchman device had migrated into the left ventricular outflow tract and destroyed the aortic cusps. Consequently the patient required an aortic valve replacement as well as a pacemaker as he had complete heart block postoperatively. In this case percutaneous retrieval had been attempted unsuccessfully.⁵

Percutaneous LAA occlusion devices offer a minimally invasive alternative treatment strategy to oral anticoagulation for selected patients with AF. They have been shown to be efficacious, but not a risk free procedure.² In view of the possible migration of these devices, they should be implanted only in centers where cardiac surgery is available. A transthoracic echocardiogram should always be performed after the device is inserted.

REFERENCES

1. Blackshear JL, Odell JA: Appendage obliteration to reduce stroke in cardiac surgical patients with atrial fibrillation. *Ann Thorac Surg* 1996;61:755–759.
2. Reddy VY, Holmes D, Doshi SK, et al: Safety of percutaneous left atrial appendage closure: Results from the Watchman left atrial appendage system for embolic protection in patients with AF (PROTECT AF) clinical trial and the continued access registry. *Circulation* 2011;123:417–424.
3. Park J, Bethencourt A, Sievert H, et al: Left atrial appendage closure with amplatzer cardiac plug in atrial fibrillation: Initial European experience. *Catheter Cardiovasc Interv* 2000;77:700–706.
4. Sievert H, Lesh M, Trepels T, et al: Percutaneous left atrial appendage transcatheter occlusion to prevent stroke in high-risk patients with atrial fibrillation. *Circulation* 2002;105:1887–1889.
5. Stollberger C, Schneider B, Finsterer J: Serious complications from dislocation of a Watchman left atrial appendage occluder. *J Cardiovasc Electrophysiol* 2007;18:880–881.

Interrupted Inferior Vena Cava Combined with Partial Anomalous Pulmonary Venous Return Drainage to the IVC in a 67-Year-Old Adult

Hee Jae Jun, M.D., Ph.D.

Department of Thoracic and Cardiovascular Surgery, Haeundae Paik Hospital, Inje University, Busan, Republic of Korea

ABSTRACT A 67-year-old woman presented with lower body edema and was found to have a suprarenal inferior vena cava (IVC) obstruction without hepatic vein obstruction and partial anomalous pulmonary venous return (PAPVR) draining the right pulmonary veins to the IVC below the obstructed IVC on CT angiography. The patient underwent retrohepatic cavoatrial bypass with a polytetrafluoroethylene (PTFE) 16-mm ringed graft via a posterolateral thoracotomy and retroperitoneal approach. doi: 10.1111/jocs.12039 (*J Card Surg* 2013;28:28–30)

The combined anomaly of a suprarenal inferior vena cava (IVC) obstruction without hepatic vein obstruction and a partial anomalous pulmonary venous return (PAPVR) is an extremely rare condition. We present a case with this complex congenital anatomy and describe its operative management.

CASE REPORT

A 67-year-old female presented with chronic edema of the lower abdomen, perineum, and bilateral lower extremities. Renal function was abnormal (BUN/creatinine 22/1.52). Echocardiography showed normal function of both ventricles, however the right-sided pulmonary veins were not identified. The systolic pulmonary arterial pressure was 34 mmHg. Computerized tomography (CT) angiography showed total interruption of the IVC below the hepatic veins and confirmed the abnormal return of the right-side pulmonary veins into the subdiaphragmatic IVC below an IVC obstruction (Fig. 1). There were IVC collaterals to the azygos vein draining into the superior vena cava and hepatic veins draining directly into the right atrium (Fig. 2). At the time of surgery, a posterior lateral thoracotomy incision was made, and the chest was

Conflict of interest: None.

Grant sponsor: 2012 Inje University

Address for correspondence: Hee Jae Jun, M.D., Ph.D., Department of Thoracic and Cardiovascular Surgery, Haeundae Paik Hospital, Jwa-dong, Haeundae-gu, Busan 612-030, Korea. Fax: 82-51-797-3101; e-mail: cs523@dreamwiz.com

Figure 1. A reconstructed computed tomography (CT) angiography and intraoperative findings showed interruption of IVC (white circle), and anomalous right pulmonary vein (white arrow) drained into the IVC.

opened through the ninth intercostal space. The eighth and ninth ribs were divided posteriorly. Division of the diaphragm was extended medially to the hiatus of the IVC. The right side of the retrohepatic IVC was exposed by retroperitoneal dissection (Fig. 1). The patient underwent retrohepatic cavoatrial bypass from right atrium to the suprarenal IVC with a PTFE 16-mm ringed graft (Gore-Tex, W. L. Gore & Associates, Inc.,

Flagstaff, AZ, USA; Fig. 3). The preoperative CVP and IVC pressure were 8 and 13 mmHg and the postoperative IVC pressure was 8 mmHg. The patient recovered without any complications. Her symptoms were

Figure 2. Computed tomography (CT) coronal view demonstrated the hepatic veins draining directly into the right atrium (red arrow).

Figure 3. Postoperative reconstructed CT image shows the ringed PTFE graft (arrow) from suprarenal IVC to right atrium with good blood flow.

resolved. The graft has remained patent on images obtained two years following the surgery. The patient has taken warfarin and aspirin to maximize the graft patency.

DISCUSSION

Failure of hepatic and prerenal segments fusion is the most common developmental anomaly of the IVC and results in infrahepatic IVC interruption. Infrahepatic IVC interruption with azygos continuation is a rare congenital anomaly. Its prevalence is 0.6% to 2.0% in patients with congenital heart disease and less than 0.3% among otherwise normal patients.¹ The infrahepatic IVC may continue as the azygos vein or the hemiazygos vein, and drains to the left superior vena cava, intrathoracic veins, or anomalous intrahepatic veins. The hepatic segment of the IVC drains directly into the right atrium. The IVC interruption may be associated with recurrent deep vein thrombosis of the lower limbs and bilateral venous insufficiency. There can be procedural difficulties during right heart catheterization, cardiopulmonary bypass surgery, femoral vein catheter advancement, IVC filter placement, and temporary pacing through the transfemoral route.

Dupuis et al.² showed that in patients with PAPVR, a left-to-right shunt is present in fewer than 50% of patients with slightly elevated pulmonary artery pressures. These patients were able to lead a normal life without surgical correction. In our case, conservative treatment was preferable to surgical correction of PAPVR because this patient did not have any heart failure symptoms and the systolic pulmonary artery pressure was only 34 mmHg. Surgical correction of PAPVR involves: (1) creating a long baffle from the orifice of the scimitar vein within the IVC to the atrial septal defect,³ (2) division with reimplantation of the scimitar vein into the right atrium with an intra-atrial baffle,⁴ and (3) direct anastomosis of the divided scimitar vein to the left atrium.⁵ In this case, Baffle surgery was impossible because of the IVC interruption. We decided that direct anastomosis of the anomalous pulmonary vein and left atrium would be a dangerous approach because this patient's heart was dextro-rotated. A direct anastomosis may have caused obstruction of the anastomosis because of in-folding and kinking of the vein (Fig. 1).

REFERENCES

1. Timmers GJ, Falke TH, Rauwerda JA, et al: Deep vein thrombosis as a presenting symptom of congenital interruption of the inferior vena cava. *Int J Clin Pract* 1999;53(1):75–76.
2. Dupuis C, Charaf LA, Breviere GM, et al: The “adult” form of the scimitar syndrome. *Am J Cardiol* 1992;70(4):502–507.
3. Zubiate P, Kay JH: Surgical correction of anomalous pulmonary venous connection. *Ann Surg* 1962;156(2):234–250.
4. Shumacker HB Jr, Judd D: Partial anomalous pulmonary venous return with reference to drainage into the inferior

vena cava and to an intact atrial septum. *J Cardiovasc Surg* 1964;5:271–278.

5. Schramel FM, Westermann CJ, Knaepen PJ, et al: The scimitar syndrome: Clinical spectrum and surgical treatment. *Eur Respir J* 1995;8(2):196–201.

Compartment Syndrome of the Vein Donor Leg Following an Uneventful Coronary Artery Bypass Surgery

Halil Fatih Asgun, M.D.*
Bahadır Kirilmaz, M.D.†

**Medicine Faculty, Department of Cardiovascular Surgery, Canakkale Onsekiz Mart University, Canakkale, Turkey; and*
†*Medicine Faculty, Department of Cardiology, Canakkale Onsekiz Mart University, Canakkale, Turkey*

ABSTRACT Compartment syndrome (CS) is a very rare complication of coronary artery bypass surgery (CABG) due to elevated intra-compartmental pressure induced by ischemia-reperfusion injury. We report a patient with CS following an uneventful CABG and discuss its management. doi: 10.1111/jocs.12050 (*J Card Surg* 2013;28:30–32)

Compartment syndrome (CS) of the vein donor leg is a very rare complication of coronary artery bypass surgery (CABG). It has devastating consequences including drop foot, sensory loss in the foot, and even amputation of the compromised leg. Ten cases without an apparent predisposing factor have been reported in the literature.^{1–6} CS may occur not only in on-pump CABG and open vein harvesting, but also in off-pump surgery and endoscopic saphenous vein harvesting.^{4,5} We report a patient with CS of the vein donor leg following an uneventful CABG and discuss its management.

Patient profile

A 61-year-old male presented with recent onset angina and angiography revealed the presence of high grade left anterior descending (LAD) and right coronary

Conflict of Interest: Authors have no disclosure regarding financial and commercial interest.

Address for correspondence: Halil Fatih Asgun, M.D., Medicine Faculty, Department of Cardiovascular Surgery, Canakkale Onsekiz Mart University, 17100, Canakkale, Turkey. Fax: 90-286-218-03-93; e-mail: hfsgun@yahoo.com