Successful hybrid method to occlude a narrowed persistent left superior vena cava after cardiac surgery

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INTRODUCTION

A persistent left superior vena cava (PLSVC) is the most common congenital anomaly of the thoracic venous system. In 80–90% of affected individuals, the PLSVC drains into the right atrium through the coronary sinus, and it is of no haemodynamic consequence [1, 2]. However, in the remainder of cases, the PLSVC may drain into the left atrium, resulting in a right-to-left-sided shunt, or it may drain into the left side of a common atrial chamber. During cardiac surgery, when the left superior vena cava (LSVC) draining into the left atrium is the only superior vena cava (SVC) or when both SVCs do not communicate freely because of atresia or stenosis of the left innominate vein, proper correction is necessary to transpose the entry of the LSVC from the left atrium to the right atrium [3]. We describe a case in which a hybrid method was used to occlude a narrowed PLSVC with a muscular ventricular septal occluder after cardiac corrections.

CASE REPORT

A 25-year old woman with complicated cyanotic heart disease and a large persistent left superior vena cava (PLSVC) with dysplasia of the innominate vein draining into the left atrium underwent cardiac surgery. Six months later, the narrowed PLSVC was successfully occluded using a muscular ventricular septal occluder (nitinol wire mesh). No complications occurred during or immediately following the catheterization. This case report is the first to describe the utilization of a hybrid method to occlude a narrowed PLSVC after cardiac surgery.

Abstract

A 25-year old woman with complicated cyanotic heart disease and a large persistent left superior vena cava (PLSVC) with dysplasia of the innominate vein draining into the left atrium underwent cardiac surgery. Six months later, the narrowed PLSVC was successfully occluded using a muscular ventricular septal occluder (nitinol wire mesh). No complications occurred during or immediately following the catheterization. This case report is the first to describe the utilization of a hybrid method to occlude a narrowed PLSVC after cardiac surgery.

Keywords: Congenital heart disease • Dysplasia • Catheterization • Muscular ventricular septal occluder • Complication

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Catheterization, and showed LSVC drainage through the innominate vein into the right atrium, with no contrast entering the left atrium. The patient was discharged 3 days after the occlusion procedure. At a 6-month outpatient exam, the patient was thriving, was not cyanotic and had an improved quality of life.

DISCUSSION

Persistent left superior vena cava, prevalent in 0.3–0.5% of the general population [1], is the most common congenital thoracic venous anomaly. The most common subtype of PLSVC includes both sides of the SVCs, and a connecting innominate vein may or may not be present. Webb et al. [4] reported that PLSVC is associated with the absence of the innominate vein in 65% of cases. In 80–90% of individuals, the PLSVC drains into the right atrium via the coronary sinus and is of no haemodynamic consequence. However, in the remainder of the cases, the PLSVC may drain into the left atrium, resulting in a right-to-left-sided shunt, or it may drain into the left side of a common atrial chamber.

During cardiac surgery, the presence of a large PLSVC with a hypoplastic innominate vein draining into the left atrium indicates that the outflow drainage of the LSVC must be established during extracorporeal circulation. The LSVC entry must be diverted from the left atrium to the right atrium, unless there is adequate collateral communication between the two SVCs, at which point, the left atrium may simply be divided. The Rastelli procedure, despite its many advantages, is an extensive operation that sometimes results in early haemodynamic instability. Numerous complications may occur during and following cardiac surgical corrections. For instance, if simply divided, the large LSVC, which would normally allow venous drainage from the head, neck and upper extremities, would not flow adequately and would result in central nervous system damage in a short time period. In addition, if the LSVC entry were diverted to the right atrium, the surgical time would increase because the LSVC was not wide enough for direct anastomosis without tension. In this case, the surgeons narrowed the LSVC to stimulate angiogenesis in the dysplasia of the innominate vein. The increased PLSVC pressure stimulated and directed the flow through hypoplasia of the innominate vein to lower the SVC pressure, resulting in communication between the pulmonary and systemic circulation. This connection allowed the vascular blood to drain into the right atrium. The lower part of the PLSVC was suitable for the transcatheter occlusion because of its morphology. No complications occurred either during or immediately following the catheterization.

Several techniques for the transcatheter occlusion of vessels have recently been developed to occlude primarily small-to-moderate end-hole vessels [1]. The largest diameter that is normally considered to be amenable for occlusion is ~12 mm; other diameters are usually managed surgically [5]. This case demonstrated that a large PLSVC can be occluded effectively using a hybrid method, and the patient experienced a marked improvement in her quality of life after improved aortic saturation. The patient left the hospital on the third postoperative day.

CONCLUSION

This previously undescribed method is useful and effective when complex cyanotic heart disease and a large PLSVC with dysplasia of the innominate vein are encountered and when the conditions are not suitable for surgical correction. This case report confirms a primary clinical experience that suggests that the transcatheter occlusion of such a defect after surgical correction represents an effective and technically feasible method of nonsurgical intervention.

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REFERENCES


