patterns (A) and (B). Pattern (C) is that crossing the midline beneath the aortic arch, above the pulmonary artery, and behind the patent ductus arteriosus. Pattern (B), so-called subaortic type, SLBCV, is the most frequent type of ALBCV [1, 5], as observed in our case.

Usually, SLBCV has no clinical symptoms if it may not be accompanied by any congenital heart disease. Therefore, it is difficult to find this anomalous vein in an adult case and most of them were incidentally detected on CT [4, 6]. To the best of our knowledge, we could not find any lung cancer patient with SLBCV.

In our case, non-contrast-enhanced CT revealed a mass shadow under the retroaortic space. This shadow seemed to be connected into the SVC, but another side was considered to be connected to the aortic arch. At first we interpreted this shadow as a shunt vessel or enlarged lymph node. Performing a contrast-enhanced CT scan and careful evaluation of it made us understand that this was not an enlarged lymph node but SLBCV. Recently, non-contrast steady-state free precession magnetic resonance angiography provides high image quality for confident assessment of thoracic vascular diseases, including thoracic central veins, instead of contrast-enhanced CT [7]. It will be considered to use this technique to distinguish from vessels or not in patients with unsuitable contrast-enhanced CTs.

In the operation, right side systemic lymph node dissection was defined that the superior mediastinal compartment, contained between the trachea, superior vena cava from the level of the azygos vein to the right subclavian artery, and the right recurrent laryngeal nerve, was dissected and the trachea, azygos vein, superior vena cava, and ascending aorta were completely freed from all tissue [8]. It was important to identify SLBCV preoperatively due to preventing any complication at the pretracheal space. Actually, we could undergo VATS lobectomy and systemic lymph node dissection safely.

In conclusion, SLBCV is a rare condition in a lung cancer patient. Careful tracing chest CT is most important to distinguish SLBCV from enlargement lymph nodes and so on. The surgeon has to keep in mind this anomaly in patients with lung cancer when planning surgical treatment.

References

Tricuspid Valve Implantation After Bjork Procedure to Establish Biventricular Physiology
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A 29-year-old male, who had undergone a Bjork procedure for tricuspid atresia with a ventricular septal defect, had redo surgery for relief of stenosis and systolic regurgitation of the right atrioventricular pathway. After revision using a valved bioprosthesis, effective biventricular physiology was established and the patient's functional status improved.


The Bjork procedure [1] is known as an alternative to the Fontan type procedure in patients with tricuspid atresia (TA) with a ventricular septal defect (VSD). When the right ventricle (RV) has enough size and function, biventricular repair is desirable rather than univentricular repair. As its initial indication is limited, only a small number of reports have been published for surgical revision after this procedure. Here we describe a successful case that biventricular physiology was established by reconstruction of the right atrium (RA)-RV pathway and implantation of a bioprosthetic valve.

A 29-year-old male (body surface area 1.9 m^2) with TA and VSD was referred to our hospital because of his exercise intolerance [New York Heart Association class 2, maximum oxygen consumption of cardiopulmonary exercise test (CPET): 41% of the predicted value]. He previously underwent a so-called Bjork procedure (con-
struction of a RA-RV channel and closure of VSD) [1] using an aortic homograft at age 2 years, followed by revision of the RA-RV channel using a Gore Tex tube (18-mm diameter) at age 15 years. He had an episode of focal atrial tachycardia, which was successfully ablated at age 24 years. Subsequently, echocardiography showed significant obstruction and regurgitation of the RA-RV pathway. Catheterization showed mean RA pressure 12 mm Hg, RV systolic/diastolic pressure 26/0 mm Hg, mean pulmonary artery pressure 13 mm Hg, and mean pulmonary capillary wedge pressure 9 mm Hg. Cardiovascular magnetic resonance data were the following: RV end-diastolic volume index (EDVi)/RV end-systolic volume index (ESVi) 109/47 mL/m²; RV ejection fraction (EF) 0.57; left ventricular (LV) EDVi/ESVi 48/15 mL/m²; LVEF 0.70; cardiac index 1.8 L·min⁻¹·m⁻²; maximal RA area 56 cm² in 4-chamber view; and RA area change 24% (Fig 1). These findings were considered sufficient indication for revision of the extra-anatomic RA-RV pathway and we decided to perform a surgical bioprosthetic valve implantation with RA-RV reconstruction.

Cardiopulmonary bypass was commenced through the femoral vessels before dividing the sternum and the chest was opened safely. With the heart still beating, the previous prosthetic material was entirely removed. The orientation of the pulmonary valve was only 1-cm away from the previous incision to the RV. In order to avoid compromise of the RV outflow tract and native pulmonary valve function, a trifoliate 31-mm (17-mm height of the stent) bioprosthesis was placed anterior to the RV cavity. The RA-RV pathway was reconstructed using a tailored patch (made of an opened 24-mm Gore-Tex tube [(W.L. Gore Associates, Flagstaff, AZ], 72-mm width and 120-mm length oval shape), rather than as a tube conduit. Where the suture lines crossed the atrioventricular groove, care was taken to avoid an injury of the right coronary artery. The patient came off cardiopulmonary bypass uneventfully and the circulation remained stable. A Gore-Tex membrane was placed behind the sternum before closing in order to avoid severe adhesion for a future surgery. There was no ischemic change or hemodynamic instability when the chest was closed.

His postoperative course was uneventful. Anticoagulation therapy (aspirin and clopidogrel) was continued for 3 months. At 6 months after surgery, he remained in sinus rhythm. There was no sign of shortness of breath, palpitation, or ankle swelling. He felt subjectively better during exercise (New York Heart Association class 1–2), although an exercise test did not show a dramatic improvement (cardiopulmonary exercise test, peak maximum oxygen consumption 43% of the predicted value). Cardiovascular magnetic resonance showed normal RV indexed volumes with preserved systolic function.

Fig 1. Preoperative cardiovascular magnetic resonance.

Fig 2. Postoperative cardiovascular magnetic resonance, 6 months after surgery.
Redo Aortic Valve Replacement in a Patient With Immunoglobulin A Deficiency and Hemophilia A

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Immunoglobulin A (IgA) deficiency may result in the development of anti-IgA antibodies. Such antibodies may result in anaphylaxis when patients receive standard blood products. Hemophilia A is a deficiency of clotting factor VIII that results in a significant coagulopathy and bleeding in the perioperative period unless precautions are taken. We present a case of successful management of combined hemophilia A and IgA deficiency in a patient undergoing repeated sternotomy for aortic valve replacement.

Cardiac surgical procedures requiring repeated sternotomy may be associated with significant bleeding often requiring massive transfusion of various blood products. Underlying coagulation disorders such as he-

Comment

There have been few reports of tricuspid valve placement after a Björk procedure, either surgically or percutaneously [2–4]. When considering revision years after this procedure, 1 of the following 4 options may be considered: (1) percutaneous placement of a stented valve in the RA-RV channel; (2) surgical revision of the channel; (3) conversion to one and a half ventricular physiology (by adding a bidirectional superior cavopulmonary anastomosis); and (4) conversion to Fontan circulation by total cavopulmonary connection. The last 2 options would be pertinent if the RV were too small to cope with the full systemic venous return, but in our case RV size and function were measured and found adequate. Percutaneous intervention was less attractive to us because the artificial material used previously could not be dilated adequately percutaneously. We therefore decided to revise the RA-RV pathway surgically and implant a bioprosthesis valve.

From a technical point of view, the following potential pitfalls needed to be avoided: (1) The RA-RV channel inevitably lies close behind the sternum, which can only be divided safely on pre-established cardiopulmonary bypass; (2) the struts or leaflets of a bioprosthesis can obstruct the RV outflow tract if placed entirely within the RV cavity; (3) when placed outside the RV, on the other hand, there is a risk of compression on the heart; and (4) a risk of an injury to the right coronary artery. The exact location of the prosthetic valve is therefore an important issue. High-profile stents or the leaflets of a bioprosthesis could have compromised RV outflow, whereas a low-profile mechanical prosthetic valve might have caused turbulence in the RV outflow tract as well if placed in the orifice of the previous right ventriculotomy. Furthermore, the patient would then have required lifelong anticoagulation, so we placed the bioprosthetic valve outside the RV. No compression of the prosthesis was seen, and reduction of the volume loading of the RV may have been advantageous.

Residual dilatation of the RA is another potential issue. Because of extra-anatomic orientation of the RA-RV pathway, RA plication and RA-sided maze procedure were not attractive during the minimally invasive, beating heart surgery. In addition, there have been no arrhythmic episodes since transcatheter ablation. Mild reverse remodeling of the RA was documented 6 months after surgery.

On the basis of findings in our patient, the RV has been established as an effective sub-pulmonary ventricle. Should degeneration of the new bioprosthesis require further intervention, a percutaneous approach is likely to be feasible.

Postoperative investigations showed effective establishment of biventricular physiology after redo surgery to the extra-anatomic RA-RV pathway of a 29-year-old man who had undergone the Björk procedure for tricuspid atresia with a ventricular septal defect.

References