Case Reports

Surgical Correction of Common Atrium with Anomally Connected Persistent Left Superior Vena Cava

Report of Two Cases

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SUMMARY

Two cases of the common atrium associated with persistent left superior vena cava directly connecting into the left side of the atrium are reported. In both patients, the mitral cleft was repaired and the atrial septum was newly constructed with a large teflon-patch. The left superior vena cava was ligated in Case 1, and in Case 2 a tunnel to transfer the emptying orifice of the left superior vena cava to the right side of the atrium was made from a pericardial pedicle. The former was reoperated upon due to the severe residual mitral insufficiency but died after mitral valve replacement. The latter was discharged with a good condition.

Additional Indexing Words :

Common atrium Persistent left superior vena cava

CASE REPORTS

Case 1. A 16-year-old girl was admitted to the University Hospital with complaints of cyanosis, palpitation and breathlessness during exercise. Slight cyanosis was visible at rest and clubbed fingers and toes were found. The precordium was prominent at the right side, but thrills were not palpable. Systolic murmurs, Grade 3/6, were audible maximally at the 3rd intercostal space along the right sternal border. S_2 was splitted and P_2 was markedly accentuated. Chest X-ray films demonstrated the marked dextroposition of the heart and moderate cardiomegaly with increased pulmonary vascularization (Fig. 1). Electrocardiograms revealed left axis deviation with mean QRS-axis of -75 degrees and right ventricular hypertrophy (Fig. 2). At cardiac catheterization, the catheter could not be inserted into the right ventricle but a left-to-right shunt at the atrial level was found and oxygen saturation of the systemic arterial blood was 91 per cent (Table I). Angiocardiograms taken after injection of contrast medium into the atrium was not conclusive for detailed anatomy

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Received for publication June 14, 1969.

but the ascending aorta was opacified at the early stage. Hemoglobin value was 14.7 Gm./100 ml., and hematocrit measured 47 per cent. She was diagnosed as the endocardial cushion defect with marked dextroposition preoperatively.

Fig. 1. Chest X-ray film of Case 1.

Fig. 2. Electrocardiogram of Case 1.

Table I. Results of Cardiac Catheterization

	Case 1		Case 2	
	mm.Hg (Mean)	O ₂ Vol. %	mm.Hg (Mean)	O ₂ Vol. %
SVC	16/3 (8.5)	14.1	—	15.1
IVC	—	—	—	15.1
RA	(6.5)	17.0	5/-2	16.1
LA	17/3 (9.0)	18.0	20/0 (10)	18.6
RV	—	—	65/0 (23)	19.9
LV	—	—	120/0 (23)	17.8
PA	—	—	—	—
PV	18/6 (10)	16.8	20/0 (10)	19.0
FA	—	17.5	—	17.8
A-O ₂ Sat.	91%		86%

Fig. 3. Diagram of operative procedures of Cases 1 and 2.

Operation was performed on February 10, 1966. The heart was explored by a median sternotomy. The heart was situated at the right side of the mediastinum and rotated anticlockwise, and the left superior vena cava was found. Tactile examination via the "right" appendage disclosed marked mitral regurgitation and the defect of the lowermost atrial septum. Because the coronary sinus was not enlarged and the left superior vena cava appeared not to drain into the coronary sinus, a third venous catheter for cardiopulmonary bypass was inserted directly into the left superior vena cava. The "right" atrium was vertically incised and the common atrium was evident. The anterior mitral cusp was completely cleft but the septal cusp of the tricuspid valve and the ventricular septum were intact. The mitral cleft was repaired with interrupted stiches and annulorrhaphy was added at the posteromedial commissure because of the marked mitral regurgitation. Then, the atrial septum was constructed by a large teflon-cloth patch. The left superior vena cava was ligated after cardiopulmonary bypass (Fig. 3).

Her postoperative course was complicated with congestive failure due to persistent mitral insufficiency. She was discharged 2 months postoperatively under

Fig. 4. Chest x-ray film of Case 2.

Fig. 5. Electrocardiogram of Case 2.

strict medical control, but was admitted again 15 months after operation due to intractable congestive heart failure.

Reoperation was performed on May 13, 1967. The constructed atrial septum was intact. The mitral valve was approached transseptally and replaced by a disc valve. However, the congestive failure did not subside postoperatively and she died 39 days after reoperation.

Case 2. A 12-year-old girl had been known to catch cold frequently and to fatigue easily. Cyanosis had not been noted even during exercise. Physically, the

Fig. 6. Operative findings of Case 2. Left superior vena connected to the left upper-posterior portion of the common atrium.

Fig. 7. Operative findings of Case 2. A third venous cannula was inserted into the left superior vena cava through the interior of the atrium. A tunnel to transfer the emptying orifice to the right side of the atrium was made from a pericardial pedicle.

Fig. 8. Operative findings of Case 2. Mitral cleft was repaired (right-upper). Septum was constructed by a large teflon-cloth patch.

precordium was prominent at the left side, but thrills were not palpable. Auscultatory findings were systolic murmurs, Grade 3/6, maximally at the 2nd and 3rd intercostal spaces along the left sternal border, splitted S_2 with accentuated P_2 at the base and systolic murmurs, Grade 3/6, at the apex. Chest X-ray films demonstrated moderate cardiomegaly and increase of pulmonary vascular markings (Fig. 4). Electrocardiograms revealed left axis deviation with mean QRS-axis of -70 degrees, incomplete right bundle branch block and right ventricular hypertrophy (Fig. 5). Hemoglobin value was 15.4 Gm./100 ml. and hematocrit was 46 per cent. The cardiac catheterization disclosed elevation of the right ventricular systolic pressure and the bidirectional shunt at the atrial level. Oxygen saturation of the arterial blood was 86 per cent (Table I). The partial form of the endocardial cushion defect or the common atrium was suspected preoperatively.

Operation was done on May 6, 1969. The "right" atrium was markedly dilated and the left superior vena cava was found. Tactile examination revealed moderate mitral regurgitation, a large septum primum defect and intact ventricular septum. The relationship between the coronary sinus and the left superior vena cava could not be defined. Cardiopulmonary bypass was started after cannulating into the right superior and inferior venae cavae and the atrium was opened. Common atrium with the superior vena cava connecting directly to the left upper-posterior portion of the atrium was disclosed. The coronary sinus was defective (Fig. 6). A third venous cannula was inserted into the left superior vena cava through the interior of the atrium. A tunnel to transfer the emptying orifice to the right side of the atrium was made from a pericardial pedicle (Fig. 7). The mitral cleft was repaired by 3 interrupted mattress sutures. Then, the septum was constructed by a large teflon-cloth patch (Fig. 3, 8).

The postoperative course was uneventful and any signs of jugular venous congestion were not found. Apical systolic murmurs, Grade 2/6, due to the persistent mitral insufficiency were audible, but she was discharged 31 days after operation with a good condition.

DISCUSSION

These 2 patients presented here are all in the condition of the common atrium, that is, cor triloculare biventricularis with complete absence of atrial septum, cleft of the mitral valve and intact ventricular septum. In common atrium, the persistent left superior vena cava is a frequently encountered anomaly. Although the persistent left superior vena cava usually empties into the coronary sinus, it is not infrequent in the common atrium that the left superior vena cava directly connects to the left-side of the atrium, and Gould¹⁾ described that the coronary sinus was defective in such condition. Rastelli²⁾ reported that 7 cases associated with the left superior vena cava have been encountered in 15 surgical cases of the common atrium, and in 2 cases among them the left superior vena cava directly drained into the left-side of the atrium. The authors have experienced 2 such cases among 6 of the common atrium (Fig. 9).

Fig. 9. Schematic presentation of surgical cases with common atrium.

This unusual drainage of the left superior vena cava proposes a special surgical problem. If it is left alone after constructing the atrial septum in this condition, a right-to-left shunt would occur in the left atrium. Ligation did not cause any marked congestion at the jugular vein in Case 1, however, if the communication between both venae cavae is poor or the right superior vena cava is absent, the construction of a tunnel which transfers the site of emptying orifice to the right-side of the created atrial septum would appear to offer a satisfactory solution to the problem.

About this problem there has been no description except Rastelli's report.³⁾ He constructed a tunnel by utilizing the posterior atrial wall. However, it seems that his method is not always feasible to be accomplished. The authors' present method is a little more time-consuming but appears more commonly applicable.

Surgical technique of the common atrium itself has been previously described by us.⁴⁾ Mitral cleft has been routinely partially or totally closed by several interrupted sutures, but the residual mitral insufficiency has been deteriorating and fatal in some cases. It appears that the initial mitral valve replacement was preferable to Case 1.

In construction of the atrial septum like as closure of the septum primum defect, anchoring stiches at the ventricular ridge has been undergone at the right side in order to avoid the surgical damage of the atrioventricular conduction system and not to deform the anterior cusp of the mitral valve after septoplasty. The authors have not experienced the complete atrioventricular block in cases of common atrium as well as in cases of septum primum defect.

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