Sinus venosus atrial septal defects: surgical follow-up

Sunil K. Agrawal a, *, S.K. Khanna b, Deepak Tampe c

a Department of CTVS, Batra Hospital and Medical Research Centre, 1-Tuglakabad Institutional Area, New Delhi 110062, India
b Department of Cardiothoracic and Vascular Surgery, G.B. Pant Hospital, New Delhi, India
c Department of Cardiac Anesthesia, G.B. Pant Hospital, New Delhi, India

Received 10 June 1994; revised 22 January 1996; accepted 15 August 1996

Abstract

Objective: To assess early and later results after surgery for sinus venosus atrial septal defects (ASDs). Methods: Forty-four patients of sinus venosus ASDs with anomalous drainage of the right superior pulmonary vein into the superior vena cava, were operated upon between January 1985 and June 1995. Defects were approached by an incision starting from the tip of the right atrial appendage then extending upward along the atrial crest to the medial wall of the superior vena cava. Atrial defects were closed by an autologous pericardial patch. Another pericardial patch was used to enlarge the superior vena cava-right atrial junction to avoid the narrowing of the superior vena cava. Results: There was no operative mortality. The total duration of follow-up was 4.90.7 years. Follow-up of the echocardiographic study at 6 months and 2 years after surgery revealed a normal study. Two patients developed sinus node dysfunction of short duration in the immediate postoperative period. Follow-up of the electrocardiographic study at 6 months and 2 years revealed sinus node dysfunction in one and two patients, respectively. © 1997 Elsevier Science B.V.

Keywords: Anomalous pulmonary venous drainage; Sinus venosus defect; Pericardial patch

1. Introduction

Sinus venosus type of atrial septal defect (ASD), associated with anomalous drainage of right pulmonary veins is an interesting and challenging cardiac malformation. Since 1953 many ingenious surgical techniques have been described for redirection of anomalous pulmonary venous drainage, e.g. simple atrioseptopexy [1], mobilization of the atrial septum [15], creation of flaps from the right atrial wall [8,13,16,17] and use of patches of synthetic material or autogenous tissue [8–10,21]. The basic principle of all these procedures being to redirect the pulmonary venous blood through the ASD into left atrium. Surgical techniques described for the correction of sinus venous type of ASD with partial anomalous pulmonary venous drainage into superior vena cava, have not produced optimal results. High incidences of occlusion of the superior vena cava or of pulmonary veins, in addition to residual shunt [9,12,14,18] and sinus node dysfunction [3,5,15,17–19] has been reported in follow-up studies. This paper describes the intermediate term results following correction of sinus venosus ASD with partial anomalous pulmonary venous drainage.

2. Material and method

Forty-four patients (9.6% of all ASD closure) of sinus venosus ASD with anomalous drainage of the right superior pulmonary vein into the superior vena cava were operated between January, 1985 and June 1995. Twenty-nine male and 15 female patients, were operated upon. The mean age was 13.3 years with a range of 2–41 years. Seven patients had associated left superior vena cava draining into coronary sinus. The
right superior vena cava was of normal size in four patients while in three patients it was small with a small left innominate vein. All patients were in normal sinus rhythm preoperatively. The defect was diagnosed by 2D-echocardiography in 38 patients. Six patients required cardiac catheterisation and angiography to confirm the diagnosis. Three patients of sinus venous defect were wrongly diagnosed as ostium secundum defect by echocardiography.

3. Surgical technique

Surgery was performed using median sternotomy incision under cardiopulmonary bypass at moderate systemic hypothermia (25–30°C) and cold blood potassium cardioplegia. The superior vena cava was cannulated through the right atrial appendage and the inferior vena cava through the lower part of the right atrium. Separate cannulation of the left superior vena cava was required in three patients. Right atriotomy incision begins from the tip of the right atrial appendage then extending upward along the atrial crest to the medial wall of the superior vena cava up to the level of highest pulmonary venous opening [4]. ASD was found to be small in seven patients and required enlargement. The defect was repaired by a pericardial patch using 4-0 continuous polypropylene suture beginning from the superolateral angle formed between the superior vena cava and the highest pulmonary venous orifice. Another pericardial patch was used to enlarge the superior vena cava and the superior vena cava-right atrial junction. The remaining part of the right atrium, and the right atrial appendage, sutured directly over the superior vena cava cannula which was brought back to the original position (Fig. 1). Following completion of the repair, deairing of heart, termination of cardiopulmonary bypass and decannulation was carried out according to standard technique.

4. Results

The operation was performed in all 44 patients with a mean aortic cross clamp time of 34 min (22–53 min). Forty-two out of 44 patients recovered normally. Two patients developed sinus node dysfunction in the immediate postoperative period for a short duration (4 and 9 h, respectively). All patients were discharged from the hospital between 6 and 11 days (mean, 8 days) after operation and were in normal sinus rhythm. The follow-up ranged between 20 days to 10.5 years (4 ± 0.7 years). Three patients were lost in the follow-up after 7 months, 17 months and 32 months, respectively. Echocardiographic evaluation was done after 6 months in 25 patients which revealed normal study without compromising pulmonary venous and the superior vena cava blood flow or residual shunt. Another echocardiographic evaluation was done after 2 years in 11 patients which also revealed the normal findings. Electrocardiographic study in two patients at 6 months detected sinus node dysfunction with intermittently developing junctional rhythm in one patient. Twenty seven patients were assessed 2 years after surgery, and in two patients sinus node dysfunction was found in the form of junctional rhythm. One patient required a permanent pacemaker. The remaining patients were maintaining normal sinus rhythm.

5. Discussion

Anomalous connection of the right superior pulmonary vein to the superior vena cava associated with the sinus venosus type ASD accounts for 10% of all cases of ASD [13]. Various surgical procedures have been reported for repair of this type of defect. These procedures are associated with possible complications of poor exposure, sinus node dysfunction, superior vena cava obstruction and residual shunt. Injury to the sino atrial node has been reported in 3.8–44% of cases leading to sinus node dysfunction [3,5–7,11,20], the most common cause being either injury to the sinus node or excessive traction of the right atrial wall. Usually these arrythmias are of short duration, but persistent arrythmias have been reported in 3.8–9.2% of cases [5,7,11]. Poor access to the defect may result in either difficulty or improper placement of patch leading to incomplete closure of the defect and residual shunt. Both right to left (14.3%) [6] and left to right shunt

Fig. 1. Completion of repair (step III).
References


