

Persistent left superior vena cava—An alternative feasible technique during Senning procedure

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Abstract

Although rarely performed today in most centers, Senning procedure continues to be a good option for patients with transposition of great arteries presenting late with either regressed left ventricle or pulmonary hypertension. There are many subsets of patients including those having deficient atrial septal tissue, situs inversus, dextrocardia, and atrial isomerism which require complex modifications of technique. One such subset is patients having bilateral superior vena cavae (SVC), which requires coronary sinus cutback and creating a wide flap for the posterior venous baffle which unduly increases the complexity of the surgery. We describe an alternative way of rerouting a persistent left SVC by reimplanting onto the left atrial appendage which forms the part of the systemic atrium after the atrial switch surgery.

KEYWORDS

congenital heart disease

1 | INTRODUCTION

Despite the adoption of arterial switch operations for transposition of great arteries (TGA), Senning procedure still remains a good choice for patients presenting late with regressed left ventricle or pulmonary hypertension. Presence of bilateral superior vena cavae (SVC) adds to the complexity of the already intricate Senning procedure, in which case, coronary sinus cutback followed by suturing of the inferior margin of the septal flap to coronary sinus flap is recommended.¹ We describe an alternative technique of rerouting a persistent left SVC by reimplanting onto the left atrial appendage which forms the part of the systemic atrium after atrial switch. Informed consent was obtained from the patient's relatives for publication of this case.

2 | SURGICAL TECHNIQUE

A 50 days child diagnosed with d-TGA with an intact ventricular septum was planned for Senning procedure because of regressed left ventricular mass. Preoperative echocardiography revealed persistent left SVC draining into coronary sinus.

Intraoperatively, the innominate vein was absent. Following vertical midline pericardiotomy, the anatomy revealed situs solitus, levocardia, normal pulmonary venous drainage, and bilateral SVC almost equal in size, with the left SVC draining into coronary sinus (Figure 1A). After systemic heparinization, cardiopulmonary bypass was established with aortic and extra pericardial angled cannulation in right SVC. The inferior vena cava (IVC) was mobilized extra pericardially, followed by angled cannulation. Left SVC was dissected extra pericardially and cannulated with an angled cannula. Such an extra pericardial dissection allows the pericardium to be used for the construction of the pulmonary venous baffle. The patient was cooled to 28°C and cardioplegia cannulation was placed. Meanwhile, the left SVC was snugged and the left atrial appendage was clamped with a small Satinsky clamp. The distal end of the left SVC was clamped near its drainage into coronary sinus and transected leaving a length of 1 cm distal to the cannula (Figure 2B). The left atrial appendage was excised creating a wide opening, the transected end of the left SVC was bevelled and a wide anastomosis was created between the left SVC and the left atrial appendage in an end-to-end fashion with continuous 6-0 polypropylene suture 13 mm needle. The distal clamped end of left SVC was closed with running 6-0 polypropylene sutures in double layers.

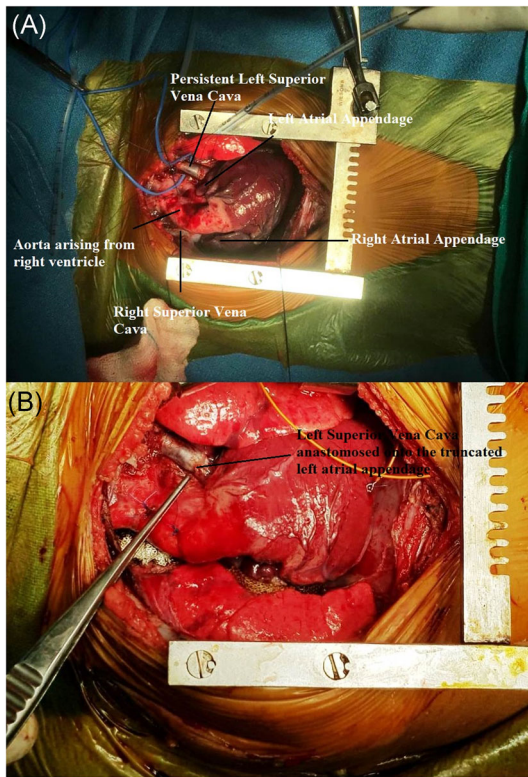


FIGURE 1 Persistent left superior vena cavae (SVC) draining into coronary sinus and left atrial appendage seen (A) before repair; left SVC anastomosed to the left atrial appendage (B)

After aortic cross clamp and cardioplegic arrest, a longitudinal incision was made in the anterior wall of the right atrium. The interatrial groove was dissected and due to the relatively large atrial septal defect, the septal patch was constructed using a small and tailored Dacron patch. The floor of the SVC and IVC channel was then constructed by suturing the Dacron patch between the left atrial appendage and the entrance of the left pulmonary veins thus allowing the left atrial appendage and hence the reimplanted left SVC to drain into the systemic venous atrium. Rest of the procedure was performed using the Schumacker's modified technique of Senning procedure wherein the pericardial flap attached behind the right pulmonary veins was sutured over the surface of the atrium and to the medial edge of the right atrial incision to form the pulmonary venous atrium.^{2,3}

Following bypass weaning, epicardial echocardiography revealed no obstruction in either the systemic or pulmonary venous baffle, smooth flow across the left SVC and left atrial appendage anastomosis (Figure 1B) and mild tricuspid regurgitation. Postoperative course of was uneventful and he was discharged on postoperative Day 7.

3 | DISCUSSION

Performing a coronary sinus cutback (Figure 2A) requires good deal of precision which may be challenging. Repeated small incisions may catch the posterior wall of the coronary sinus and cut outside the heart which may be a source of torrential bleeding once the

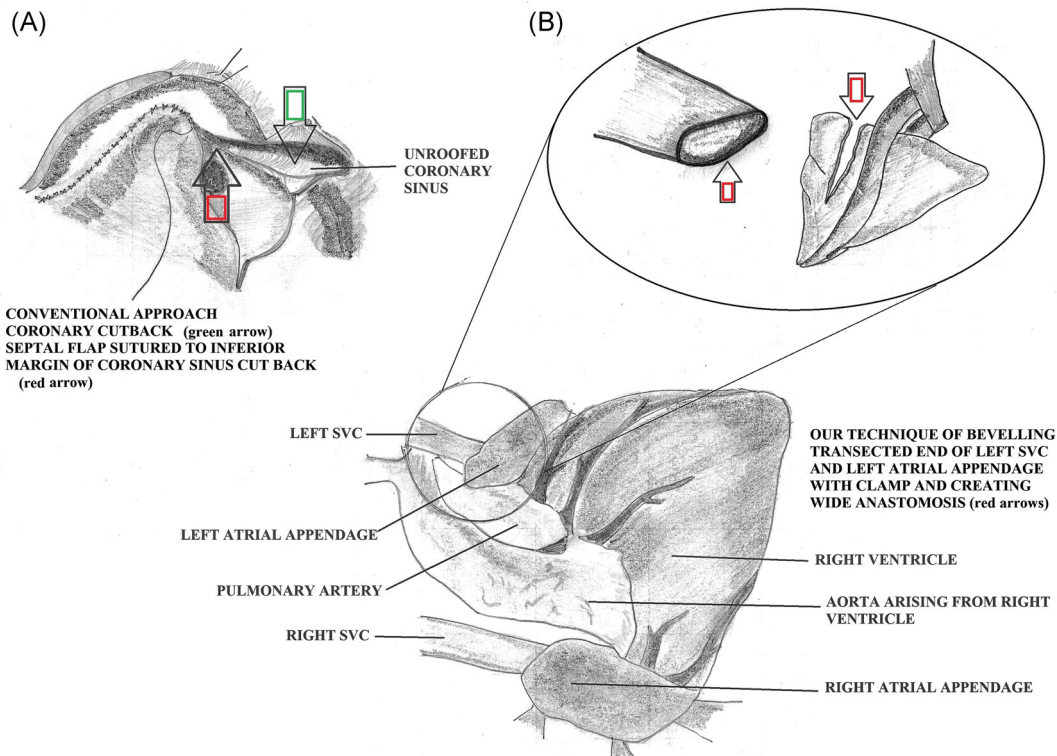


FIGURE 2 Conventional approach to left superior vena cavae (SVC) managed by coronary cutback (A); our modification showing creation of wide left SVC to atrial appendage anastomosis (B)

cardiopulmonary bypass is being weaned off making it technically troublesome to repair it.¹ Additionally, a cutback often provides a wide flap and if enough attention is not paid to the size of the patch, if used, can result in systemic venous obstruction.⁴

In contrast, our technique of reimplanting the left SVC onto the left atrial appendage eliminates the above problems and can be performed while cooling the patient, thus not affecting the bypass and aortic cross clamp durations. It does not require much expertise except that the anastomosis created should be wide enough to avoid any gradient postoperatively. Direct pressure measurement using a 26-G needle, connected to a pressure transducer across the anastomosis can rule out any gradient intraoperatively. This modification may simplify the management of left SVC in a case of Senning atrial switch operation.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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