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## SUPERIOR VENA CAVA APPROACH TO REPAIR OF SINUS VENOSUS ATRIAL SEPTAL DEFECT

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The repair of sinus venosus-type atrial septal defect (ASD) is considered a safe procedure. The standard approach has been through an oblique atriotomy. Exposure is often difficult and awkward, and damage can occur to the sinoatrial node, its blood supply, or the atrial tissue, resulting in arrhythmia. This has inspired a number of different surgical techniques, none of which is entirely satisfactory.<sup>1-4</sup> We now approach the repair through a transverse superior vena cava (SVC) incision, a technique not previously described.

**Methods.** Through the median sternotomy approach, a 1.5 to 2.5 cm by 2 to 3 cm piece of pericardium is harvested and treated with 0.6% glutaraldehyde. After the SVC has been dissected and mobilized to the level of the innominate vein, the aorta is cannulated. The SVC is cannulated at the level of

the innominate vein by using a right-angle cannula (Medtronic DLP, Grand Rapids, Mich). The inferior vena cava is also cannulated at the level of the junction with the right atrium (Fig 1). Cardiopulmonary bypass is begun, and the patient's temperature is allowed to drift to 32°C. The aorta is crossclamped, and the heart is arrested. Snares are applied and tightened around the cavae.

Stay sutures are then applied to the SVC 1 cm above the junction with the right atrium, taking care to remain superior to the sinus node artery. The SVC is then opened with a transverse incision. This provides excellent exposure of the defect and the anomalous pulmonary veins (Fig 1). The previously harvested and treated pericardium is then fashioned and used to baffle the anomalous veins to the left atrium with a running suture (Fig 2). The patch should be large enough so that it is slightly dome shaped to allow unobstructed flow between the anomalous pulmonary veins and the left atrium. In addition, care must be taken to keep the suture line as posterior as possible to avoid stenosis of the SVC (Fig 3). After de-airing, the SVC incision is closed in a running fashion without patch enlargement (Fig 3).

**Results.** To date we have used this technique in 6 patients with a median age of 5.5 years (range, 4-54 years). At follow-up (mean, 2.5 years; range, 2 months to 4 years) all 6 patients are in sinus rhythm and are asymptomatic. Echocardiographic follow-up demonstrated normal flow between the SVC and right atrium and no obstruction of flow in the pulmonary veins.

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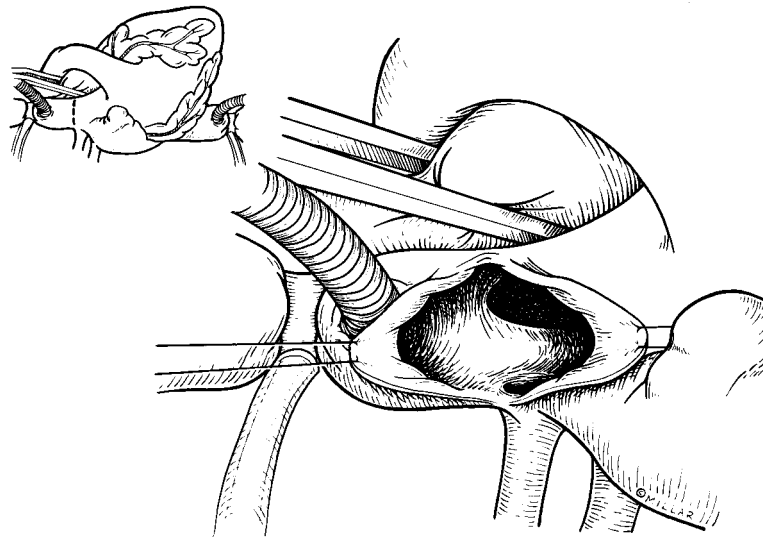
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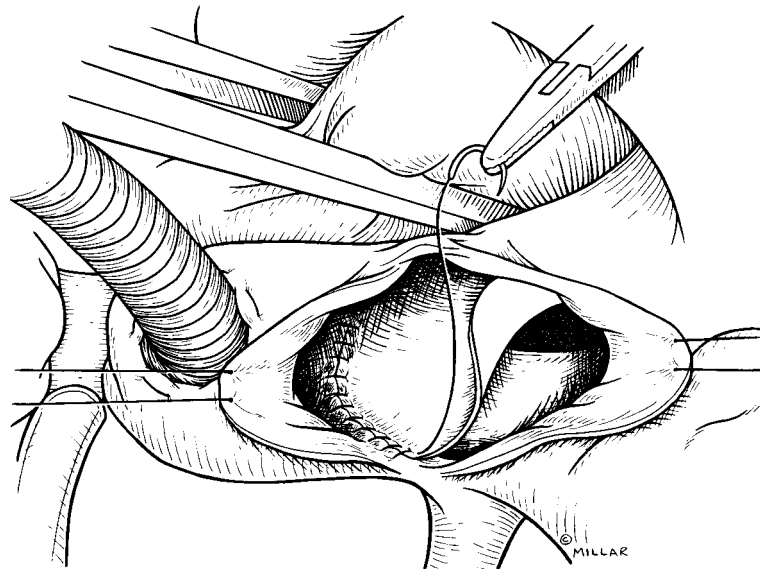
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**Fig 1.** The cannula position is high on the SVC, and the incision is on the anterior surface of the SVC (*inset*). Note the excellent exposure of the ASD.

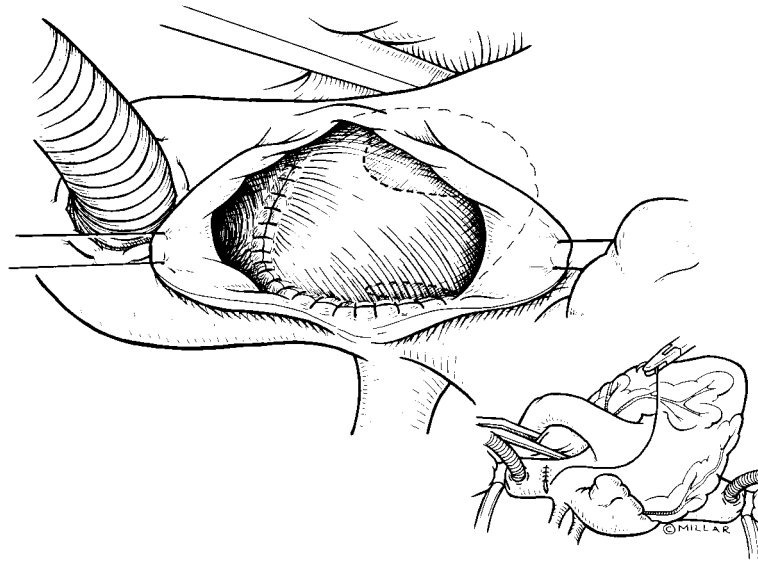


**Fig 2.** The pericardial patch is positioned posteriorly to baffle the anomalous pulmonary veins to the left atrium and avoid obstruction of SVC inflow.

**Conclusion.** It is important to cannulate the SVC very high to provide adequate exposure, especially of the anomalous pulmonary veins, which often connect to the SVC or the SVC–right atrial junction.<sup>5</sup> Most other methods involve cannulation through the right atrial appendage.<sup>1,4</sup> It has been demonstrated that selective SVC cannulation can decrease the incidence of postoperative arrhythmias.<sup>3</sup> However, previously described methods involve an atriotomy and/or an incision that crosses the SVC–right atrial junction, which can

damage the sinoatrial node, its blood supply, or the atrial tissue.<sup>1,2,4</sup>

The careful sizing of the patch and its posterior placement are important to prevent any possible stenosis of the SVC–right atrial junction or the pulmonary veins. The transverse SVC approach provides excellent exposure of the sinus venosus ASD and avoids any disruption to the integrity of the right atrium, the sinus node, or the sinus node artery. The natural connection between the SVC and the right atrium is



**Fig 3.** Pericardial patch in position. The patch is larger than the defect, making it dome shaped, which prevents obstruction of pulmonary venous flow. The SVC is closed transversely with a running suture (*inset*).

maintained. The transverse incision avoids the use of an enlarging patch on the SVC to prevent stenosis, which can occur with the use of a longitudinal incision.<sup>4</sup> Although not necessary in our series to date, the SVC could be enlarged with a pericardial patch if it appeared inadequate.

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