Catheter Entrapment in a Chiari Network Involving an Atrial Septal Defect

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During cardiac catheterization in a 51-year-old man with secundum atrial septal defect, catheter entrapment in the area of the interarterial defect occurred. At thoracotomy, the catheter was found to be caught by and looped within a Chiari network involving the septal defect, a hitherto unreported complication of cardiac catheterization.

Chiari's network, reportedly found in 2 to 3 percent of hearts, is a membranous fenestration which may involve the vena cavae, right atrial wall (crista terminalis), coronary sinus, and interatrial septum. Most of Chiari's webs are incidental findings at cardiac surgery or postmortem examination. To our knowledge, entrapment of a cardiac catheter in this network is a hitherto unreported complication of cardiac catheterization. We report this incident in a patient whose Chiari network involved a secundum atrial septal defect.

Case Report

A 51-year-old asymptomatic man underwent evaluation of a heart murmur which had been noted at the age of 21. Physical examination revealed a blood pressure of 150/90 mm Hg and a regular pulse of 80/min. Venous distention was not present; the chest was clear to percussion and auscultation. There was a slight parasternal lift. A widely split second heart sound with an accentuated pulmonic component was present. A grade 2/6 systolic ejection murmur was heard in the pulmonic area. Chest x-ray examination revealed no evidence of ventricular enlargement. The pulmonary vasculature was prominent and the lung fields hyperemic. Electrocardiogram showed sinus rhythm and a right bundle branch block pattern.

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Laboratory data were normal. Cardiac catheterization was performed from the right basilic vein. An atrial septal defect was crossed with some difficulty; no associated anomalous pulmonary venous drainage was found on pulmonary arteriography. The hemodynamic findings showed a pulmonary flow of 14.4 L/min with a net left-to-right shunt of 9.6 L/min (3:1 pulmonary to systemic flow ratio). Towards the end of the investigation, during withdrawal of a No. 7 Gournard catheter from a right
lower lobe pulmonary vein into the left atrium, the catheter became trapped and looped at the level of the atrial septal defect; injection of contrast material revealed its tip to be floating freely in the left atrium (Fig 1). Attempts at extraction involved the use of guide wires in an effort to straighten the catheter, pressure injections of saline solutions to dislodge the trapped portion, and amyl nitrate inhalation to relax possible vascular spasm associated with the entrapment. Simple traction on the catheter was without result, and produced considerable chest pain. Because the exact site and cause of entrapment was unknown, the catheter was left in place, and connected to a rapidly flowing heparinized saline infusion in order to prevent thrombus formation within the catheter. Continuous overnight traction was applied to the catheter by means of a specially designed weighted pulley system, and was of no avail. On the following day, another attempt to remove the catheter under fluoroscopic control was unsuccessful.

As the hemodynamic data indicated a significant left-to-right shunt, and as the catheter could not be extricated, thoracotomy was performed on the third post-catheterization day. With the patient under full cardiopulmonary bypass, right atriotomy was made. The tip of the Courmand catheter was discovered to be curled upon itself and caught in the strands of a Chiari network in the atrial septum (Fig 2): The Chiari strands, together with the catheter, were excised and the atrial septal defect closed by direct suture. There were no complications.

**Discussion**

Chiari's networks are fenestrated membranes in the right atrium, resulting from incomplete resorption of the valves of the inferior vena cava (Eustachian) and coronary sinus (Thebesian). Such membranes are occasionally the site of thrombus formation, thereby providing a potential source of pulmonary emboli. Unusual murmurs may also result from these anomalous bands. The fibers of the network have wide attachments, either to the crista terminalis of the right atrium or to the interatrial septum. In the presence of an atrial septal defect, the network might therefore be found anywhere within the defect, thereby representing a potential difficulty, as well as a hazard to transseptal catheterization.

Surgery performed by Dr. Frank Gerbode.

**References**

5. Cooperative study on cardiac catheterizations. (Braunwald E and Swan HJC, eds). Circulation 37 (Suppl 3), 1968

**Ventricular Demand Pacemaker Inhibition by An Atrial Fixed Rate Pacemaker**

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External and internal electrical fields may suppress pacemaker function. Suppression of an epicardial ventricular demand pacemaker by an epicardial fixed rate atrial pacemaker set at high supraventricular is described in this report.

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