

Catheter Entrapment During Cardiac Electrophysiology Study

A 50-year-old man underwent cardiac electrophysiology study for palpitations. Under fluoroscopic guidance, 1 deflectable decapolar and 2 quadripolar diagnostic catheters were introduced smoothly into the right femoral vein and up the inferior vena cava (IVC) till the level of the right diaphragm. Using biplane fluoroscopic views at left anterior oblique 30 degrees and right anterior oblique 30 degrees, several attempts at coronary sinus cannulation with the decapolar catheter were unsuccessful. In the course of catheter manipulation, it became entrapped at the position shown in Figure 1. Attempts to pull the catheter out met with marked resistance. At this point, the patient did not complain of any chest pain.

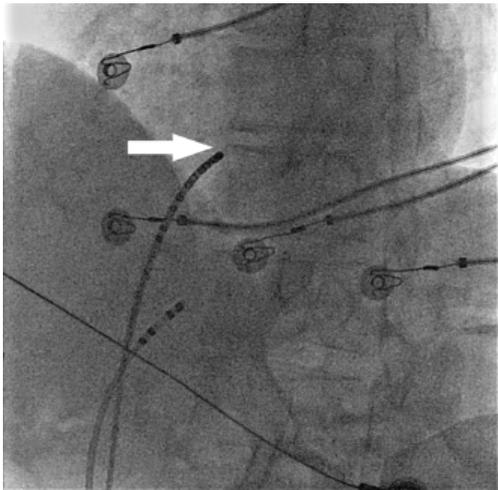


Fig. 1. The deflectable decapolar catheter was entrapped at the junction of the inferior vena cava and the right atrium as shown by the white arrow.

Bedside transthoracic echocardiography revealed that the catheter was entrapped at the junction of the IVC and the right atrium and the presence of mild tricuspid regurgitation. After gentle traction, clockwise and counter-clockwise torque, the catheter eventually came loose and was pulled out of the femoral venous sheath. Inspection of the catheter tip revealed a filamentous piece of tissue, coiled round the catheter with a long free end (Fig. 2). The patient remained haemodynamically stable without chest

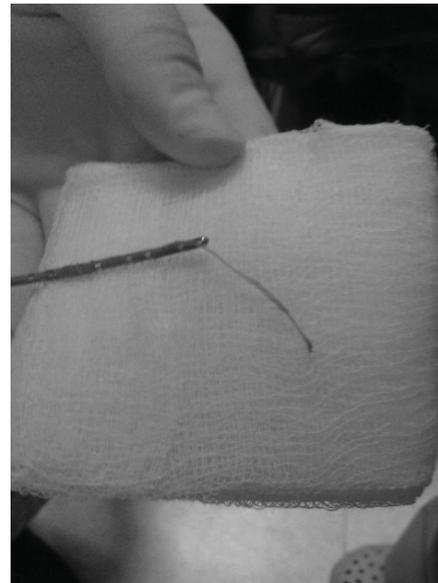


Fig. 2. A filamentous strand of cardiac tissue was noted to be coiled round the catheter after it was removed, with a long free end.

pain. Serial echocardiography did not reveal worsening tricuspid regurgitation or pericardial effusion. The patient remained well and was discharged the following day.

Which of the following cardiac structures likely accounted for the catheter entrapment?

- A. Eustachian valve remnant
- B. Chiari network
- C. Tricuspid valve
- D. Coronary sinus
- E. Mitral valve

Discussion

Based on the position of entrapment at the junction of the IVC and the right atrium, there are 2 possible answers: the eustachian valve remnant or the Chiari network. The filamentous piece of tissue was likely a remnant of either of these structures. The position of entrapment is not consistent with entanglement at the tricuspid valve, coronary sinus or mitral valve.

Answer: A and B

The eustachian valve lies at the junction of the IVC and right atrium. During fetal life, the valve directs blood from the IVC towards the foramen ovale and into the left atrium. Postnatally, following the closure of the foramen ovale, the eustachian valve regresses and is usually absent by adulthood. An eustachian valve remnant, if present, usually takes the form of a crescentic fold of endocardium arising from the anterior rim of the IVC orifice. The lateral horn of the endocardial fold tends to meet the lower end of the crista terminalis, while the medial horn joins the thebesian valve at the coronary sinus orifice. Alternatively, the remnant may appear as a mobile, elongated structure projecting several centimetres into the right atrial cavity.

The Chiari network is an embryologic remnant of the right valve of the sinus venosus. It appears as a web-like structure with a variable number of thread-like components and is attached to the wall of the right atrium, close to the IVC opening.

There have been case reports of pacemaker lead and catheter entrapment during pacemaker implantation, cardiac electrophysiology studies and radiofrequency ablations. Areas of entrapment include the chordae tendineae of the tricuspid valve,¹ the coronary sinus,² and the Chiari network.³ This case highlights a rare but real complication of cardiac electrophysiology study. Care must be taken during catheter introduction and manipulation.

REFERENCES

1. Barakat K, Robinson NM, Dymond DS. Instantaneous lead entrapment: successful percutaneous removal using the cook workstation. *Pacing Clin Electrophysiol* 1998;21:774-5.
2. Sopher SM, Grace AA, Heald SC, Rowland E. Entrapment of an ablation catheter in the cardiac venous system: a case report. *Pacing Clin Electrophysiol* 1998;21:1306-8.
3. Shimoike E, Ueda N, Maruyama T, Kaji Y, Niho Y. Entrapment of a guide wire by the Chiari network in a patient with ablated idiopathic ventricular tachycardia. *J Interv Card Electrophysiol* 2001;5:219-22.

Pow Li Chia,¹ MBBS, MRCP(UK), FAMS, Yin Xia Tai,² MBBS,
David CG Foo,¹ MBBS, MRCP(UK), FAMS

¹Department of Cardiology, Tan Tock Seng Hospital, Singapore

²Department of General Medicine, Tan Tock Seng Hospital, Singapore

Address for Correspondence: Dr Chia Pow Li, Department of Cardiology,
Tan Tock Seng Hospital, 11 Jalan Tan Tock Seng, Singapore 308433.
Email: powlichia@gmail.com