FELLOWS CORNER

Diagnostic decapolar catheter entrapment in the coronary sinus: A rare complication of electrophysiology procedures

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A 16-year-old male with recurrent palpitations was referred for diagnostic electrophysiology study. Holter monitoring demonstrated paroxysms of atrial tachycardia and symptoms were refractory to medical therapy. There was no relevant medical history, and transthoracic echocardiography was normal. Electrophysiology study was undertaken under sedation with intravenous fentanyl and midazolam. The right femoral vein was cannulated and a 6-F steerable decapolar catheter (Inquiry Medium Curve, Abbott Medical, Minneapolis, MN) introduced into the right atrium. Once the tip was at the coronary sinus (CS) ostium, catheter advancement was not possible despite deflexing and further clockwise rotation, and it was speculated that a Thebesian valve may be obstructing the passage. Thus, a 7-F steerable ablation catheter (NaviStar Thermocouple D Curve, Biosense Webster Inc, Irvine, CA) was used to successfully cannulate the CS without difficulty, demarcating the venous anatomy and vertical CS course (Figure 1A). Attempts to simultaneously cannulate the CS with the decapolar catheter were not successful, and so the ablation catheter was removed. The decapolar catheter could subsequently be advanced; however, withdrawal of the catheter was met with unexpected resistance, and retraction was associated with pain, anxiety, tachycardia, and transient hypotension.

Transthoracic echocardiography was undertaken with no pericardial effusion, nor obvious catheter entrapment within the tricuspid valve apparatus or Chiari network seen. A long sheath (Swartz SR2, Abbott Medical) was used to cannulate the CS ostium, and venography demonstrated that the midportion of the catheter was entrapped very proximally in the CS with obstruction to contrast beyond the point of entrapment (Figure 1B). Additional intravenous sedation was administered to relieve discomfort and any contribution from CS spasm. Attempts were made to navigate the ablation catheter past the obstruction from both femoral and right internal jugular approaches. Glyceryl trinitrate was administered through the SR2 sheath to further reduce any spasm component. While general anesthesia was being considered and cardiothoracic surgery opinion being sought, repeated counterclockwise catheter rotations were finally able to free the catheter tip and it was withdrawn successfully. There was no visible tissue around the removed catheter nor obvious indentation. A small 1.1 cm pericardial effusion was noted without symptoms or hemodynamic effect 1 hour postprocedure (Figure 1C). The patient was admitted for overnight observation and discharged the next day on anti-inflammatory medication. Repeat echocardiography 1 week later demonstrated complete resolution of the pericardial effusion.

Despite the routine nature of CS cannulation in electrophysiological procedures, the potentially serious possibility of catheter entrapment within the CS or coronary venous system has been rarely reported.[1,2] Previous cases have used general anesthesia or open heart surgery in order to release catheters entrapped in the CS[1,2]; fortunately, we were able to free the entrapped decapolar catheter with catheter manipulation alone. The Thebesian valve, present in most individuals, is a fold of endocardial tissue located at the ostium of the

WHAT WE LEARNED FROM THIS CASE

- Catheter entrapment in the coronary sinus is a rare but potentially serious complication of electrophysiology procedures.
- Entanglement in the Thebesian valve or vessel spasm are possible mechanisms.
- An awareness of management strategies in the event of catheter entrapment may avoid further trauma and need for surgical intervention.

KEYWORDS Coronary sinus; Catheter; Complication; Electrophysiology study; Ablation (Heart Rhythm O^2 2023;4:67–68)

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https://doi.org/10.1016/j.hroo.2022.12.003

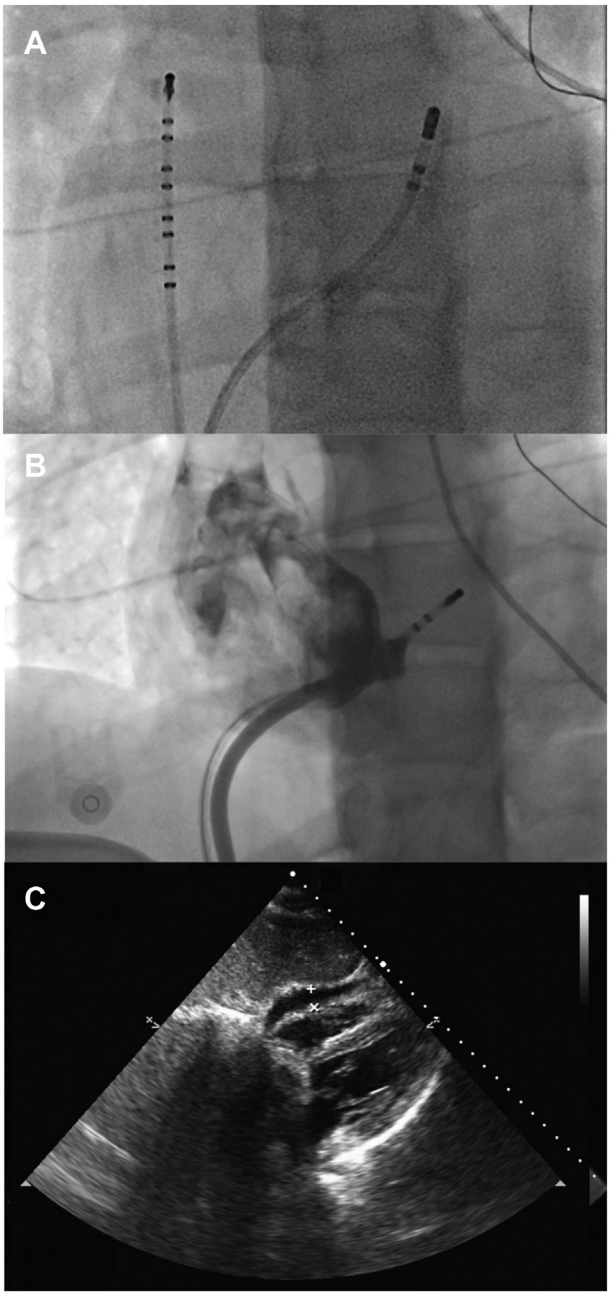

Figure 1 **A:** Successful cannulation of the coronary sinus (CS) with a steerable ablation catheter. **B:** Venography demonstrating the midportion of a steerable decapolar catheter entrapped very proximally in the CS with obstruction to contrast beyond the point of entrapment. **C:** A 1.1 cm pericardial effusion was noted 1 hour postprocedure.

CS, which can present a barrier to CS cannulation by obstructing the catheter entry, and may be fenestrated in up to a quarter of cases.[3] We posit that our catheter tip passed through a fenestration of the Thebesian valve and with repeated clockwise rotations; in an attempt to advance the catheter through a vertical CS, we may have entangled a band of valve tissue around the catheter. Although initial counterclockwise rotation did not free the catheter, the number of rotations required to unwind the entrapped catheter was not appreciated. We suspect that the small pericardial effusion was most likely related to cardiac injury in our attempts to retract the entrapped catheter against significant resistance.

Our case underscores the need for careful catheter manipulation while attempting to cannulate the CS. In particular, repeated catheter rotations while the tip has already engaged the ostium may result in a rare complication of catheter entrapment, presumably involving the Thebesian valve structure. In the first instance, rotation in the opposite direction should be attempted to unwind any adherent tissue; this may require more turns than expected. Venography, echocardiography, or right heart angiography may be useful to document the site of entrapment and exclude other involved structures, such as the tricuspid valve apparatus or Chiari network. Long sheaths may provide additional countertraction support. Other catheters, guidewires, and/or snares may also be helpful in providing additional traction, particularly from another angle if used from a jugular approach. Antispasmodic measures, sedation, and general anesthesia may reduce any potential spasm and minimize pain/anxiety. Modest radiofrequency energy may also be potentially beneficial, either to warm and relax any spastic segment of vessel tissue or to transect a band of tissue wrapped around a trapped catheter.[4]

Funding Sources: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Disclosures: Dr Wong reports that the University of Adelaide has received on his behalf lecture, travel, and/or research funding from Abbott Medical, Bayer, Boehringer Ingelheim, Medtronic, Novartis, Servier, St. Jude Medical, and Vifor Pharma. Dr Sanders reports having served on the advisory board of Medtronic, Abbott Medical, Boston Scientific, CathRx, and PaceMate. Dr Sanders reports that the University of Adelaide has received on his behalf lecture, consulting, and/or research funding from Medtronic, Abbott Medical, Boston Scientific, and MicroPort. Dr Lau reports the University of Adelaide has received on his behalf lecture and/or consulting fees from Abbott Medical, Bayer, Biotronik, Boehringer Ingelheim, Medtronic, MicroPort, and Pfizer/BMS. The rest of the authors report no conflicts of interest.

Authorship: All authors attest they meet the current ICMJE criteria for authorship.

Patient consent: Written consent for this publication was obtained from the patient.

Disclaimer: Given his role as Associate Editor, Dennis H. Lau had no involvement in the peer review of this article and has no access to information regarding its peer review. Full responsibility for the editorial process for this article was delegated to Editors Valentina Kutyifa and Jeanne E. Poole.

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