Left ventricle penetration—A rare complication of transseptal puncture and catheter ablation for supraventricular tachycardia

Nelson Chavarria, MD, Seth Goldbarg, MD, FHRS

From the Division of Cardiology, Department of Medicine, New York Hospital Queens, affiliate of Weill Cornell Medical College, Cornell University, New York, New York.

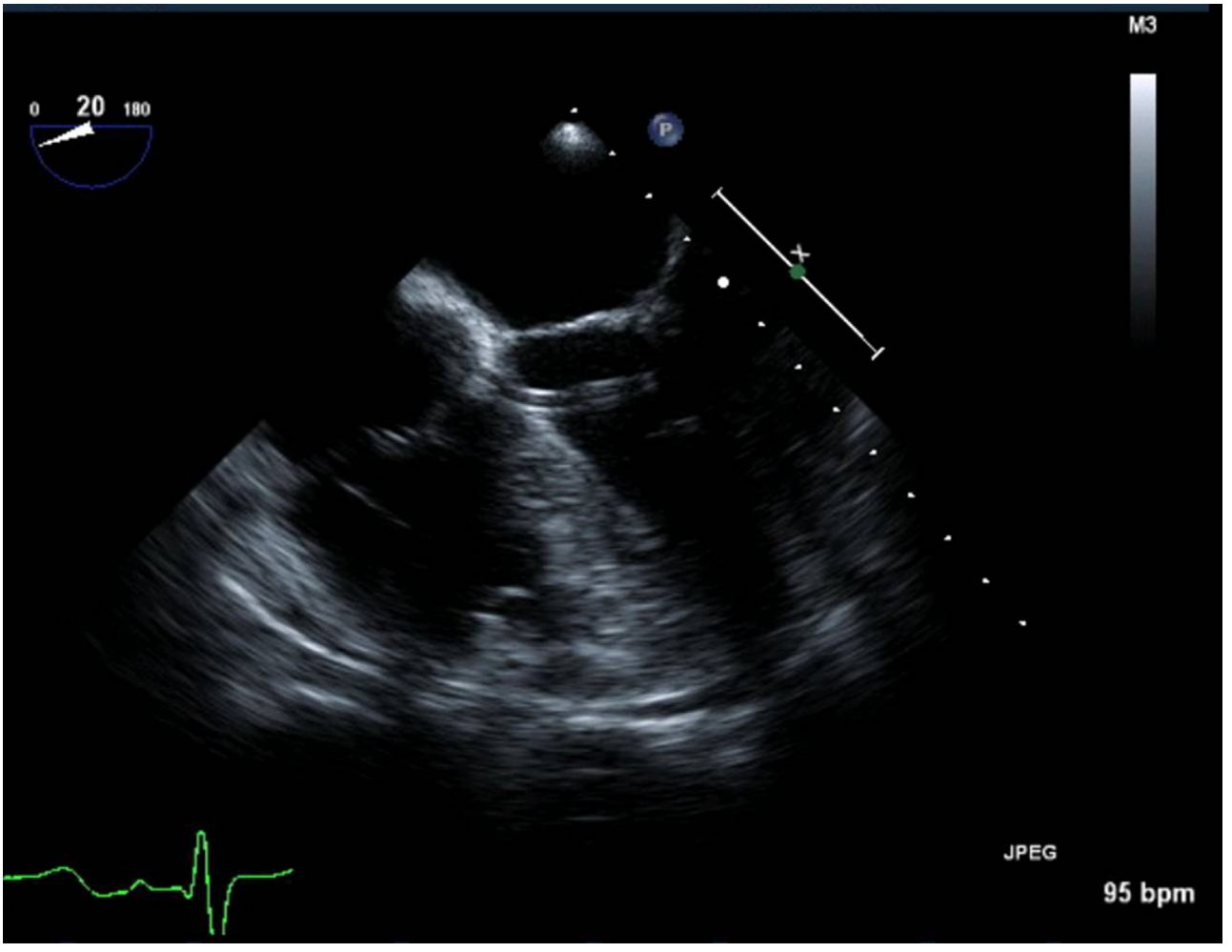

Figure 1 An ultrasonogram of left ventricular penetration complicating a transseptal puncture during an electrophysiologic study.

KEYWORDS Atrioventricular septum; Transseptal puncture; Catheter ablation; Adverse effects; Echocardiography
(Heart Rhythm Case Reports 2015;1:382–383)

Address reprint requests and correspondence: Dr. Nelson Chavarria, Division of Cardiology, New York Hospital Queens, affiliate of Weill Cornell Medical College, 56-45 Main Street, New York, NY 11355-5095. E-mail address: nec9018@nyp.org.

Introduction

A transseptal puncture through the interatrial septum at or near the fossa ovalis is frequently used to access the left side of the heart for electrophysiologic procedures. Fluoroscopy and intracardiac ultrasonography are imaging modalities commonly employed to facilitate the procedure. Complications associated with transseptal puncture include pericardial bleeding when the

http://dx.doi.org/10.1016/j.hrcr.2015.03.023

KEY TEACHING POINTS

- Complications associated with transatrial septal puncture include pericardial bleeding when the posterior segment of the fossa ovalis is punctured or aortic root injury when the anterior segments are penetrated.
- The membranous ventricular septum can be divided into 2 segments based on the attachment of the septal leaflet of the tricuspid valve: a superior atrioventricular segment and an inferior interventricular segment. Accidental puncture into the superior atrioventricular segment can lead to direct left ventricular–right atrial communication.
- The use of intracardiac echocardiography should be strongly considered when transseptal left heart catheterizations prove difficult with fluoroscopy alone.

posterior segment of the fossa ovalis is punctured or aortic root injury when the anterior segments are penetrated.[1,2] Inadvertent needle puncture directly into the left ventricle via the atrioventricular membranous septum is extremely rare and is a seldom-reported complication. We present an ultrasonogram (Figure 1) of left ventricular penetration complicating a transseptal puncture during an electrophysiologic study.

Case report

A 51-year-old male with intellectual disability and no history of cardiac problems was referred for evaluation of recurrent narrow QRS tachycardia. During an electrophysiologic study, an orthodromic atrioventricular reentrant tachycardia with a posterolateral pathway was diagnosed. In preparation for radiofrequency ablation, a Brockenbrough needle was advanced via an SL1 sheath into the high right atrium under single-plane fluoroscopic guidance. The sheath was drawn back until a drop into the region of the fossa ovalis was visualized. Despite repeated attempts, the position obtained was more inferior than usually seen, though still above the coronary sinus ostium. Positioning was confirmed fluoroscopically in the extreme right anterior oblique and left anterior oblique projections, and the needle was advanced through the sheath, across the septum. The sheath was then advanced over the needle. When the pressure line was connected, it revealed a left ventricular pressure waveform.

The results of urgent transesophageal echocardiography revealed that the sheath had advanced into the left ventricle from the right atrium (Online Supplemental Video 1). The sheath was pulled back under transesophageal echocardiographic guidance, with no residual shunt observed. The procedure was aborted, and the patient was observed overnight with no clinical sequelae. The patient returned several weeks later and underwent successful ablation of the accessory pathway via a retrograde approach.

Acquired left ventricular and right atrial communications are rare intracardiac defects that can arise from valve operations, infective endocarditis, trauma, or ischemia.[3] Less commonly reported are left ventricular and right atrial communications arising from transseptal puncture or radiofrequency catheter ablation.[4] The lack of hemodynamic consequence and the absence of a residual shunt in our patient suggest that the acquired defect closed upon removal of the sheath. This case illustrates important anatomical structures contiguous with the atrioventricular septum and highlights a rare complication associated with transseptal puncture. As previously recommended in a case involving aortic root injury,[5] the use of intracardiac or transesophageal echocardiography should be strongly considered when transseptal left heart catheterizations prove difficult with fluoroscopy alone.

Appendix

Supplementary data

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.hrcr.2015.03.023.

References

1. Chen SA, Chiang CE, Tai CT, Cheng CC, Chiou CW, Lee SH, Ueng KC, Wen ZC, Chang MS. Complications of diagnostic electrophysiologic studies and radiofrequency catheter ablation in patients with tachyarrhythmias: An eight-year survey of 3,966 consecutive procedures in a tertiary referral center. Am J Cardiol 1996;77:41–46.
2. Green TO, Huang SK, Wagshal AB, Mittleman RS, Pires LA, Mazzola F, Andress JD. Cardiovascular complications after radiofrequency catheter ablation of supraventricular tachyarrhythmias. Am J Cardiol 1994;74:615–617.
3. Yuan SM. Left ventricular to right atrial shunt (Gerbode defect): Congenital versus acquired. Postepy Kardiol Interwencyjnej 2014;10:185–194.
4. Can I, Krueger K, Chandrashekar Y, Li J-M, Dykoski R, Tholakanahalli VN. Images in cardiovascular medicine. Gerbode-type defect induced by catheter ablation of the atrioventricular node. Circulation 2009;119:e553–e556.
5. Claridge S, Kapetanakis S, Gill J, Rinaldi CA, Wright M. A rare complication from transseptal puncture persistent aorto-right atrial shunt and puncture of noncoronary cusp of aortic valve. Heart Rhythm 2012;9:2089–2090.