

CASE REPORT

ADVANCED

CLINICAL CASE

# Rare Complication of Endoscopic Variceal Therapy



## Wide-Complex Tachycardia Associated With Embolization of Glue and Coil

Kenneth Guber, MD,<sup>a</sup> Robert S. Zilinyi, MD,<sup>b</sup> Elissa Driggin, MD,<sup>b</sup> Ali Soroush, MD,<sup>c</sup> Sara Welinsky, MD,<sup>c</sup> John Nathanson, MD,<sup>c</sup> Amrita Sethi, MD,<sup>c</sup> David Rubin, MD<sup>b</sup>

### ABSTRACT

We present the case of a woman with upper gastrointestinal bleeding secondary to gastric varices requiring endoscopic cyanoacrylate glue and coil embolization. The procedure was complicated by regular, wide-complex tachycardia, with further investigation revealing cardiopulmonary migration of the glue and coil. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2022;4:433-437) © 2022 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

### HISTORY OF PRESENTATION

A 36-year-old woman presented with 2 days of black, tarry stools and several episodes of hematemesis. While brushing her teeth, she gagged and brought up a large blood clot accompanied by lightheadedness. This prompted her local gastroenterologist to refer her to an area hospital.

On presentation, her initial vital signs were a temperature of 36 °C, a heart rate of 122 beats/min,

blood pressure of 129/86 mm Hg, a respiratory rate of 16 breaths/min, and an oxygen saturation of 99% on ambient air. Initial laboratory test results were notable for a hemoglobin of 9 g/dL. She underwent emergency esophagogastroduodenoscopy, which showed a large gastric varix where 2 hemostatic clips were placed. A triple-phase contrast computed tomography (CT) scan was completed, and it demonstrated evidence of liver cirrhosis, multiple gastric varices, and a splenorenal shunt.

The following day, the patient was found to be hypotensive, with down-trending hemoglobin and recurrent melena. She received 2 U packed red blood cells and fresh frozen plasma. The patient was transferred to our institution (Columbia University Irving Medical Center, New York, New York) for endoscopic ultrasound (EUS)-guided glue and coil embolization of her varix. During the procedure, she became hypotensive, with a regular wide-complex

### LEARNING OBJECTIVES

- To consider the potential cardiac manifestations of complications of advanced interventional gastroenterology procedures.
- To learn the differential diagnosis of WCT.
- To understand the treatment of acute WCT from a mechanically induced focus.

From the <sup>a</sup>Department of Medicine, Columbia University Irving Medical Center, New York, New York, USA; <sup>b</sup>Division of Cardiology, Columbia University Irving Medical Center, New York, New York, USA; and the <sup>c</sup>Division of Gastroenterology, Columbia University Irving Medical Center, New York, New York, USA.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the [Author Center](#).

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### ABBREVIATIONS AND ACRONYMS

- CT** = computed tomography
- EUS** = endoscopic ultrasound
- PARTO** = plug-assisted retrograde transvenous obliteration
- PVC** = premature ventricular contraction
- RVOT** = right ventricular outflow tract
- VT** = ventricular tachycardia
- WCT** = wide-complex tachycardia

tachycardia (WCT) on cardiac monitoring. She was started on a phenylephrine drip at 80 µg/min for blood pressure stabilization; she was quickly weaned from the medication. She was given intravenous esmolol (20 mg), magnesium sulfate (2 mg), and a 150-mg amiodarone bolus with continuous drip at 1 mg/min, with resolution of the WCT, although with continued ventricular ectopy.

### PAST MEDICAL HISTORY

The patient's medical history included alcoholic pancreatitis and alcohol use disorder.

### DIFFERENTIAL DIAGNOSIS

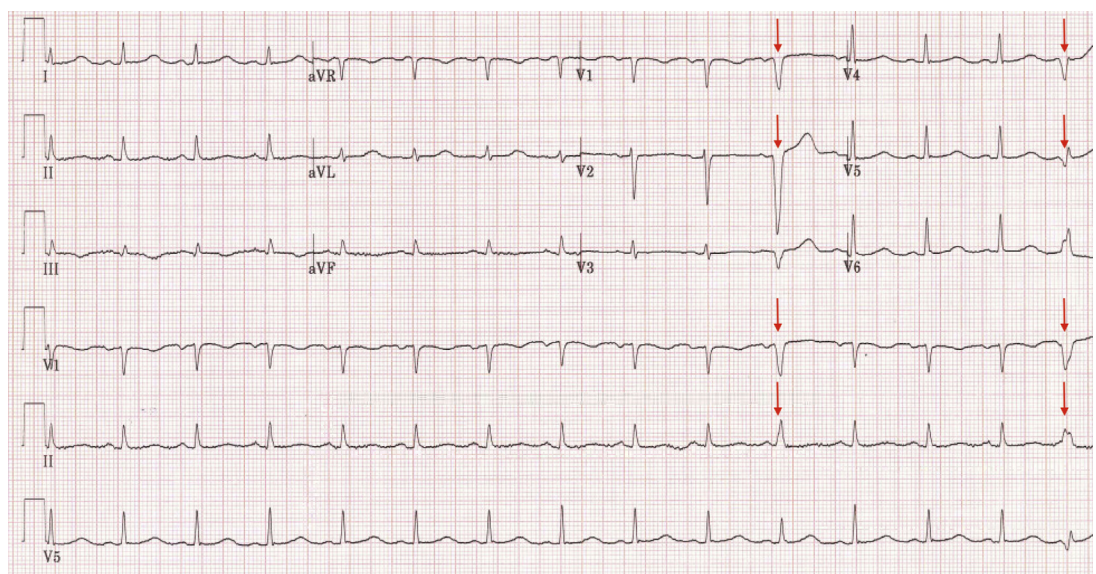
The differential diagnosis of new onset regular WCT is categorized into ventricular tachycardia (VT), supraventricular tachycardia with aberrancy, pre-excited supraventricular tachycardia, and antidromic atrioventricular re-entrant tachycardia. Differentiating among these entities requires electrocardiographic analysis that synthesizes atrioventricular association, the duration, configuration, and axis of the QRS complex, and the presence of concordance within the precordial leads.<sup>1</sup> VT is the most common cause of regular WCT in all comers.<sup>2</sup> However, in patients

without a history of structural cardiovascular disease, idiopathic VT is a unique entity, commonly seen in young patients.<sup>3</sup> Right ventricular outflow tract (RVOT) tachycardia is the most common form of idiopathic VT, and it accounts for almost 70% of all cases.

### INVESTIGATIONS

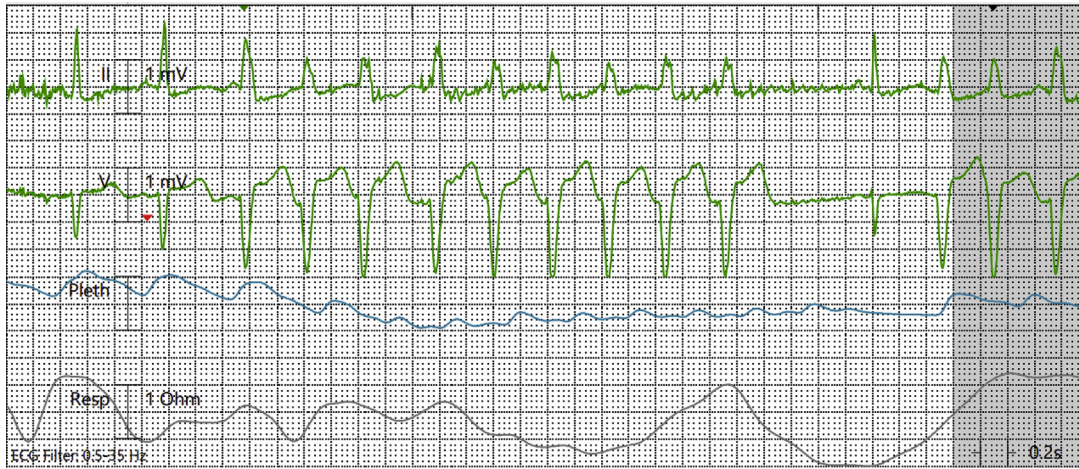
In the endoscopy suite, the patient was extubated to 2 L oxygen by nasal cannula and was transferred to the step-down unit. A bedside transthoracic echocardiogram demonstrated an ejection fraction of 55%-60%, normal dimensions, valve function, and estimated right ventricular systolic pressure, and no evidence of foreign bodies. Premature ventricular contraction (PVC) configuration on electrocardiogram was left bundle, inferior axis, with a late precordial transition, consistent with an RVOT exit site (Figures 1 and 2). The amiodarone drip was discontinued, and propranolol, 20 mg every 6 hours, was initiated. The postprocedural chest radiograph revealed nodular hyperdensities throughout the lungs (Figure 3). Given auscultatory findings of lung crepitations and new onset hypoxia, on postoperative day 2 chest CT with contrast was performed, revealing hyperdensities throughout the pulmonary arteries and material within the right

**FIGURE 1** Postprocedure Electrocardiogram Demonstrating Premature Ventricular Contractions (Left Bundle, Inferior Axis, V<sub>5</sub> Transition) Consistent With Right Ventricular Outflow Tract Focus



The first premature ventricular contraction is fused, as demonstrated by the lead II rhythm strip. **Arrows** show the right ventricular outflow tract focus.

**FIGURE 2** Captured Segment of Nonsustained Ventricular Tachycardia on Telemetry



The red arrowhead is a telemetry marker identifying the start of the nonsustained wide-complex tachycardia. Pleth = plethysmograph; Resp = respiratory rate.

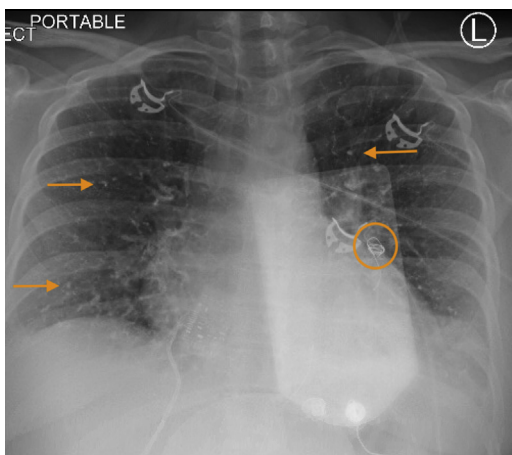
ventricle and RVOT (Figures 4 to 6). A retrospective review of the initial chest radiograph demonstrated the presence of a radiopaque density in the pulmonary vasculature corresponding to coil material.

### MANAGEMENT

On an emergency basis, the patient was taken for left pulmonary artery coil retrieval using a cloverleaf ensnare over a 5-F catheter through the right

common femoral vein. Plug-assisted retrograde transvenous obliteration (PARTO) of the splenorenal shunt using an Amplatz plug was also completed (Video 1). Surgery was not considered given the coil's amenable position for endovascular retrieval with the added benefit of a tandem PARTO procedure. The patient tolerated the procedure well and was extubated to room air. A repeat chest radiograph redemonstrated diffuse calcific densities throughout all 5 lobes (Figure 7). Given the extensive glue burden, the patient was administered dabigatran for

**FIGURE 3** Postprocedure Chest Radiograph



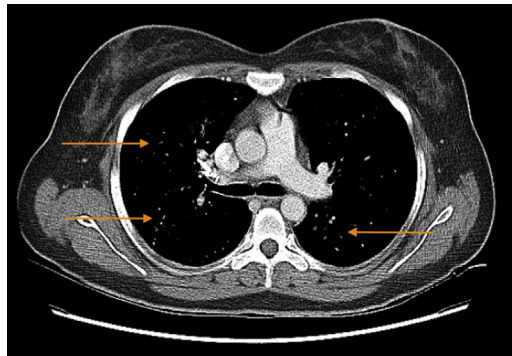
The image demonstrates nodular hyperdensities throughout all 5 lung lobes (arrows) and a radiodense embolized coil within the left pulmonary artery (circle). L = left.

**FIGURE 4** Axial Computed Tomography of the Chest With Contrast Demonstrating Intracardiac Hyperdensities Consistent With Embolized Glue Adherent to the Right Ventricle



The circle indicates the area of hyperdensities.

**FIGURE 5** Axial Computed Tomography of the Chest With Contrast Demonstrating Hyperdensities Throughout the Pulmonary Vasculature Found to be Embolized Glue



The **arrows** point to the hyperdensities.

**FIGURE 6** Sagittal Computed Tomography of the Chest With Contrast Demonstrating Hyperdensities Within the Right Ventricle and Outflow Tract Consistent With Retained Glue



The **circle** indicates the area of hyperdensities.

anticoagulation and was discharged with close follow-up.

## DISCUSSION

To our knowledge, this is the first CT demonstration of cardiopulmonary glue and coil portosystemic embolization following EUS-guided variceal treatment. The deployed materials likely migrated into the left renal vein through the patient's splenorenal shunt, then into the inferior vena cava, right side of the heart, and pulmonary vasculature. This anatomical distribution likely corresponds to the precipitating focus of the RVOT VT. Sustained VT from an acute pulmonary embolism has seldom been described.<sup>4</sup> Therefore, the patient's VT was likely from cardiac toxicity rather than a primary pulmonary insult. What may have precipitated the event was a constellation of focal mechanical irritation in the RVOT from retained glue, coil, or both. Alternatively, this could have been driven by catecholamine-mediated delayed after-depolarizations from procedural stress; however, the VT exit coinciding with the retained glue and coil location points toward the former. Although endoscopic glue is a nonconductor of electricity, its adherence to cardiac tissue may inflame and establish an electrical focus. The possible passage of the coil through the pulmonary valve into the left pulmonary artery, although never visualized, may have played an important role in terminating the event. This would explain sustained VT cessation in the setting of retained intracardiac glue. The treatments of amiodarone, esmolol, and beta-blockade

likely further suppressed any inherent electrical irritability.

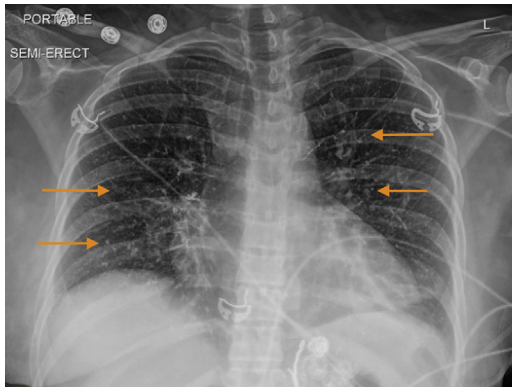
The endoscopic glue *N*-butyl-cyanoacrylate polymerizes immediately on contact with blood. It has been used for decades as the initial treatment of gastroesophageal varices.<sup>5</sup> Initial reports of fatal embolization led to the development of first deploying coils to act as a scaffold and nidus for clot formation. In a series of 152 patients with gastric varices treated with EUS glue and coil embolization, there was 1 patient with proven pulmonary glue embolization and 3 patients with bleeding from extruded contents.<sup>6</sup> Complications of glue embolization include pulmonary embolism, sudden cardiac arrest, portal and splenic vein thrombosis, splenic infarction, and sepsis.<sup>7-9</sup> The migration of endovascular coils is also rare, with complications including intracardiac trauma, pulmonary infarcts, and thrombophlebitis.<sup>10</sup>

Given the extensive embolic burden in the cardiopulmonary vasculature and its inherent thrombotic risks, the patient was started on anticoagulation therapy. Careful review of post-portosystemic glue embolization treatment found limited evidence for such practice.

## FOLLOW-UP

At 2-weeks after hospitalization, the patient remained stable, although with occasional coughing, dyspnea on exertion, and episodes of desaturation on pulse oximetry. Repeat CT of the chest with contrast enhancement redemonstrated multiple foci of densities in the segmental and subsegmental arteries of

**FIGURE 7** Post-Plug-Assisted Retrograde Transvenous Obliteration Chest Radiograph Demonstrating Removal of Embolized Coil From Left Pulmonary Artery and Diffuse Glue Throughout All 5 Lobes



The arrows point to the areas of diffuse glue.

**FIGURE 8** Postdischarge Follow-up Axial Computed Tomography of the Chest With Contrast Redemonstrating Multiple Foci of Embolized Glue Without Obvious Right Ventricular Abnormalities



The arrows point to the areas of embolized glue.

all lung fields, similar to previous studies (Figure 8). The patient reported heavy menses and bleeding from her rectum, and laboratory studies confirmed a hemoglobin value of 5.9 g/dL. She underwent transfusion, and anticoagulation was discontinued.

## CONCLUSIONS

VT is a rare complication of glue and coil embolization following endoscopic procedures. Operators should be alerted to this event in the setting of unexplained postprocedural ventricular arrhythmia. The need for short-term, or long-term, anticoagulation in this setting remains unclear.

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Dr Sethi has received consultant fees from Boston Scientific, Intuitive Surgical, Medtronic, Microtech, and Olympus; and has ongoing relationships with Fujifilm (nonfinancial consultant), Women in Endoscopy (President), AGA Center for GI Innovation and Technology (Co-chair), and *Gastrointestinal Endoscopy* (Editorial Review Board). All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

**ADDRESS FOR CORRESPONDENCE:** Dr Kenneth Guber, Department of Medicine, Columbia University Irving Medical Center, 230 Riverside Drive, 12N, New York, New York 10025 USA. E-mail: [keg9104@nyp.org](mailto:keg9104@nyp.org).

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**KEY WORDS** gastric varices, iatrogenic complication, wide-complex tachycardia

**APPENDIX** For a supplemental video, please see the online version of this paper.