

# Ventricular tachycardia from embolized central venous port

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#### Abstract

Central venous access is typically required for prolonged administration of intravenous medications. Implantable ports are most frequently used in cancer chemotherapy. The spontaneous fragmentation and embolization of these catheters is not uncommon and can present rare but potentially life-threatening complications such as ventricular tachycardia (VT). We present an adolescent with a 2-week history of intermittent VT unrelated to activity. A chest x-ray confirmed spontaneous fragmentation of the central line and embolization in the right ventricle and pulmonary artery. Successful retrieval of the embolized catheter was performed without any complications using the gooseneck snare technique and the patient was free of symptoms at follow up. Chest x-rays can be beneficial in ruling out other causes of VT and in avoiding unnecessary treatment or management.

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## Introduction

Central venous catheters are essential for prolonged intravenous support in such cases as oncology, cystic fibrosis, short gut syndrome, and cardiology [1]. Spontaneous fragmentation and embolization are a rare, noninfectious complication of central venous catheters [2]. In this report, we describe a 16-year-old male patient with intermittent ventricular tachycardia (VT) secondary to embolization of a central venous port in the right ventricle and pulmonary artery.

## **Case Report**

A 16-year-old male presented with a 2-week history of palpitations lasting 2 to 4 minutes, unrelated to activity. At age 12, he had been diagnosed with complex low-grade astrocytoma (World Health Organization Grade I) of his left temporal lobe with posterior extension into the left thalamus and anterior extension into the hypothalamus. He had residual mixed and solid cystic tumor after partial resection. He then completed 12 months of chemotherapy. He was placed on regular observation surveillance; however, recurrence of malignancy was noted 54 months after the completion of initial chemotherapy. A 9.6F silicone catheter implantable port (BardPort\* Implantable Port, Bard Access Systems, Inc., Salt Lake City, UT, USA) was then placed to facilitate the administration of chemotherapy. Four months after placement of the central venous port, the patient reported palpitations to his treating oncologist. As a result, pediatric cardiology opinion was sought.

Our assessment showed that the patient had been on medications including benzodiazepines and muscle relaxants. He was not a smoker, and denied alcohol or illicit drug use. His vital signs and cardiac examination were normal. Echocardiography showed normal cardiac function. and no rhythmic abnormalities observed. from were Findings neurologic examination were unremarkable. Ongoing abdominal complaints secondary to chemotherapy, such as intermittent diarrhea and reduced appetite, were noted. The port was palpated in the upper left

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chest and was fairly mobile. A Holter monitor revealed multiple premature atrial contractions (PACs) and runs of polymorphic VT. The longest run included 16 beats and up to 234 beats per minute (Fig. 1).



Figure 1. Holter monitor recording shows VT

A chest x-ray was performed to define the location of the distal end of the central venous catheter. This confirmed fragmentation of the central line with embolization in the pulmonary artery, with one end in the left pulmonary artery branches and the other end jutting into the right ventricular outflow tract (Fig. 2). Upon review, it was determined that emergency retrieval of the embolized central venous line should be performed through the percutaneous transcatheter route.

Under general anesthesia and aseptic precautions, central venous access was obtained using the Seldinger technique, and an 8F Cordis sheath was secured in the right femoral vein. A 6F standard GuideLiner<sup>TM</sup> (Vascular Solutions, Inc., Minneapolis, MN, USA) catheter was introduced through the sheath over a guidewire in to the pulmonary artery. The standard retrieval technique using an Amplatz Gooseneck snare (Covidien, Plymouth, MN, USA) was technically difficult as one end of the catheter was impacted in the pulmonary artery branch and the other end migrated into the sinus of the pulmonary valve. The distal end of the embolized line was captured with a 20-mm Gooseneck snare (Covidien) over a 4F right Judkins catheter, which was then

successfully exteriorized through the 8F sheath. At follow up one month later, the Holter monitor showed no further arrhythmias and the patient was free of any adverse symptoms.



Figure 2. Chest x-ray shows fragmentation point (A) and embolization of the central venous catheter in the right ventricle and pulmonary artery (B)

### Discussion

When children and young adults present with VT, it is important to establish cause in order to treat it appropriately. The common causes of VT in children include electrical conduction problems like long QT syndrome, catecholaminergic polymorphic VT, and Brugada syndrome. Mechanical irritation of the heart can cause VT due to myocardial tumors, central venous catheters, and other lines. Rare inflammatory causes such as acute inflammatory myocarditis, dilated or hypertrophic cardiomyopathy, drug toxicity from antiarrhythmic drugs (sotalol, dofetilide, and amiodarone), or metabolic imbalance (hypokalemia. hypomagnesaemia) are also described in the literature [3]. Arrhythmias in patients undergoing chemotherapy typically caused are by



cardiomyopathy or electrolyte imbalance. Intracranial space-occupying tumors are also known to cause ECG abnormalities and rhythm disorders secondary to central nervous system disruption. These causes have to be ruled out in patients with cancer.

The spontaneous fragmentation and embolization of central venous catheters is not uncommon. Complications associated with embolization of central venous catheters include arterial puncture, arrhythmias, central venous thrombosis, phlebitis, and fibrin sheath formation [1-2, 4]. However, catheter fragmentation may be underreported as nearly 83 percent of cases are asymptomatic. In 1990, Hinke et al. first described the compression of a central venous catheter between the clavicle and the first rib as pinch-off syndrome, a sign of impending catheter fragmentation. Catheter pinch-off may be detected on a chest x-ray, and prompt removal of the line is recommended [5]. As a result, chest x-ray follow-up is a requirement for close monitoring of patients with central venous catheters [6].

Spontaneous fragmentation and embolization of central venous catheters must be considered a probable cause of VT in patients with these lines. A chest x-ray should be used as an important diagnostic tool as it can reveal the underlying pathology excluding the need for extensive treatment or management.

The spontaneous fragmentation and embolization of central venous catheters may cause life-threatening VT. Resolution of the adventitious symptoms is achieved through the exteriorization of the catheter fragment(s). The awareness of catheter pinch-off, fragmentation, embolization, migration, cardiac perforation, and defective lines is important for accurate diagnosis and prompt management of the patient. Upon completion of treatment, central venous catheters should be removed; however, if kept, they should be monitored closely with periodic chest x-rays. Patients with central venous catheters who present with arrhythmias or other unusual symptoms may benefit from a chest x-ray for early differential diagnosis.

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