EXTRACTION OF A TUNNELED JUGULAR DEFIBRILLATOR LEAD VIA A SUPERIOR APPROACH

ABSTRACT: Extraction of cardiac implantable electrical devices (CIED) is becoming an increasing necessity. Infection is among the most frequent and serious complications associated with the surge of CIED implants. We describe the extraction of an infected cardiac resynchronization therapy-defibrillator (CRT-D) in a patient with a tunneled implantable cardioverter defibrillator (ICD) lead implanted from the right jugular vein. Keywords: implantable cardioverter defibrillator, extraction

INTRODUCTION

The most common complication of cardiac implantable electrical devices (CIED) is infection leading to extraction of the device and lead system [1-2].

A challenging case of a patient with an infected cardiac resynchronization therapy-defibrillator (CRT-D) that had a tunneled implantable cardioverter (ICD) lead implanted from the right jugular vein is described below.

CASE REPORT

An 81-year-old man underwent implantation of a left pectoral dual chamber pacemaker seven years ago for the diagnosis of symptomatic sick sinus syndrome. Four years later, he developed an ischemic cardiomyopathy with documentation of an ejection fraction at 30% and a left bundle branch block on his electrocardiogram (ECG).

A CRT-D upgrade was planned but this was challenging as the operator was faced with an occluded left subclavian vein. A dual coil ICD lead was implanted from the right internal jugular (IJ) vein and tunneled to the left sided CRT-D can. The left ventricular (LV) lead was placed epicardially (Figure 1). About three months later the patient started spiking fever; blood cultures were repeatedly positive for Staphylococcus epidermedis. He received several courses of PO and IV antibiotics without complete control of the infection.

As he continued to have positive blood cultures for the following two years, he was referred for extraction of the device.


RÉSUMÉ : L’extraction des défibrillateurs cardiaques implantables devient une nécessité croissante, avec l’augmentation du nombre de dispositifs implantés et les complications associées, en particulier infectieuses.

Une méthode originale d’extraction d’un défibrillateur CRT-D infecté ayant une sonde tunnelisée implantée par voie jugulaire droite est décrite dans cet article.

Mots-clés : défibrillateur cardiaque implantable, extraction.

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FIGURE 1

Chest X ray showing the leads of the device and the tunnel dual coil high impedance right ventricular lead from the right internal jugular vein.
Extraction procedure
In the electrophysiology laboratory and under general anesthesia, the existing pocket was dissected and the leads disconnected from the device, the right atrial lead pulled out with manual traction. The abandoned right ventricular (RV) lead required preparation and the utilization of the Cook Evolution sheath to free the fibrosis, but we could not advance the extraction system beyond the mid subclavian level. At this point we moved to the ICD lead. A 2 cm incision over the right IJ region was made to access the lead. This was cut and prepared. The proximal part was pulled out from the pocket side with manual traction. A locking stylet was placed in the inner conductor reaching the tip.

A 13 French Cook Evolution sheath was used to free the fibrosis. This allowed us to get to the RV with an ideal coaxial tract over the coils of the lead (Figure 2) and successfully extract it (Figure 3). Subsequently, we moved back to the abandoned RV lead and were able to extract it through the Evolution sheath as well. The intravascular system was successfully extracted without complications and the epicardial LV lead was abandoned (Figure 4).

Follow-up
After the procedure, the patient has done very well. His ejection fraction was 50% with normal atrioventricular conduction. He is being followed clinically and a new system will only be implanted if his left ventricule function starts to deteriorate again.

DISCUSSION
Implantation of cardiac devices continues to increase. More than 400 thousands devices are being implanted yearly in the United States. Pacemakers and ICD have different indications. They adjust the heart rhythm by correcting the heart rate or coordinate the contractions of the heart in patients with heart failure [3]. ICDs deliver an electric shock to correct any life-threatening arrhythmia [4].
In some cases, device and lead extraction may be necessary especially with the increasing number of devices implanted. Infection is the main reason for extraction [5]. These infections rarely respond to conservative management with antibiotics and usually require complete removal of all hardware [6].

Other problems like nonfunctional leads might not require extraction unless the operator is faced with an occluded vessel. Leaving the lead in place while implanting another lead is an acceptable approach since lead extraction is a relatively high-risk procedure.

*Staphylococcus* species continue to represent the most common pathogen isolated in cases of CIED infections [7-9]. The morbidity and mortality associated with CIED infections remain high [10]. CIED extraction has its inherent risk especially when faced with an ICD lead removal. In a series from the Cleveland Clinic, the in-hospital mortality was 4.6%. However, of 412 total patients, only 2 (0.5%) of the 19 deaths were extraction related. The one-year mortality after removal of the infected device was 17% [2].

The decision to remove the leads should not be delayed especially when dealing with gram positive infections. Our case was referred after two years of the diagnosis. The extraction procedure would have been easier had the patient been referred earlier.

In order to clarify when to do lead extraction, there are guidelines published by the Heart Rhythm Society clarifying the indications of CIED lead removal or extraction and more importantly defining the requirement for centers performing these procedures [1].

CIED extraction is often performed in tertiary referral centers because of the availability of expertise, tools, and techniques used to extract the leads of these cardiac devices.

There are several techniques and tools utilized for CIED leads extraction. The major obstacle that the operator is faced with during the procedure is passing the extraction sheath around the curvature of the lead at the level of the superior vena cava (SVC). This ninety degree angle is cumbersome and carries the risk of SVC laceration by the sheath. This risk is even higher when dealing with a dual coil ICD lead. The SVC coil becomes anchored to the body of the vessel and the risk of SVC laceration goes up tremendously especially if the lead is more than five years old.

In our case, The ICD lead was implanted from the right IJ and tunneled to the left pectoral device making extracting it from the left subclavian vein impossible. The superior approach provided a safer and a coaxial tract that bypassed the unfavorable angle of the SVC.

**CONCLUSION**

Extraction of tunneled leads from the right internal jugular veins is feasible and safe. The superior approach provides an ideal coaxial tract on the lead minimizing the risk of SVC injury.

**REFERENCES**