Diffuse large B-cell lymphoma presenting as implantable cardioverter-defibrillator pocket swelling: A case report

Farah Olleik, MD,* Talar Telvizian, MD,* Steven Liskov, MD,† Bahij Kreidieh, MD,† Douglas Esberg, MD, FHRS†

*From the *Division of Internal Medicine, Lankenau Medical Center, Philadelphia, Pennsylvania, and †Division of Cardiology, Department of Medicine, Lankenau Medical Center, Philadelphia, Pennsylvania.*

Introduction

The number of cardiovascular implantable electronic devices (CIEDs) has increased owing in part to the growing number of indications for their use and the increasing demand of the aging population.[1] An estimated 1.2 million CIEDs are implanted annually worldwide, and 2.9 million CIEDs were implanted in the United States alone between 1993 and 2009.[2] The growing incidence of device implantation requires familiarity with and recognition of device-related complications. CIED infections are a feared complication reported, and familiarity with CIED pocket abnormalities including pain, swelling, inflammatory changes, and erosion is essential to identifying patients with possible device-related infection. Noninfectious etiologies of device pocket inflammation including lymphoma are limited to case reports. The pathophysiology of malignant transformation of tissue surrounding the device pocket remains unknown. We report a case of diffuse large B-cell lymphoma in a 91-year-old male patient presenting with subacute swelling and inflammatory changes at his implantable cardioverter-defibrillator (ICD) pocket site.

Malignant neoplasms presenting as CIED pocket masses are extremely rare yet remain in the differential diagnosis.

KEY TEACHING POINTS

- Malignancy should be considered in the differential diagnosis of patients presenting with cardiovascular implantable electronic device (CIED) pocket swelling.
- Gross pathologic and histological analysis of tissue specimens from CIED generator pocket should be considered in atypical cases of CIED pocket swelling.
- Treatment includes a multidisciplinary approach and involves electrophysiology, surgery, and oncology to evaluate and treat CIED-associated malignancies.

Case report

A 91-year-old male patient with a nonischemic cardiomyopathy status post dual-chamber ICD implantation in 2010 and upgrade to left prepectoral biventricular ICD in 2013, permanent atrial fibrillation, and essential thrombocythemia on hydroxyurea presented to an outside hospital for 2 weeks of progressive ICD pocket swelling and erythema. The patient denied pain at the ICD pocket site. Examination revealed an erythematous, swollen pocket with overlying telangiectasias. The patient was afebrile with mild leukocytosis. Ultrasound of the pocket revealed an irregular fluid collection inferior to the ICD generator measuring 4 × 2.6 × 3.3 cm. The patient was treated empirically with broad-spectrum antibiotics for presumed ICD pocket infection and transferred to our center for pocket exploration and possible extraction.

Pocket exploration revealed a solid mass with cystic components extending onto the ICD generator, leads, and surrounding tissues. A biopsy specimen was obtained. The device was left in position and the pocket was closed. Bacterial and acid-fast bacilli wound cultures showed no growth, and blood cultures remained negative. Antibiotics were discontinued given low clinical suspicion for infection and absence of supportive microbiologic data. Microscopy of the biopsy specimen revealed fragments of fibrous tissue

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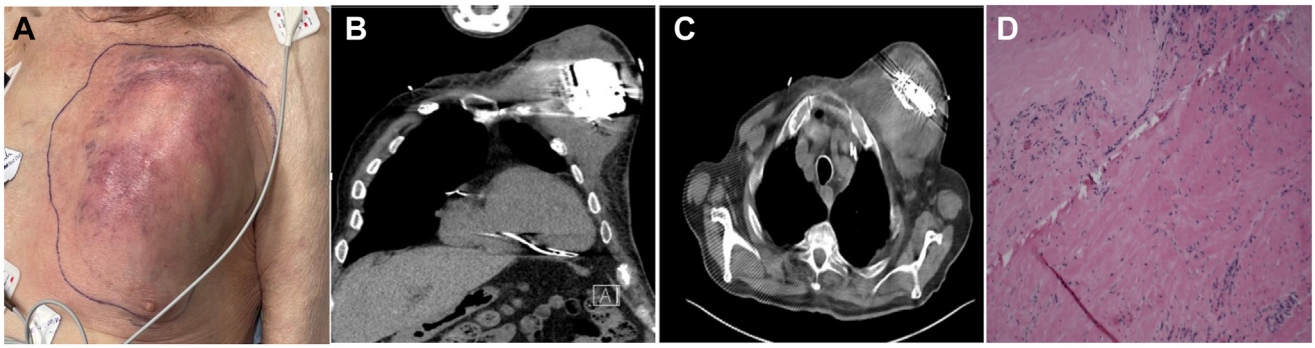

Figure 1 **A:** Surface appearance of cardiovascular implantable electronic device (CIED) pocket swelling. **B, C:** Computed tomography scan of the chest in coronal (**B**) and axial views (**C**) showing a soft mixed-density material surrounding the left anterior chest wall CIED. **D:** Pathology with hematoxylin-eosin staining showing partially necrotic tumor with diffuse proliferation of atypical cells with frequent mitotic figures and apoptosis extending into skeletal muscle.

with focal chronic inflammation and fibrosis. No malignant cells were observed.

The patient was seen in follow-up approximately 1 month later for consideration of surgical excision of the ICD pocket mass. Computed tomography scan of the chest revealed a large complex fluid collection measuring up to 11.5 cm involving the ICD pocket, few top-normal mediastinal lymph nodes, and a rounded density within the left pectoralis muscle measuring up to 1.8 cm. The patient was admitted following this evaluation for worsening ICD pocket swelling and erythema. The patient underwent repeat pocket exploration and resection of the 418 g, 14 × 8 × 6 cm mass including a segment of the left pectoralis major muscle. Microscopy revealed a partially necrotic tumor with diffuse proliferation of atypical cells with frequent mitotic figures and apoptosis extending into skeletal muscle. Flow cytometry revealed evidence of abnormal B cells, confirming the diagnosis of diffuse large B-cell lymphoma, activated immunophenotype (Figure 1). An interdisciplinary team including the patient, oncology, and electrophysiology favored holding further staging and treatment owing to poor functional status. The patient was transitioned to hospice care and died.

Discussion

DLBCL is the most common histologic subset of non-Hodgkin lymphoma (NHL). Treatment of DLBCL includes cytotoxic chemotherapy with rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisone, and radiation therapy for bulky disease, and may include additional treatments based on immunologic and molecular subtype. Prognosis is determined by the patient's age, performance status, stage of malignancy, and serum lactate dehydrogenase.[3] NHL at the site of CIEDs is reported rarely in the literature, and most often presents with swelling of the generator pocket. The pathophysiologic relationship of the CIED and NHL remains unknown.

Infections, namely Epstein-Barr virus, human immunodeficiency virus, hepatitis C virus, *Helicobacter pylori*, *Borrelia burgdorferi*, and *Chlamydophila psittaci*, among others, have been well documented in the literature and linked to the development of lymphoma through chronic inflammation.[4] Hojo and colleagues[5] reported a case of DLBCL in a pacemaker pocket and suggested chronic inflammation as the culprit. Additionally, Kang and colleagues[6] reported a case of squamous cell carcinoma in a chronic nonhealing CIED pocket infection. Our patient did not have any known infections and was Epstein-Barr virus negative. However, most of the reported cases in the literature did not mention a history of infection on inflammation at the site of CIED implant.[5,7]

CIED pocket malignancy may be initially misdiagnosed as infection.[8] Atypical cases of CIED pocket swelling should prompt biopsy for pathologic diagnosis. Noninfectious etiologies require high clinical suspicion and should be on the differential diagnosis for CIED pocket swelling. Provider familiarity with the spectrum of CIED pocket complications is critical to early diagnosis and management of rare noninfectious causes of pocket swelling.

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