


CASE REPORT



An unusual case of fungal ball on implantable cardioverter defibrillator wire and literature review

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ABSTRACT

Cardiac Implantable Electronic Device (CIED) includes pacemakers and implantable cardioverter defibrillators (ICD). The device infection is classified into pocket and systemic infection. We present a case of candida fungemia secondary to dissemination from the fungal ball found on an ICD. Patient was successfully managed with IV fluconazole, ICD explantation and reimplantation. The purpose of this report is to highlight rare complications of ICD implantation and guide its clinical course and management.

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1. Introduction

In implanted cardiac devices, the rate of infection with any organism is 0.8% to 5.7% with fungi contributing to 2% of these infections[1]. The infection can arise from procedural contamination or underlying comorbid conditions. The infection can occur as early as within 2 weeks of implantation. The most common organism is Staphylococcus with Candida occurring in minor cases. The diagnosis is made with strong clinical suspicion, blood cultures and imaging. The treatment is targeted at eradication of pathogens with antimicrobials and device removal. The device can be re implanted after the eradication of infection is confirmed. In view of the very limited literature that describes Candida related device infections, we report a case in an elderly male with ICD infection, his hospital course and management strategy.

2. Case report

An 84-year-old male with a past medical history of coronary artery bypass grafting and bilateral carotid endarterectomy, presented to the emergency department with complaints of fever, fatigue and acute on chronic back pain for one day. He also reports an extensive history of hypertension, hyperlipidemia, ischemic cardiomyopathy, coronary artery disease, atrial fibrillation, carotid disease and ventricular tachycardia. Few years ago, the patient was placed on ICD and mexiletine for ventricular tachycardia.

On physical assessment, the patient was febrile and tachycardic. Cardiac examination revealed an audible 2/6 ejection systolic murmur in right second

intercostal space, consistent with aortic stenosis. The precordium and the site of the ICD was not inflamed. The lumbar area on the back was tender without any obvious deformity. The skin examination revealed a stage 2 ulcer at the sacral area. The rectal examination showed black stools with no organomegaly or abdominal tenderness.

The laboratory studies revealed his Hb was 10.5, leukocytosis of 20,000 with platelet count of 26,000. His blood urea nitrogen (BUN) was 54 and creatinine was 1.47. Hepatic function panel revealed aspartate aminotransferase (AST) of 113, alanine aminotransferase (ALT) of 122, alkaline phosphatase (ALP) of 215 and albumin of 2.9. His lactate dehydrogenase (LDH) was also elevated. Coagulation profile was normal. Urinalysis was positive for leukocyte esterase, WBC and RBC. RBC indices and iron studies were suggestive of anemia of chronic disease. The stool examination was positive for fecal occult blood. The chest radiographs and electrocardiographic findings were normal. Urine culture reports came back positive for Candida with over 100 K colonies/ml. The blood was sent for cultures twice and was found positive for Candida Albicans.

Transthoracic Echocardiography(TTE) revealed an ejection fraction of 25–30% and a 3.3 cm by 2.7 cm mobile mass attached to the ICD wire near the tricuspid valve. The repeat blood work showed worsening anemia, thrombocytopenia and systemic fungal infection.

Based on the history of ICD implantation, positive fungal cultures and echocardiographic findings, we made a diagnosis of candidemia secondary to ICD infection.

The patient was stabilised and treated with intravenous fluconazole. He underwent successful ICD

explantation on the 4th day of admission. The measurements of fungal mass were consistent with echocardiographic findings. The results of pathology and culture confirmed *Candida Albicans*. The treatment with IV fluconazole was continued during his hospital stay. He was discharged on the 8th day of admission with an 8 week prescription of fluconazole. After assessing the negative blood cultures at 2 weeks, our patient underwent the procedure for ICD reimplantation. At the 8th week follow up, the patient was stable with negative cultures and absent vegetations on TTE. He was advised to continue the fluconazole for lifelong suppression and closely follow up with the cardiologist.

3. Discussion

Intracardiac device infections are becoming more frequent considering the increased indications for device implantation. The most common pathogens are coagulase negative staphylococcus and *Staph Aureus*[2]. Among all ICD infections, the incidence of fungal infection is 2% with *Candida* being the most common species[3]. The predisposing risk factors for *Candida* infection include immunosuppression, diabetes mellitus, intravenous drug abuse, antibiotic therapy, indwelling device and underlying cardiac dysfunction[4]. The infection occur as the microbial biofilm forms over the device and extend into the intracardiac structure. The device infection usually presents with a wide array of symptoms including fever, pain, malaise and weight loss depending on the location and time since implantation.

Our literature review showed 29 reported cases of intracardiac fungal infections. There were 14 males and 15 females with the mean age of 65.6 years. The intracardiac device was implanted for a mean duration of 5.48 years. The most common presentations were fever (51.7%) and dyspnea (27.5%). *Candida Albicans* was the most common pathogen (37.9%) recovered from the culture followed by *Aspergillus* (27.50%), *Candida Tropicalis* (10.34%), *Candida Parapsilosis* (10.34%) and other fungi (13.7%). The size of the largest vegetation was 2.09 × 4.49 cm. The patients were managed both medically and with device removal. The outcomes were more favourable with the medication, device removal and reimplantation as compared to medical therapy alone. Among these patients' survival rate was 76% whereas 24% patients died. The complications ranged from systemic infection, shock and organ failure.

Our patient also presented with non-specific complaints of fever, fatigue and back pain. The other non-specific findings are leukocytosis, anemia, thrombocytopenia and high erythrocyte sedimentation rate which were also present in our patient. Upon further investigation, the blood cultures can be positive or negative. A negative blood culture doesn't exclude the possibility of infection. Therefore, imaging tests like echocardiography or chest CT scan should be carried

out to further elucidate the diagnosis. The choice of optimal diagnostic imaging remains crucial with the aim of reaching definite diagnosis. The specificity of transesophageal echo remains higher at 90% than TTE at 30%[5]. In our case, the TTE was easily accessible and demonstrated the vegetation therefore transesophageal echocardiography was not done.

The management approach depends on underlying co-morbidities and severity of the infection. Infectious Disease Society of America recommends Amphotericin B or a combination of Amphotericin with 5-flucytosine as an initial treatment which can later be switched to Fluconazole 400–800 mg daily as the patient stabilises and blood culture becomes negative [1,6,7]. Additionally, device explantation is crucial to prevent local recurrence and systemic infection. A case reported by Brown et al, showed treatment resistance even after 3 weeks of antifungal therapy for *Candida* device infection [7,8]. Therefore, device explantation along with prolonged antifungal treatment is the mainstay for *Candida* ICD infection. This therapy should be continued for at least 6 weeks post device removal in patients with ICD wire infections[9]. In our patient, we removed the infected device and instituted fluconazole for 8 weeks with clinical improvement. Sohail et al reported that device reimplantation can be done after blood cultures are negative for 72 hours[5]. In other cases, reimplantation is deferred until 2–6 weeks depending on the site of infection[10]. In our patient, device reimplantation was done at 2 weeks with no reported complications. The specific time for reimplantation is variable depending on the patient's underlying cardiac condition, site of infection, blood culture reports and future risk of infection. Hence, there is limited data to guide the clinicians regarding the optimal time of reimplantation. Future studies should evaluate the merits of different timings of reimplantation in different patient populations. In our case, ICD removal was risky due to the patient's age and underlying comorbidities, however, he had successful device explantation, reimplantation and a successful recovery on follow up.

4. Conclusion

- Early diagnosis and prompt intervention is crucial in minimizing septicemia and mortality, it is imperative to explant the device and start patients on long term antifungal therapy.
- Patients can present with coexisting valvular infections therefore physicians should have a high index of suspicion for diagnosing this condition.
- The decision of cardiac device reimplantation depends on the patient's underlying cardiac condition, culture results and future risk of infection.

Disclosure statement

The authors report no financial relationships or conflict of interest regarding the content therein.

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