

CARDIOVASCULAR IMPLANTABLE ELECTRONIC DEVICES FUNGAL INFECTIONS: UNPREDICTED FREQUENCY AND CHALLENGING MANAGEMENT

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Background and aims

Fungal infections (FIs) of cardiovascular implantable electronic devices (CIED) are uncommon but show often a poor prognosis.

Furthermore, their characteristics and optimal management are not clearly defined. Aim of our study was to describe characteristics and outcome of a series of CIED-FIs.

Patients and methods

Study design: prospective, observational, single-centre study, enrolling all consecutive patients with CIED infection observed at our Centre with clinically significant fungal isolates obtained from either blood, CIED-pocket samples, leads, co-managed with Cardiology and Microbiology Units.

Duration: november 2012 - november 2016

Results

CIED-FIs: 7 out of 84 pts (8,3% vs. 2% from the literature¹).

Type of CIED involved: PM (2 pts), ICD (5 pts). All pts. had undergone ≥1 prior device revision

Etiology: *C. albicans* (4 pts), *C. tropicalis* (2), *C. parapsilosis* (1), all with an associated bacterial infection and all pansensible to antifungals except for one *C. albicans* strain (Fluconazole-R).

Patient	Age / sex	Comorbidities	Type of infection	Clinical findings	Echocardiography	Culture results (Site)	Complications	Antifungal therapy, Device Management	Outcome (Follow-up)
Pt. 1	83 / M	Parkinson's disease, CHF	Pocket infection + endocarditis	Pocket erosion and purulent discharge	8 mm filamentous vegetation on RA lead tip, a smaller one along the RV lead	<i>C. Albicans</i> (P, L) MSSA (P, L, B)	None	Caspofungin for 4 wks Complete CIED removal	Clinical success No relapse (18 months)
Pt. 2	83 / M	Anemia	Endocarditis	Sepsis	30 mm round vegetation over tricuspid valve and lead loop	<i>C. Albicans</i> + <i>S. epidermidis</i> (B from CVC)	Confusion, metastatic abscesses	Fluconazole for 5 wks No CIED removal	Failure*
Pt. 3	79 / M	Essential hypertension, dyslipidemia, CHF, myeloperoxidase deficiency	Pocket infection + endocarditis	Fever, pocket erosion and generator exposure	7 x 4 mm vegetation along the RV lead	<i>C. tropicalis</i> + <i>S. epidermidis</i> (P, RA-L)	Acute heart failure, sepsis, pneumonia	Micafungin for 1 wks, then fluconazole for 2 wks Complete CIED removal	Clinical success No relapse (18 months)
Pt. 4	50 / F	Marfan's syndrome, mental retardation, CHF	Pocket infection + endocarditis	Pocket erosion and purulent discharge	4 x 2 mm vegetation on RA lead tip	<i>C. parapsilosis</i> + <i>S. epidermidis</i> (P)	None	Fluconazole for 5 wks No CIED extraction	Failure*
Pt. 5	86 / M	Essential hypertension, Parkinson's disease, arteriopathy, CHF	Pocket infection	Pocket erosion and purulent discharge	No vegetations	<i>C. albicans</i> (P) MSSA (P, B, RA-L)	None	Micafungin for 1 wk Complete CIED removal	Clinical success No relapse (11 months)
Pt. 6	74 / M	Type I mellitus diabetes, CKD, essential hypertension, CHF, dyslipidemia, multinodular goiter	Pocket infection	Pocket erosion and purulent discharge	No vegetations	<i>C. tropicalis</i> (P, RV-L) <i>P. aeruginosa</i> (RV-L)	Pocket hematoma, anemia, diabetes decompensation	Micafungin for 3 weeks Complete CIED removal	Relapse* after 5 months
Pt. 7	73 / F	Type II diabetes, COPD, essential hypertension, CHF, hypotiroidism	Pocket infection + endocarditis	Fever, pocket erosion with generator exposure and purulent discharge	No vegetations	<i>C. Albicans</i> (P) MSSA (P, L)	Diabetes decompensation, AKI, pocket hematoma, anemia	Fluconazole for 2 weeks Complete CIED removal	Clinical success No relapse (6 months)

Figure 1. Characteristics, management and outcome of the 7 patients with CIED FIs.

Legend: M, male; F, female; CHF, chronic heart failure; CKD, chronic kidney disease; COPD, chronic obstructive pulmonary disease; RA, right atrium; RV, right ventricle; P, pocket culture; L, lead culture; B, blood culture; CVC, central venous catheter; MSSA, methicillin-sensitive Staphylococcus aureus; AKI, acute kidney injury; IV, intra-venous.

*Pts 2, 4 and 6 were furtherly re-managed with device extraction and antimicrobial treatment, obtaining successful outcome.

Management and outcome

Five pts. underwent a complete CIED extraction with successful outcome. No relapse occurred in 4/5 pts. after a median follow-up of 14,5 months (range 6-18); whereas 1 pt. showed a non-fungal relapse of CIED infection after 5 months.

CIED was not removed, due to critical clinical conditions, in 2 pts., who experienced a clinical failure but no further fungal isolate.

Relapsing (1) and failing (2) pts. were subsequently re-managed with device extraction and antimicrobial treatment, with a successful outcome.

Conclusions

In our experience, CIED-FIs were more frequent than previously reported, and represented a severe clinical event, requiring a complex management. An echinocandin-based regimen, in addition to device extraction, could represent a successful treatment approach.

¹ Sandoe, Jonathan AT, et al. "Guidelines for the diagnosis, prevention and management of implantable cardiac electronic device infection. Report of a joint Working Party project on behalf of the British Society for Antimicrobial Chemotherapy (BSAC, host organization), British Heart Rhythm Society (BHRS), British Cardiovascular Society (BCS), British Heart Valve Society (BHVS) and British Society for Echocardiography (BSE)." Journal of Antimicrobial Chemotherapy 70.2 (2015): 325-359.