

Case Report

Streptococcus Pseudoporcinus and Cardiac Implantable Electronic Device: Do We Need To Worry?? A Case Report

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Abstract

Streptococcus pseudoporcinus was first recognized as a colonizer of the female genital tract but upcoming cases with no genitourinary infections have been reported since then. Here we report a case of an 81-year old male with a recently implanted cardiac device that was diagnosed with infective endocarditis caused by *S. pseudoporcinus*.

Keywords: Bacteremia; β -hemolytic *Streptococcus*; Cardiac implantable device; Endocarditis; Hardware removal; Radiolabeled leucocyte scintigraphy; *Streptococcus pseudoporcinus*

Abbreviations

CIED: Cardiac Implantable Electronic Device

IE: Infective Endocarditis

CDRIE: Infective Endocarditis related to Cardiac Device

ECG: Electrocardiography

AVB: Atrioventricular block

RBBB: Right bundle branch block

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TTE: Transthoracic echocardiogram

TEE: Transesophageal echocardiogram

History of Presentation

An 81-year-old gentleman presented with a 2-day history of fevers and chills. On admission, he was febrile, with a body temperature of 37.6°C, tachypneic (respiratory rate: 30 breaths/minute) with 97% oxygen saturation on room air, and hemodynamically stable.

ECG showed sinus rhythm at 65 beats/minute, 1st degree AVB and RBBB. His physical examination was unremarkable, except for mild, diffuse abdominal tenderness on palpation.

White blood cells count was 11,700 cells/ μ l (normal range: 3.8-10.5 cells/ μ l) with 73.4% neutrophils, hemoglobin was 9.4g/dl (14-18 g/dl), platelets were 96,000 K/ μ l (150-450), erythrocyte sediment rate was 107 mm/hr and C-reactive protein was 8.66 mg/dl (<0.5). Creatinine was 1.91 mg/dl (0.72-1.18mg/dl) and urea 66 mg/dl (17- 43 mg/dl). Urinalysis demonstrated proteinuria and increased RBCs.

Past Medical History

His medical history included hypertension, hyperlipidemia, cholecystectomy, past exposure to asbestos, Hodgkin lymphoma, portal hypertension with hepato/splenomegaly, angiectasias, colon polyps, and a recent 2-months-old pacemaker implantation due to 3rd degree of AVB.

Medications included ASA 100mg, bisoprolol 2,5mg, ramipril 5mg and acetaminophen as needed.

Differential diagnosis

His presentation was suspicious for abdominal infection. Non-infectious syndromes such as inflammatory bowel diseases, ischemic colitis, and malignancies can also present with fever and diffuse abdominal pain, though.

Investigations

His chest and abdomen radiography were unremarkable. Ultra-sound and Computed tomography of the abdomen did not reveal relevant abnormal findings. Blood cultures were obtained while the patient was febrile and empiric antibiotic treatment was initiated.

Blood cultures were soon reported to contain Gram-positive cocci in chains.

A TTE demonstrated a normal ejection fraction with mild aortic stenosis and regurgitation and no evidence of valvular or lead vegetation. A TEE did not reveal signs of cardiac infection either (Figure 1).

Vascular and immunological phenomena were investigated and fundoscopy revealed a Roth spot in the left eye.

Due to his recent cardiac device implantation, a radiolabelled leucocyte scintigraphy was performed, which was positive for lead infection (Figure 2).

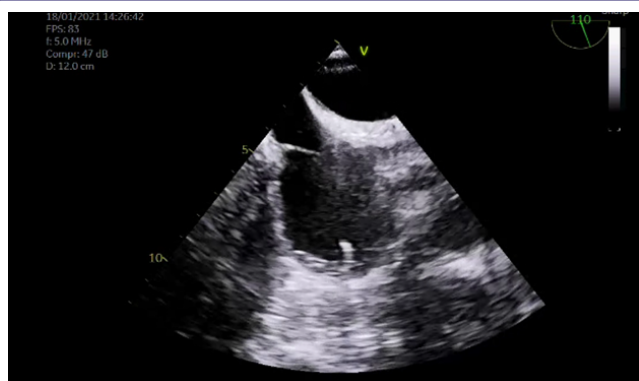


Figure 1: Transthoracic Echocardiogram. Transthoracic echocardiogram did not reveal any vegetation on valves or pacer's leads.

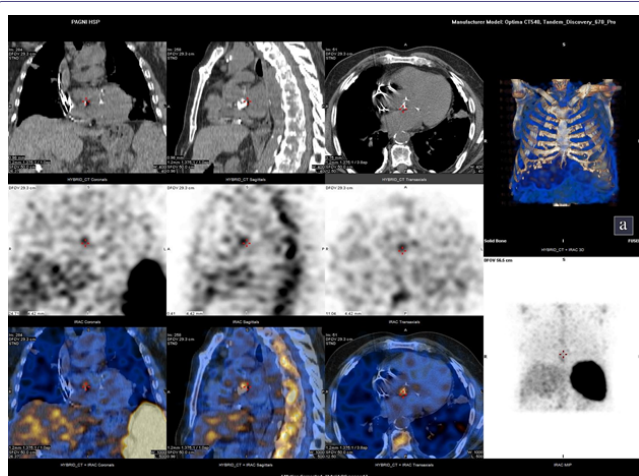


Figure 2: Radiolabelled Leucocyte Scintigraphy. ^{99m}Tc-HMPAO-WBC scintigraphy revealed the presence of CIED-associated infection.

Streptococcus pseudoporcinus was later identified in three separate blood cultures.

Management

According to the existing guidelines, our patient met the modified Duke's criteria for definitive endocarditis, one major (endocardial involvement) and three minor criteria (fever, Roth spot, and positive blood cultures with an organism not typically associated with endocarditis). The patient received 2gr intravenous ceftriaxone daily in accordance with the antimicrobial susceptibility testing.

Repeat blood cultures remained negative, and complete hardware removal (device and transvenous lead extraction) was performed after a prolonged (4-week) antibiotic therapy. Subsequent blood cultures along with hardware cultures were negative.

Optimal timing for reimplantation of a new cardiac device was under consideration since there is a lack of experience regarding appropriate management of such infections. During his hospitalization, he experienced a new unprovoked episode of symptomatic 3rd degree AVB that was initially treated with isoproterenol.

Eventually, device reimplantation was performed after 20 days of hardware free interval and after 1-month antibiotic therapy completion.

Discussion

Streptococcus pseudoporcinus is a β -hemolytic Streptococcus first isolated from female genito-urinary tract in 2006; it can be CAMP- and Lancefield group B-positive and therefore can be misidentified as *Streptococcus agalactiae*. However *S. agalactiae* has a narrow zone of beta-hemolysis, is hippurate hydrolysis positive, is bile esculin hydrolysis negative, and does not produce acid from mannitol or sorbitol, unlike *S. pseudoporcinus* [1].

It was initially considered a colonizer of the female genital tract and cases of infection in men were associated with sexual activity [1-3].

First recordings demonstrated *S.pseudoporcinus* as an emerging pathogen for adverse maternal or neonatal outcomes in pregnancy [3-4]. Additionally, it has been reported as the virulent factor of soft tissue infections [1,5,15] or for more invasive infections, for instance bacteremia/infective endocarditis [6-9,13-15] and peritonitis [9]. In fact, 5 cases of *S. pseudoporcinus* related endocarditis have been identified through a thorough literature review [5-8], all involving native valves. No cardiac or other prosthetic device infection has been reported in the existing literature until now (Table 1).

Given the great similarities with Group B Streptococcus (*Streptococcus agalactiae*) one [1] could suppose a similar epidemiological and clinical behavior of both. Thus, they could represent an important cause of invasive infections in high-risk populations, especially in pregnant women, neonates, and the elderly and in individuals with underlying medical conditions such as diabetes, cirrhosis and cancer.

Although Streptococcus species are commonly associated with endocarditis, this is the first known report of *Streptococcus pseudoporcinus* causing infective endocarditis related to cardiac device.

S. pseudoporcinus can be isolated from human rectum, upper respiratory and genital tracts [3,5]. The definitive source of our patient's *S. pseudoporcinus* is unclear. We postulate that it may have originated via gastrointestinal colonization and subsequent bacteremia due to his known angiectasias and splenomegaly.

Last but not least according to ESC guidelines, clinical presentation of CDRIE is frequently ambiguous and echocardiography and blood cultures are the cornerstones of diagnosis. A normal TTE does not rule out CDRIE and high suspicion is needed in the presence of unexplained fever in a patient with a CIED, whereas additive tools may be needed, such as radiolabelled leucocyte scintigraphy and ¹⁸F-FDG PET/CT scanning [10].

Follow-up

His postoperative course was uneventful. A 3-month overall antibiotic therapy was completed without any adverse concerns.

Conclusion

This is the first reported case of *Streptococcus pseudoporcinus* causing Infective Endocarditis related to Cardiac Device.

Knowledge is limited regarding these recently differentiated novel species, and thus, reporting of previously unknown *S.pseudoporcinus* infection manifestations is of utmost importance. Accordingly, the present report extends current knowledge regarding the ability of *S.pseudoporcinus* to infect prosthetic materials and will, hopefully,

Year of report	Authors	Patient Age(yrs)/ Gender	Type of Infection	Site of isolation	Antibiotic Regimen	Outcome
2009	Mahlen, Clarridge III	33 M	Thumb infection	Wound purulence culture	10d cephalixin	Recovered
2017	Fang, Gandhi	77 M	Subacute mitral valve endocarditis	Blood cultures	Ceftriaxone	Unknown (Transferred to other hospital for valve replacement)
2017	Gullet et al	29 F	Pregnancy complications/ slow fetal growth/Pre-eclampsia	Vagino-rectal culture	Nil	Recovered
2018	Sawamura et al	94 F	Cellulitis of left lower extremity	Wound purulence culture	Cefepime+Vancomycin due to multi drug resistance	Recovered
2019	Pierce et al	41 F	Singleton fetal demise/Acute necrotizing chorioamnionitis+acute umbilical vasculitis	Urine, placenta, endometrium, 2 blood sets	Ampicillin+gentamicin->D3 amoxicillin	Recovered
2020	Benzar	35 M	Aortic+mitral valve endocarditis/stroke brain infarcts	2 blood sets	Ceftriaxin+Vancomycin	Deceased
2020	Hai et al	40 M	Aortic valve infective endocarditis	3 blood sets	Cefepime 6gr+Ofloxacin 400mg	Recovered+aortic valve replacement
2020	Akagi et al	40 M	Pulmonary valve (CCTGA) endocarditis+ IgA vasculitis+septic pulmonary emboli	2 blood sets	Unknown+prednisolone	Recoveredtransferred to the initial hospital
2020	Khan et al	81 M	Cellulitis of right lower extremity /Aortic+mitral valve endocarditis	Blood sets	Ceftriaxone 2gr changed to Vancomycin	Deceased
2020	Khan et al	72 F	Pneumonia	Lung tissue, pleural fluid	Ceftriaxone 1gr changed to Ertapenem 1gr (coinfection)	Recovered
2020	Gupta et al	43 M	Bacteremia	Blood sets	Ceftriaxone 2gr	Unknown
2021	Vergadi et al	9 M	Cellulitis of right lower extremity/Bacteremia	Blood sets	Ceftriaxone+Vancomycin->Clindamycin+Vancomycin 14d	Initially recovered-Cellulitis relapsed – discharged with 3-mo chemoprophylaxis
2021	Liatsos et al	56 M	Spontaneous bacterial peritonitis (SBP) +bacteremia	Blood+ascitic fluid cultures	Meropenem 3gr+Daptomycin 350mg	Deceased
2022	Russo et al	45days infant	Relapsing cervical lymphadenitis	Blood cultures	Ceftriaxone and oxacillin changed to ampicillin, followed by oral amoxicillin	Initially clinical improvement-discharged- cervical lymphadenitis. relapsed – workup for immunodeficiency- CD4 levels below 3rd percentile
2022	Venincasa et al	59 F	Endophthalmitis – 3ws after a bilateral upper and lower blepharoplasty	Vitreous culture	Intravitreal injection of vancomycin and ceftazidime	Postoperative vision improved to 5/200 but was limited by a full-thickness macular hole.
2023	Birlutiu et al	63 M	Endocarditis / Mastocytosis and Spondylodiscitis	Blood sets	Ceftriaxone 2g +Vancomycin 2g	Ceftriaxone for up to 4wks, levofloxacin 750 mg/d at discharge for 2 mo for spondylodiscitis
2023	Dong, Tian	Nil	Orbital cellulitis -Corneal perforation	Pus culture	Nil	aggressive anti-infection+surgical treatment
2023	Papapanagiotou et al	67 M	Bacteremia - soft tissue infection of left lower limb	2 Blood sets	Ceftriaxone 2gr (2 weeks)	Recovered
2024	Plevritaki et al	81 M	Endocarditis due to Cardiac Implantable Electronic Device Infection	3 Blood sets	Ceftriaxone 2gr	Recovered-New device was implanted

Table 1: Review of cases in the literature.

raise the level of suspicion of cardiac or other prosthetic device infection in patients with persistent bacteremia. Moreover, given the lack of relevant experience and the successful outcome of the applied management course, this case could be used as a management/treatment guide, until consensus for such cases has been reached.

Learning Objectives

1. To recognize Infective Endocarditis related to Cardiac Device and to raise the level of suspicion for IE in patients with a CIED and unexplained fever.
2. To understand that normal echographic examination does not rule out CDRIE and additive tools may be needed (radiolabelled leucocyte scintigraphy, 18F-FDG PET/CT scanning).
3. To discuss how bacteremia by an uncommon bacterium, *Streptococcus pseudoporcinus* can cause Infective Endocarditis related to Cardiac Device.

Disclosure

The authors have nothing to disclose.

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