ORIGINAL ARTICLE

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Corynebacterium striatum Infective Endocarditis from Different Perspectives: A Comprehensive Literature Review

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ABSTRACT

Objective: *Corynebacterium striatum* infective endocarditis (IE) is rare but increasingly recognized. Delays in the diagnosis and treatment of subacute IE caused by *C. striatum* are possible. In patients with predisposing risk factors, it is essential to carefully review clinical history and imaging findings before dismissing *C. striatum* isolated from repeated blood cultures as a contaminant. This study aimed to present two cases of *C. striatum* IE and to review all published cases in the literature.

Materials and Methods: Case reports describing *C. striatum* IE were identified through PubMed, Scopus, and ULAKBIM databases up to August 1, 2024. Studies providing data on the epidemiology, clinical characteristics, microbiology, treatment, and outcomes were included. Eligible cases from the literature, along with the two cases presented herein, were analyzed collectively.

Results: A total of 53 patients were included in the study. The median (range) age was 63 (24–91) years, with a male predominance (62.3%). Previous *C. striatum* bacteremia during earlier hospitalizations was reported in 18.9% of cases. The most frequent predisposing factors were hemodialysis (20.8%), prosthetic valves (18.9%), and cardiac implantable electronic devices (13.2%). Native valve involvement was present in 67.9% of cases, most commonly affecting the mitral and aortic valves. The in-hospital mortality rate was 24.5%.

Conclusion: The predominance of native valve involvement and the high prevalence of hemodialysis among patients with *C. striatum* IE suggest that vascular access-related bacteremia may play a key role in disease pathogenesis. Effective management requires prolonged, targeted antimicrobial therapy, often in combination with surgical intervention.

Keywords: *Corynebacterium striatum*, infective endocarditis, hemodialysis, native valve

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INTRODUCTION

Aerobic, non-spore-forming, Gram-positive bacilli of the *Corynebacterium* genus are frequently regarded as contaminants when isolated from blood cultures, as they are part of the normal skin and mucosal flora (1,2). Among these, *Corynebacterium striatum*, a coryneform bacterium commonly isolated in clinical microbiology laboratories, has recently been identified as a potential pathogen in both immunocompromised and immunocompetent individuals (3). It has been associated with various infections, including bacteremia, infective endocarditis (IE), pneumonia, arthritis, and meningitis. It is often acquired through nosocomial transmission (4- 6). Due to its ability to form biofilms, *C. striatum* is increasingly recognized as an emerging pathogen in the etiology of IE, particularly in infections associated with endovascular devices (6).

Because *C. striatum* is a part of normal skin flora, distinguishing true infection from contamination can be challenging. Repeated positive blood cultures or isolation from sterile sites are critical to confirm infection. Reported risk factors include immunosuppression, prior invasive procedures, the presence of prosthetic or intravascular devices, prolonged hospitalization, and previous antibiotic exposure. In patients with suggestive clinical findings, advanced diagnostic evaluation and timely initiation of appropriate therapy are essential (3,7,8).

Corynebacterium species have been identified in 9% of early prosthetic valve IE cases, 4% of late prosthetic valve IE cases, and only 0.2–0.4% of native valve IE cases (9). However, it remains unclear whether specific *Corynebacterium* species are more frequently associated with IE (10). Among them, *C. striatum* possesses virulence factors, most notably biofilm formation, that facilitate infection, particularly in the presence of intravascular devices such as venous catheters (9). Nevertheless, published cases of *C. striatum* IE remain limited.

This study aimed to present two cases of *C. striatum* IE and systematically review all reported cases in the literature to characterize its epidemiological, clinical, and microbiological features, treatment approaches, and outcomes at the species level.

MATERIALS AND METHODS

A systematic literature search was conducted in PubMed, Scopus, and ULAKBIM databases to identify cases of *C. striatum* IE published between January 1, 1990, and August 1, 2024. The search terms used were "*Corynebacterium striatum*" and "endocarditis." Articles with accessible full texts that included patient-specific data were eligible for inclusion. Studies were excluded if they involved patients younger than 18 years, lacked full-text access, or reported only aggregated data on *C. striatum* IE. Cases from all studies that met the inclusion criteria, together with the two cases presented in this study, were included in the final analysis.

For each patient, demographic data, comorbidities, and predisposing risk factors for IE, such as the presence of a prosthetic valve, a history of *C. striatum* bacteremia, or previous IE, were recorded. Clinical data included the type of IE (native valve, prosthetic valve, or cardiac implantable electronic device-associated IE [CIED-IE]), source of infection, affected valve(s), and any surgical interventions performed. Microbiological information, including *C. striatum* identification methods and antimicrobial susceptibility results, was documented. Treatment details, including antibiotic regimens, combinations, and transitions to oral therapy, were assessed. Clinical outcomes such as embolic complications, in-hospital mortality, and associated risk factors were also analyzed.

A comprehensive dataset of *C. striatum* IE was generated by compiling all available patient-level data.

HIGHLIGHTS

- *Corynebacterium striatum* infective endocarditis (IE) is a rare but increasingly reported condition.
- Delays in diagnosis and treatment are frequent, as recurrent *C. striatum* isolates in blood cultures are often misinterpreted as contamination, particularly in patients with predisposing risk factors.
- The most common risk factors for *C. striatum* IE include hemodialysis, prosthetic valves, and cardiac implantable electronic devices.
- A considerable number of patients with *C. striatum* IE present with native valve involvement.

Statistical analyses were performed using SPSS software, version 23.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were reported as medians for non-normally distributed variables and as frequencies and percentages for categorical variables.

CASE REPORTS

Case 1

A 68-year-old male patient with a history of heart failure, coronary artery disease, peripheral artery disease, diabetes mellitus (DM), familial Mediterranean fever, and benign prostatic hyperplasia had undergone implantation of an implantable cardioverter defibrillator (ICD) nine months earlier. He presented with a one-month history of night sweats and weight loss. Transthoracic and transesophageal echocardiography revealed a 16×16 mm mobile vegetation at the tip of the ICD lead in the right atrium, without evidence of valvular involvement. Based on these findings, the patient was diagnosed with early CIED-IE. Empirical therapy with meropenem (1 g three times daily) and vancomycin (25 mg/kg loading dose followed by 15–20 mg/kg twice daily as maintenance, adjusted according to trough plasma concentrations) was initiated.

Two separate sets of blood cultures yielded *C. striatum*, which was resistant to clindamycin, penicillin, rifampicin, ciprofloxacin, and tetracycline, but susceptible to linezolid and vancomycin. The isolate was identified using matrix-assisted laser desorption/ionization time-of-flight (MALDI-TOF) mass spectrometry, and antimicrobial susceptibility testing was performed according to the guidelines of the European Committee on Antimicrobial Susceptibility Testing (EUCAST). Meropenem was discontinued, and vancomycin continued to achieve blood culture clearance.

After two weeks of intravenous antibiotic therapy, ICD replacement was performed. The lead tip culture also grew *C. striatum* with an identical susceptibility pattern. Postoperatively, intravenous vancomycin was administered for an additional two weeks, followed by oral linezolid as an outpatient, for a total treatment duration of four weeks. The patient remained under annual follow-up, and no complications, recurrence, or relapse were observed over a five-year period.

Case 2

A 39-year-old male patient with a history of Wegener's granulomatosis, hypertension (HT), chronic kidney disease (CKD), atrial fibrillation, and atrioventricular block was admitted to the rheumatology clinic with complaints of fever, chills, cough, and sputum production. Twelve years earlier, the patient had undergone intramedullary nailing of the humerus following a gunshot injury. The nails were removed three months prior to admission due to infection; however, residual bullet fragments remained in place. Postoperatively, the patient required a temporary pacemaker for one month due to atrioventricular block. During this period, he developed acute kidney injury necessitating hemodialysis (HD) via a temporary central venous catheter in the intensive care unit. His medical history included ventilator-associated pneumonia caused by *Klebsiella pneumoniae* and *Pseudomonas aeruginosa*. Empirical antibiotic therapy with intravenous meropenem and fosfomycin was initiated.

Two sets of blood cultures yielded *C. striatum*, resistant to penicillin, clindamycin, moxifloxacin, rifampicin, ciprofloxacin, and tetracycline, but susceptible to vancomycin and linezolid. The isolate was identified using MALDI-TOF mass spectrometry, and antimicrobial susceptibility testing was performed according to the guidelines of the EUCAST. Transthoracic and transesophageal echocardiography revealed a 20×6 mm mobile vegetation on the tricuspid valve, accompanied by grade 2–3 tricuspid regurgitation. A diagnosis of right-sided native valve IE was made, and daptomycin (10 mg/kg every 48 hours, adjusted for renal function) was added to fosfomycin (2 g three times daily, adjusted for renal function), while meropenem was discontinued.

Given the patient's history of Wegener's granulomatosis-associated pulmonary hemorrhage and the anticipated need for high-dose anticoagulation after surgery, the cardiovascular surgery team recommended initial management with antibiotic therapy. Despite two weeks of combination therapy with daptomycin and fosfomycin, the patient continued to have a fever and persistent bacteremia. Consequently, fosfomycin was discontinued, and linezolid (600 mg twice daily) was added to the

treatment regimen due to concerns about pulmonary complications and to enhance therapeutic efficacy. The fever resolved, and the blood cultures became negative on the second day of linezolid treatment.

On day 42 of the IE treatment, follow-up transesophageal echocardiography revealed persistent tricuspid valve vegetation measuring 20×9 mm, necessitating bioprosthetic tricuspid valve replacement. Intraoperative tissue cultures were sterile; however, histopathological examination of the valve revealed fibrinous masses containing erythrocytes, sparse blood elements, and clusters of Gram-positive coccobacilli (Figures 1a-c). After achieving blood culture negativity, the patient continued daptomycin and linezolid therapy for a total duration of four weeks before discharge. The patient remained complication-free during a one-year follow-up period, and regular monitoring is ongoing.

RESULTS

A total of 51 cases were identified from 45 articles that met the inclusion criteria (6,8-51). Including the two cases presented in this study, 53 cases were analyzed in total. Table 1 presents a summary of the cases. The median patient age was 63 years (range, 24 –91 years), with a male predominance of 59.2%. The most common comorbidities were DM (40%), HT (35.6%), and CKD (31.1%). A prior episode of *C. striatum* bacteremia during previous hospitalizations was documented in 18.9% of patients. The most common predisposing risk factors for IE were HD (20.8%), prosthetic valves (18.9%), and CIEDs (13.2%). Additionally, 11.1% of cases had immunosuppression related to malignancy or transplantation (Table 2).

A considerable proportion of patients (67.9%) presented with native valve IE. The mitral valve was the most commonly affected site (52.8%), followed by the aortic valve (39.6%). Tricuspid and pulmonary valve involvement were observed in 15.1% and 3.8%, respectively. Multivalvular involvement occurred in 8.2% of patients, including triple valve involvement (mitral + aortic + tricuspid and mitral + aortic + pulmonary) and dual valve involvement (mitral + aortic).

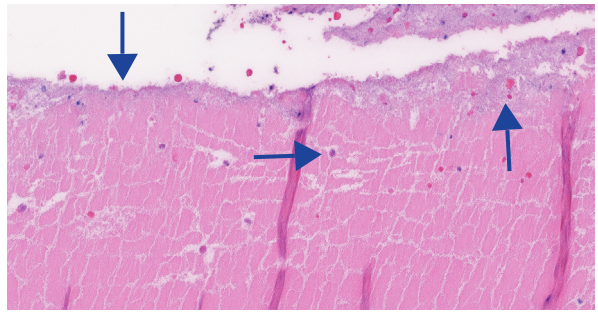

Figure 1a. Small part of fibrinous mass containing sparse erythrocytes. Faint basophilic hue (arrow) reflecting bacterial colonization is present in the fibrinous exudate; H&Ex26.

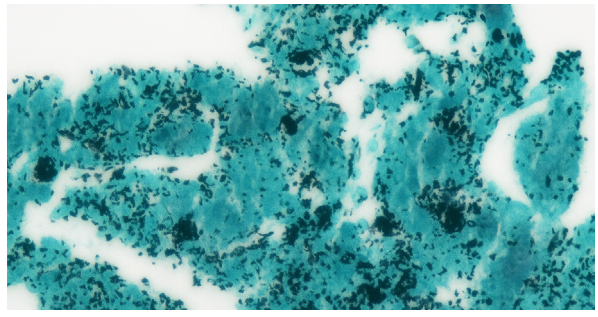

Figure 1b. Colonies of black stained small rods are seen by Grocott Methanamin Silver stain in the fibrinous mass; x77.5.

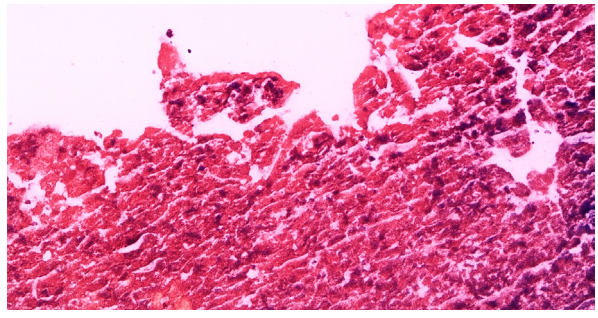

Figure 1c. Bacterial organisms are gram positive with Gram stain; x25.2.

Among the 48 patients for whom the site of infection acquisition was reported, 58.3% had healthcare-associated IE (35.4% non-nosocomial and 22.9% nosocomial). Cardiac surgery was performed in 50.1% of cases due to IE. Embolic complications occurred in 20.8%, with cerebral infarction being the most frequent manifestation. The overall in-hospital mortality rate was 24.5%, and 25.9% among patients who underwent surgery (Table 2).

Table 1. Sociodemographic characteristics of the students participating in the study (n=1005).

Author	Year	Number of cases	Age/sex	Valve	TEE/TTE findings	Site of infection acquisition	Type of IE	Treatment	Treatment duration (week)	Surgical intervention	In-hospital mortality	Number of positive blood culture bottles
Weiss et al. (6)	1996	1	54/M	AV	Unknown	Community-acquired	Native	AMP+VAN	6	Yes	No	Unknown
Melero-Bascones et al. (11)	1996	1	73/M	TV	TTE: Normal TEE: Vegetation on the old electrode wire	Community-acquired	CIED	VAN 4 week → TMP/SMX+RIF 4 week	11	Yes	No	Unknown
Tattevin et al. (12)	1996	1	24/M	PV	TTE: Vegetation (10 mm)	Non-nosocomial HCA	Native	AMX 2 weeks → netilmicin+TEC 5 weeks → AMX 2 weeks	13	No	No	6
Juurlink et al. (13)	1996	1	68/M	MV	TTE: Moderate left ventricular dysfunction and MV regurgitation TEE: severe mitral regurgitation and a vegetation on MV	CA	Native	VAN → PEN	6	No	No	10
Keijman et al. (14)	2000	1	65/M	MV	TEE: Vegetation on MV (3mm)	Nosocomial	Native	TIC+GEN 10 days, concurrent pneumonia → PEN 4 weeks	6	No	Yes	6
de Arriba et al. (15)	2002	1	72/F	AV and MV	TTE: Vegetation (17 mm)	Nosocomial	Prosthetic	PEN	6	No	Yes	3
Houghton et al. (16)	2002	1	62/F	AV	TTE and TEE: No vegetation or abscess formation	Community-acquired	Prosthetic	VAN	7	No	No	4
Kocazeybek et al. (17)	2002	1	50/M	AV	TEE: Mass (15 mm)	Community-acquired	Native	VAN+GEN+DOX (coinfection with MRSE)	Unknown	Yes	No	6
Knox et al. (18)	2002	1	69/F	MV	TEE: Large vegetation	Non-nosocomial HCA	Native	VAN+RIF	6	Yes	No	4
Shah et al. (19)	2005	1	46/F	TV	TEE: Vegetations	Nosocomial	Native	VAN 1 day → LIN 1 week → DAP+RIF 6 weeks	7	No	No	2
Stoddart et al. (20)	2005	2	72/F	MV	TEE: Calcified vegetations	Non-nosocomial HCA	Prosthetic	VAN+RIF	6	No	No	8
			61/F	MV	TTE: A partially calcified vegetation	Community-acquired	Native	VAN 4 weeks → GEN 1 week	5	No	No	6

Table 1. Sociodemographic characteristics of the students participating in the study (n=1005). ***(Continued)***

Author	Year	Number of cases	Age/sex	Valve	TEE/TTE findings	Site of infection acquisition	Type of IE	Treatment	Treatment duration (week)	Surgical intervention	In-hospital mortality	Number of positive blood culture bottles
Mashavi et al. (21)	2006	1	68/M	MV	TTE: Mobile mass (10 mm)	Nosocomial	Native	VAN	6	No	No	3
Tibrewala et al. (22)	2006	1	69/F	MV	TEE: Echodensities, multiple perforation, moderate mitral regurgitation	Non-nosocomial HCA	Native	VAN	6	Yes	No	Unknown
Muñoz et al. (23)	2007	1	57/F	Atrial wall	Unknown	Unknown	Native	CRO+VAN 4 weeks → LNZ 4 weeks	8	No	No	Unknown
Belmares et al. (10)	2007	1	62/M	AV	TEE: Vegetation (3-4 mm), perforation, moderate aortic insufficiency	Nosocomial	Native	VAN	12	Yes	No	Unknown
Bhat et al. (24)	2008	1	83/M	MV	TTE: Normal	Non-nosocomial HCA	Native	VAN+RIF 5 days → PEN+GEN 2 weeks → DAP 17 days	5	No	No	8
Marull et al. (25)	2008	1	73/F	MV	TTE: Asymmetric shaggy densities TEE: Echo densities (29×5 mm), small eccentric perforation of the valve	Non-nosocomial HCA	Native	VAN	6	No	No	4
Boltin et al. (26)	2009	1	71/M	MV	TTE: Vegetation (21×24 mm), moderate regurgitation	Non-nosocomial HCA	Native	VAN	Unknown	No	Yes	9
Oliva et al. (27)	2010	1	71/F	PM lead	TTE: Mobile mass adherent to the intracardiac lead	Nosocomial	CIED	DAP 1 week → LNZ → DAP 4 weeks	Unknown	Yes	No	Unknown
Batalla et al. (28)	2011	1	62/M	AV and MV	TEE: Mitral and aortic regurgitation	Community-acquired	Prosthetic	AMX	7	Yes	No	3
Fernández Guerrero et al. (29)	2012	1	78/M	TV and PM lead	TTE: Mobile masses	Nosocomial	CIED	DAP	7	Yes	No	5
Tran et al. (30)	2012	1	56/M	MV	TEE: Vegetation (30-40 mm), abscesses, severe mitral regurgitation	Community-acquired	Native	TEL	Unknown	Yes	Yes	8

Table 1. Sociodemographic characteristics of the students participating in the study (n=1005). ***(Continued)***

Author	Year	Number of cases	Age/sex	Valve	TEE/TTE findings	Site of infection acquisition	Type of IE	Treatment	Treatment duration (week)	Surgical intervention	In-hospital mortality	Number of positive blood culture bottles
Mizoguchi et al. (31)	2014	1	53/F	AV	TTE: Severe aortic regurgitation, quadricuspid AV TEE: Vegetation (14×9 mm)	Community-acquired	Native	SAM+GEN	9	Yes	No	Unknown
Hong et al. (32)	2016	1	55/M	MV	TTE: 2 mobile oscillating masses TEE: 2 hypermobile echogenic masses (10 mm and 8 mm)	Nosocomial	Native	VAN	6	Yes	No	4
Jagadeeshan et al. (33)	2016	1	27/M	MV	TTE: Vegetation, mitral valve prolapses, moderate mitral regurgitation	Community-acquired	Native	CXM	Unknown	No	No	2
Xu et al. (34)	2017	1	63/M	Left atrium	TEE: Mass (27×26 mm)	Community-acquired	Native	LNZ (?) → DAP 4 weeks → LNZ 3 weeks	Unknown	Yes	No	Unknown
Hosseini Dehkordi et al. (35)	2017	1	59/M	MV	TTE: MV prolapse, regurgitation, and a flail leaflet. TEE: small perforations, severe regurgitation and a vegetation on MV (6×5mm)	CA	Native	VAN	6	Yes	No	2
Naqvi et al. (36)	2018	1	69/M	AV	TTE: Severe aortic regurgitation, no vegetationTEE: Mobile vegetation, severe regurgitation, thickened leaflets	Community-acquired	Prosthetic	VAN	6	Yes	No	4
Lee et al. (37)	2018	1	54/M	MV, AV and TV	TTE: Vegetations on MV, AV, and TV with severe aortic and moderate tricuspid regurgitations TEE: Vegetations on MV, AV, and TV	Non-nosocomial HCA	Native	Unknown	Unknown	Yes	No	Unknown
Syed et al. (38)	2019	1	65/F	AV	TTE and TEE: Normal	Community-acquired	Prosthetic	DAP	Unknown	No	Yes	Unknown

Table 1. Sociodemographic characteristics of the students participating in the study (n=1005). ***(Continued)***

Author	Year	Number of cases	Age/sex	Valve	TEE/TTE findings	Site of infection acquisition	Type of IE	Treatment	Treatment duration (week)	Surgical intervention	In-hospital mortality	Number of positive blood culture bottles
Kim et al. (39)	2019	1	54/M	AV and MV and TV	TTE: Large and multiple echogenic mass affecting the TV, MV and AV	Non-nosocomial HCA	Native	VAN+CRO	7	Yes	No	4
Chang et al. (40)	2020	1	76/M	AV	TTE: Normal TEE: Vegetation	Community-acquired	Prosthetic	DAP	Unknown	Yes	Yes	Unknown
Mansour et al (41)	2020	1	79/F	MV	TEE: Irregular mobile mass, vegetation (0.65×0.35 mm)	Non-nosocomial HCA	Prosthetic	PEN	4	No	No	Unknown
Rasmussen et al. (9)	2020	2	66/M	AV	TEE: Vegetation, abscess	Unknown	Prosthetic	Unknown	Unknown	Yes	Yes	3
			56/M	AV	TEE: Suspect	Unknown	Prosthetic	Unknown	Unknown	No	No	2
Biscarini et al. (42)	2021	3	68/M	MV	Unknown	Unknown	Native	VAN → PEN	6	No	Unknown	Unknown
			77/F	MV	Unknown	Unknown	Native	Unknown	7	No	No	Unknown
			76/F	AV	TTE: AV vegetation (4 mm), severe aortic regurgitation	Non-nosocomial HCA	Native	VAN 3 weeks → LNZ 1 week	4	No	No	Unknown
Serpa Pinto et al. (43)	2021	1	48/M	TV	TTE: Normal TEE: Vegetation	Community-acquired	CIED	VAN 2 weeks → DAP 12 weeks	13	Yes	No	Unknown
Khan et al. (44)	2021	2	55/M	AV	TTE: Vegetations	Non-nosocomial HCA	Prosthetic	VAN 4 days → DAP+RIF (10 days)	2	Yes	Yes	Unknown (at least 8)
			82/M	MV	TEE: Multi-lobar large vegetation, paravalvular abscess	Community-acquired	Native	VAN	2	No	Yes	2
Zheng et al. (45)	2022	1	35/M	MV	TTE: Echoic mass (27×14 mm)	Nosocomial	Native	VAN	2	Yes	Yes	Unknown
Melo et al. (8)	2022	1	73/F	PM lead	TTE: Normal TEE: Small vegetation	Non-nosocomial HCA	CIED	VAN	14	Yes	No	4
Cabanilla et al. (46)	2022	2	36/F	AV, MV and PV	TTE: Large AV vegetation, small MV vegetation, thickened PV leaflets	Non-nosocomial HCA	Native	VAN	6	No	No	8
			46/M	AV	TTE: Aortic regurgitation, possible AV endocarditis	Non-nosocomial HCA	Native	VAN	Unknown	No	Yes	4

Table 1. Sociodemographic characteristics of the students participating in the study (n=1005). ***(Continued)***

Author	Year	Number of cases	Age/sex	Valve	TEE/TTE findings	Site of infection acquisition	Type of IE	Treatment	Treatment duration (week)	Surgical intervention	In-hospital mortality	Number of positive blood culture bottles
Gaifer et al. (47)	2023	1	56/M	MV	TEE: Small growth of the MV leaflet, moderate mitral regurgitation	Non-nosocomial HCA	Native	LNZ 2 weeks → VAN 4 weeks → LNZ 3 weeks	9	No	No	Unknown
Dilmen et al. (48)	2023	1	91/F	MV	TTE: Labile, echogenic appearance TEE: Vegetation (10 mm)	Community-acquired	Native	DAP	2	No	Yes	6
Umemoto et al. (49)	2023	1	85/F	AV	TEE: Vegetation	Community-acquired	Native	AMP	8	Yes	Yes	4
Sloan et al. (50)	2024	1	62/M	MV	TTE: Vegetation (23×26 mm), mitral stenosis, mild mitral regurgitation	Community-acquired	Native	VAN	8	No	No	4
Mohammadi et al. (51)	2024	1	63/F	MV	TTE and TEE: Vegetation (10 mm), severe MV regurgitation	Community-acquired	Native	CRO	8	Yes	No	4
Sarıcaoğlu et al. (present study)	2025	2	66/M	ICD lead	TTE and TEE: Vegetation at the tip of the ICD lead (16×16 mm)	Non-nosocomial HCA	CIED	VAN	4	Yes	No	4
			39/M	TV	TTE and TEE: V egetation (20×6 mm), grade 2-3 tricuspid regurgitation	Nosocomial	Native	DAP+FOS 2 weeks → DAP+LNZ 5 weeks	7	Yes	No	8

F: Female, **M:** Male, **AV:** Aortic valve, **MV:** Mitral valve, **PV:** Pulmonary valve, **TV:** Tricuspid valve, **TTE:** Transthoracic echocardiography, **TEE:** Transesophageal echocardiography, **HCA:** Healthcare-associated, **ICD:** Intracardiac defibrillator, **CIED:** Cardiac implantable electronic device, **AMC:** Amoxicillin-clavulanate, **AMP:** Ampicillin, **AMX:** Amoxicillin, **CRO:** Ceftriaxone, **CXM:** Cefuroxime, **DAP:** Daptomycin, **DOX:** Doxycycline, **FOS:** Fosfomycin, **GEN:** Gentamycin, **LNZ:** Linezolid **PEN:** Penicillin, **RIF:** Rifampicin, **SAM:** Ampicillin-sulbactam, **TEL**: Telavancin, **TIC:** Ticarcillin, **TMP/SMX:** Trimethoprim-sulfamethoxazole, **VAN:** Vancomycin.

Table 2. Demographic and clinical characteristics of infective endocarditis cases caused by *Corynebacterium striatum* (n=53)

Demographic and clinical characteristics	n (%)
Age, median (min–max)	63 (24–91)
Sex (Male)	33 (62.3)
Comorbidities*	
Diabetes mellitus	18 (40)
Hypertension	16 (35.6)
Chronic kidney disease	14 (31.1)
Heart failure	12 (26.7)
Coronary artery disease	7 (15.6)
Rheumatologic disease	6 (13.3)
Cerebrovascular event	6 (13.3)
Solid organ malignancy	3 (6.7)
Chronic obstructive pulmonary disease	3 (6.7)
Liver cirrhosis	2 (4.4)
Solid organ transplantation	1 (2.2)
Bone marrow transplantation	1 (2.2)
Predisposing risk factors for infective endocarditis	
Hemodialysis	11 (20.8)
Prosthetic valve	10 (18.9)
Cardiac implantable electronic device (CIED)	7 (13.2)
History of acute rheumatic fever	3 (5.7)
Mitral valves prolapse	2 (3.8)
History of infective endocarditis	1 (1.9)
History of *Corynebacterium* bacteremia	10 (18.9)

Demographic and clinical characteristics	n (%)
Type of endocarditis	
Native valve endocarditis	36 (67.9)
Prosthetic valve endocarditis	11 (20.8)
CIED-associated infective endocarditis	6 (11.3)
Site of infection acquisition**	
Community-acquired	20 (41.7)
Non-nosocomial healthcare-associated	17 (35.4)
Nosocomial	11 (22.9)
Involved valve	
Mitral valve	28 (52.8)
Aortic valve	21 (39.6)
Tricuspid valve	8 (15.1)
Pulmonary valve	2 (3.8)
Lead tip	2 (3.8)
Multivalvular involvement	5 (9.4)
Cardiac surgery	27 (50.9)
Time from diagnosis to surgery (days), median (min–max)	21 (4–93)
Embolic complications	11 (20.8)
Cerebral infarction	7 (13.2)
Splenic infarction	3 (5.7)
Mycotic aneurysm	1 (1.8)
In-hospital mortality	13 (24.5)

*Analyzed based on 45 patients with specified comorbidities.

**Analyzed based on 48 patients with specified infection acquisition sites.

Vancomycin was the most frequently used intravenous agent, followed by daptomycin. Combination antibacterial therapy was used in 24.5% of patients. Among these regimens, gentamicin and rifampicin were the most common co-administered agents. In cases treated with daptomycin, monotherapy was used in all except for our case (combined with fosfomycin) and two other cases where it was combined with rifampicin. The median duration of antibiotic therapy was six weeks (range, 2–14 weeks), and 13.1% of patients transitioned to sequential oral maintenance therapy. Linezolid was the most frequently prescribed oral agent, followed by amoxicillin and trimethoprim/sulfamethoxazole.

All *C. striatum* isolates from blood and intraoperative valve cultures were susceptible to vancomycin and linezolid (100%). High susceptibility was also observed for gentamicin (83.3%). Table 3 provides detailed antibiotic susceptibility profiles. Among 13 patients with intraoperative valve cultures, seven exhibited the same pathogen as detected in blood cultures. Additionally, *C. striatum* was identified

Table 3. Antibiotic susceptibility results of *Corynebacterium striatum* isolates.

Antibiotic	Susceptibility, n (%)
Penicillin	5/16 (31.2)
Fluoroquinolone	1/9 (11.1)
Gentamicin	5/6 (83.3)
Vancomycin	22/22 (100)
Clindamycin	1/9 (11.1)
Tetracycline	1/4 (25.0)
Linezolid	8/8 (100)
Rifampicin	4/7 (57.1)

using molecular techniques in five cases—three from valve samples and two from blood samples.

DISCUSSION

Recent studies have highlighted the increasing number of invasive diseases such as sepsis and IE caused by *Corynebacterium* spp., observed in both immunocompromised and immunocompetent individuals (52,53). *Corynebacterium* spp. have been identified as significant pathogens due to their biofilm-forming capacity, particularly in individuals with predisposing risk factors (9). Advances in microbiological diagnostics have facilitated better recognition and improved outcomes in patients with *C. striatum* infections. Data from the Swedish National Infective Endocarditis Registry indicate that *Corynebacterium* spp. accounted for 0.5% of 5275 IE cases over a 10-year period (53). *C. striatum* has been identified as the predominant species causing IE, accounting for 37% of *Corynebacterium* IE cases in one study (52). Another population-based analysis confirmed its role in 2 of 8 *Corynebacterium* IE cases (9). The present study provides insight into the epidemiological and clinical features of *C. striatum* IE through a systematic review of published case reports.

Corynebacterium IE typically presents as a subacute infection, most often in elderly patients with multiple comorbidities who are receiving immunosuppressive therapy or have prosthetic devices (52). In a study by Lee et al. (54), the majority of patients with *C. striatum* infections had severe underlying conditions such as DM, CKD, and malignancies. Similarly, the present study found that *C. striatum* IE patients were predominantly elderly and had significant comorbidities. As *Corynebacterium* species are part of the normal skin flora, they are frequently dismissed as contaminants, leading to delayed diagnosis (55). In our analysis, *C. striatum* bacteremia during previous hospitalizations, suggesting that a significant proportion of infections may have initially gone unrecognized.

C. striatum IE is most commonly associated with prosthetic heart valves or CIEDs (9). Although *C. striatum* is a component of the normal skin flora, it can become pathogenic when the integrity of the skin barrier is compromised (54). In patients undergoing HD, arteriovenous fistulas, central venous catheters, ports, and other HD-related interventions may act as additional predisposing factors for native valve IE. In this review, 67.9% of *C. striatum* IE cases involved native valves, and 31.1% and 20.8% of patients had CKD and HD, respectively. These findings underscore the importance of distinguishing *C. striatum* bacteremia from contamination, particularly in patients with frequent vascular access. In high-risk individuals, repeated isolation of *C. striatum* from blood cultures should prompt evaluation for IE.

Biscarini et al. (42) reported the mitral valve as the most frequently affected site (51.8%), followed by the aortic valve (29.6%), indicating a clear predominance of left-sided involvement. Similarly, our findings showed that left-sided IE was most common, with the mitral and aortic valves affected in 52.8% and 39.6% of cases, respectively. Interestingly, tricuspid valve involvement was also observed in 15.1% of cases. As the IE patient population ages and the prevalence of comorbidities increases, the greater use of CIEDs and central venous catheters, along with healthcare-associated exposure, may be contributing to changes in the microbial profile.

Antibiotic resistance among *Corynebacterium* spp. is a growing challenge. *C. striatum* has demonstrated resistance to beta-lactams, fluoroquinolones, daptomycin, and gentamicin, with significant variations in resistance profiles (52). In a study of 256

C. striatum isolates, vancomycin, linezolid, and telavancin demonstrated strong *in vitro* activity, whereas high resistance rates were observed for penicillins, cephalosporins, ciprofloxacin, meropenem, tetracycline, and clindamycin (56). Systematic reviews confirm that *C. striatum* remains universally susceptible to vancomycin, which is therefore considered the first-line therapy for these infections, including IE (57). In our study, all isolates were vancomycin-susceptible, and vancomycin was the most frequently used antibiotic. Daptomycin was the second most commonly utilized agent; however, emerging data have raised concerns about reduced susceptibility and clinical failure. In one study, daptomycin nonsusceptibility and treatment failure occurred in 36% and 45% of patients with *C. striatum* bacteremia, respectively (58). Several *Corynebacterium* spp., including *C. striatum*, can rapidly develop resistance to daptomycin, suggesting it may not be a reliable therapeutic option (59). For patients in whom vancomycin is contraindicated due to allergy or renal impairment, alternative bactericidal options remain limited. In our case, a daptomycin–fosfomycin combination failed to achieve a cure, though surgical delay and missing MIC data limited interpretation. While high-dose or combination daptomycin regimens (including fosfomycin) have shown benefit in *Staphylococcus aureus* IE (60,61), further studies are needed to assess their role in *Corynebacterium* infections and in preventing resistance development.

Surgical management is crucial for the outcome of *Corynebacterium*-related bone and joint infections, which are frequently characterized by chronicity and association with devices (62). Given the biofilm-forming capacity of *C. striatum*, the presence of a surgical indication should be carefully evaluated in IE cases as well. These findings emphasize the importance of surgical management in eradicating intracellular *C. striatum* reservoirs for effective IE treatment strategies. IE. Zheng reviewed 30 previously reported *C. striatum* IE cases, determining that surgical intervention was performed in 50%, with an overall mortality rate of 23.3% and 20% among those who underwent surgery. In our review, surgical intervention was performed in half of the cases, with a median time to surgery of 21 days. The overall in-hospital mortality rate was 24.5%, with a slightly higher figure of 25.9% observed among surgical patients. These findings suggest that surgical intervention alone did not significantly increase survival rates. However, the relatively delayed timing of surgery, in conjunction with the advanced age and high comorbidity burden, may have contributed to the absence of a mortality benefit. A timely and multidisciplinary evaluation of surgical indications is essential to optimize outcomes in cases of *C. striatum* IE.

This study has limitations inherent to its retrospective and literature-based design. The number of *C. striatum* IE cases remains small relative to more common IE pathogens, limiting generalizability. Moreover, inconsistencies in susceptibility testing and interpretive criteria across reports may affect data reliability. Nonetheless, to our knowledge, this study represents the largest compilation of *C. striatum* IE cases to date. The evolving epidemiology of IE, coupled with the increasing recognition of *C. striatum* as a pathogen, underscores the need for characterization of its clinical and microbiological features.

CONCLUSION

Corynebacterium striatum IE represents an emerging clinical challenge in both immunocompromised and immunocompetent patients. The predominance of native valve involvement and the high prevalence of HD and vascular interventions indicate that frequent vascular manipulation may play a key role in disease pathogenesis. Because *C. striatum* exhibits intrinsic multidrug resistance and biofilm-forming ability, effective treatment requires prolonged, targeted antimicrobial therapy, often in conjunction with surgical intervention. Early identification through molecular diagnostic techniques and susceptibility testing is crucial for optimizing therapeutic outcomes. Further research is needed to establish standardized treatment protocols and elucidate the underlying mechanisms of antimicrobial resistance in this pathogen.

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Informed Consent: Written informed consent was obtained from both patients for publication of their anonymized clinical data.

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