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A Four-Year Silence: Late-Onset Stent-Graft Endocarditis Due to Rare *Enterobacter hormaechei* Diagnosed via Transesophageal Echocardiography

Dört Yıllık Sessizlik: Transözofageal Ekokardiyografi ile Tanısı Konulan, Nadir Bir Patojen Olan *Enterobacter hormaechei*'ye Bağlı Geç Başlangıçlı Stent-Greft Endokarditi

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Öz

Stent-graft infection (SGI) after thoracic endovascular aortic repair (TEVAR) is a rare but life-threatening complication. We report a 66-year-old male patient who presented four years after TEVAR with systemic sepsis. At admission, laboratory investigations revealed a marked inflammatory response with a C-reactive protein (CRP) level of 212 mg/L and a procalcitonin level of 23.30 ng/mL. Empirical treatment was initiated with Meropenem (2g IV q8h) and Vancomycin (1g IV q12h). Diagnostic workup identified multidrug-resistant (MDR) *Enterobacter hormaechei bacteremia* via MALDI-TOF MS. While transthoracic imaging was inconclusive, transesophageal echocardiography (TEE) confirmed a 6.6 x 5 mm mobile, fibrillar vegetation on the luminal surface of the aortic stent-graft, fulfilling the Modified Duke Criteria for Definite Infective Endocarditis. Following susceptibility results, Vancomycin was discontinued, and targeted intravenous Gentamicin (5 mg/kg daily) was added to the Meropenem regimen for synergistic effect. The patient completed 6 weeks of the Meropenem and Gentamicin combination. After multidisciplinary evaluation, a conservative management approach was adopted. The patient remains under stable clinical follow-up at the 3rd month post-discharge.

Anahtar Kelimeler *Enterobacter hormaechei*, TEVAR, stent-graft infection, antibiotic resistance, gentamicin.

Abstract

Torasik endovasküler aort onarımı (TEVAR) sonrası gelişen stent-greft enfeksiyonu (SGE), nadir görülen ancak hayati tehlike arz eden bir komplikasyondur. Bu yazıda, TEVAR işleminden dört yıl sonra sistemik sepsis ile başvuran 66 yaşında bir erkek hasta sunulmaktadır. Başvuru anındaki laboratuvar incelemelerinde; 212 mg/L C-reaktif protein (CRP) ve 23.30 ng/mL prokalsitonin düzeyleri ile belirgin bir inflamatuar yanıt saptanmıştır. Ampirik tedaviye Meropenem (8 saatte bir 2 g IV) ve Vankomisin (12 saatte bir 1 g IV) ile başlanmıştır. Tanısal süreçte, MALDI-TOF MS yöntemiyle çoklu ilaç direnci (MDR) gösteren Enterobacter hormaechei bakteremisi tanımlanmıştır.

Transtorasik görüntüleme tanı koydurucu olmazken, transözofageal ekokardiyografi (TEE); aortik stent-greftin lüminal yüzeyinde 6,6 x 5 mm boyutlarında hareketli, fibriler bir vejetasyonu doğrulamış ve Modifiye Duke Kriterlerine göre "Kesin İnfektif Endokardit" tanısını karşılamıştır. Duyarlılık sonuçlarının ardından Vankomisin kesilmiş ve sinerjik etki amacıyla Meropenem rejimine hedefe yönelik intravenöz Gentamisin (günlük 5 mg/kg) eklenmiştir. Hasta, Meropenem ve Gentamisin kombinasyon tedavisini 6 haftaya tamamlamıştır. Multidisipliner değerlendirme sonrası konservatif yönetim yaklaşımı benimsenmiştir. Hasta, taburculuk sonrası 3. ayda stabil klinik takip altındadır.

Keywords *Enterobacter hormaechei, TEVAR, stent-greft enfeksiyonu, antibiyotik direnci, gentamisin.*

INTRODUCTION

Thoracic endovascular aortic repair (TEVAR) has become the gold standard for various aortic pathologies; however, stent-graft infection (SGI) remains a devastating complication with an incidence of 0.5-5% and mortality rates exceeding 75%.[1,2] Although most SGIs occur within the first year, late-onset cases occurring years after the procedure present a diagnostic challenge due to their occult clinical course.1 We present a rare case of E. hormaechei infection occurring four years after TEVAR, successfully managed with targeted antimicrobial therapy.

CASE PRESENTATION

A 66-year-old male patient with a history of coronary artery bypass grafting (5 years ago) and TEVAR for Type A aortic dissection (4 years ago) was admitted with fatigue and recurrent chills. Physical examination was remarkable for a palpable pulsation in the abdominal region. On admission, the patient exhibited a severe systemic inflammatory response: CRP level was 212 mg/L and procalcitonin level was 23.30 ng/mL. Empirical antibiotic therapy with Meropenem (2g IV q8h) and Vancomycin (1g IV q12h) was immediately initiated.

Thoracic computed tomography (CT) identified a 4 cm subcutaneous collection anterior to the superior sternum. This finding was interpreted as a secondary extension of the perigraft infection via direct continuity (per continuitatem). Due to the patient's high surgical risk and the confirmed presence of a primary endovascular nidus, the collection was managed conservatively without drainage or aspiration. Consequently, no cultures were obtained from this specific site as the causative agent had already been identified through persistent bacteremia. The clinical course of this lesion was favorable, with complete resolution observed under systemic antimicrobial therapy, paralleling the rapid decline in inflammatory markers and the stabilization of the patient's clinical status.

Blood and central venous catheter (CVC) cultures yielded E. hormaechei with a multidrug-resistant (MDR) profile, identified via MALDI-TOF MS. Based on automated MIC determination (VITEK-2) and EUCAST criteria, the strain was carbapenem-resistant but susceptible to Gentamicin (MIC ≤2 mg/L) and Amikacin (MIC ≤8 mg/L) (Table 1).

Table 1. Antimicrobial susceptibility profile of the *Enterobacter hormaechei* isolate showing resistance to carbapenems and susceptibility to aminoglycosides.

Antibiotic	Susceptibility	MIC
Ampicillin	Resistant (R)	>16 mg/L
Ampicillin / Sulbactam	Resistant (R)	>8/8 mg/L
Cefepime	Resistant (R)	>8 mg/L
Ceftazidime	Resistant (R)	>8 mg/L
Ciprofloxacin	Resistant (R)	>1 mg/L
Ertapenem	Resistant (R)	>1 mg/L
Imipenem	Resistant (R)	>8 mg/L
Levofloxacin	Resistant (R)	>2 mg/L
Meropenem	Resistant (R)	>8 mg/L
Piperacillin / Tazobactam	Resistant (R)	>16/4 mg/L
Trimethoprim/Sulfamethoxazole	Resistant (R)	>8/152 mg/L
Amikacin	Susceptible(S)	≤8 mg/L
Amoxicillin / Clavulanic Acid	Resistant (R)	>16/2 mg/L
Ceftolozane/Tazobactam	Resistant (R)	>4/4 mg/L
Gentamicin	Susceptible(S)	≤2 mg/L
Ceftriaxone	Resistant (R)	>4 mg/L

Upon these results, Vancomycin was discontinued, and Gentamicin (5 mg/kg daily) was added to the Meropenem regimen to achieve synergistic bactericidal activity. The patient completed 6 weeks of the Meropenem and Gentamicin combination.

TEE revealed a 6.6 x 5 mm mobile, fibrillar vegetation on the luminal surface of the aortic stent-graft. The diagnosis was confirmed as 'Definite Infective Endocarditis' according to the Modified Duke Criteria. The patient fulfilled two major criteria: first, persistent bacteremia with multiple positive blood cultures for E. hormaechei obtained at separate times; and second, the TEE finding of a 6.6 x 5 mm mobile vegetation on the stent-graft. Additionally,

two minor criteria were met: a documented fever of 38.8°C and the presence of a predisposing prosthetic endovascular graft.

DISCUSSION

Our case is notable for two primary reasons: the extreme latency of the infection and the rarity of the causative pathogen.[3,4] Enterobacter hormaechei is seldom isolated as a primary agent in endovascular prosthesis infections. The novelty of our case lies in this exceptionally long four-year latency period; while the majority of prosthetic vascular graft infections (PVGIs) manifest within the first year often due to perioperative contamination our patient's presentation years later is a phenomenon rarely documented for the Enterobacter cloacae complex.[5] In the existing literature, late-onset SGIs are predominantly associated with low-virulence organisms like Staphylococcus epidermidis. In contrast, our case involves an MDR E. hormaechei, suggesting that this pathogen can maintain a prolonged subclinical presence, potentially through biofilm stabilization on the stent-graft's surface.

The diagnosis of stent-graft infection (SGI) in our case follows a robust application of the Modified Duke Criteria. Although Enterobacter species are not listed as 'typical' microorganisms for infective endocarditis, the Major Microbiological Criterion was satisfied through persistent bacteremia, demonstrated by multiple positive blood cultures. When combined with the Major Echocardiographic Criterion (the 6.6 x 5 mm vegetation) and two minor criteria (fever and prosthetic material), the case strictly fulfills the requirements for Definite Infective Endocarditis. In our case, the 4 cm subcutaneous collection identified on CT presented a diagnostic challenge regarding the primary source. We interpreted this finding as a secondary extension of the perigraft infection, spreading via direct continuity (per continuitatem) from the infected stent-graft through the mediastinal space to the subcutaneous tissues. Although this presentation mimics localized mediastinitis, the clinical and radiological evidence pointed to the endovascular prosthesis as the continuous primary nidus of infection. This underscores the necessity for clinicians to maintain a high index of clinical suspicion for graft-related complications when superficial abscesses or collections appear in post-TEVAR patients.

The therapeutic management of thoracic stent-graft infections remains highly complex and controversial. While complete surgical explantation accompanied by extra-anatomic bypass or in situ reconstruction is the definitive gold standard, it is associated with significant perioperative mortality, often exceeding 30% in thoracic aortic cases.6 Consequently, conservative management relying on prolonged targeted antimicrobial therapy is increasingly recognized as a viable alternative for patients with prohibitive surgical risks or those lacking signs of acute graft rüptüre.[7] Furthermore, endovascular infections caused by the Enterobacter cloacae complex are exceptionally challenging. These pathogens are notorious for their propensity to form dense biofilms on prosthetic materials and their capacity to develop multidrug resistance via chromosomal AmpC beta-lactamases and acquired carbapenemases.[5] Recent literature emphasizes that in the absence of surgical source control, achieving synergistic bactericidal activity is crucial to penetrate these biofilms. Our favorable clinical outcome with the targeted Meropenem and Gentamicin combination aligns with recent observations that aminoglycoside-based regimens can effectively provide vital 'rescue' therapy in the conservative management of MDR prosthetic infections.[3,5]

According to current guidelines, conservative management of retained infected prosthetic grafts typically requires 4 to 6 weeks of targeted intravenous therapy, often followed by chronic suppressive antimicrobial therapy (CSAT) using highly bioavailable oral agents. However, in our case, the MDR profile of E. hormaechei revealed resistance to all suitable oral options, including fluoroquinolones and trimethoprim/sulfamethoxazole. Due to the lack of viable oral step-down therapy and the cumulative toxicity risks

of prolonged intravenous aminoglycosides and carbapenems, the treatment was strictly capped at a 6-week intensive IV synergistic regimen, followed by rigorous clinical and laboratory surveillance.

CONCLUSION

Late-onset SGI must remain in the differential diagnosis of occult bacteremia in TEVAR patients. TEE is an indispensable diagnostic tool, and targeted therapy with Gentamicin in combination with Meropenem, guided by precise MIC levels, is a life-saving strategy when surgical intervention is contraindicated.

Ethical Approval

Written informed consent was obtained from the patient.

Peer-review

Externally and internally peer-reviewed.

Conflict of Interest

The authors declare that they have no conflict of interest.

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Artificial Intelligence Statement

No AI tools were used in the data collection or clinical analysis.

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