Native Tricuspid Valve Endocarditis due to *Escherichia coli* in A Non-drug Addict: A Case Report

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Abstract

Despite being the most common gram-negative organism associated with bacteremia, *Escherichia coli* remains an uncommon cause of infective endocarditis. Herein, a 52-year-old female without pre-existing valvular heart disease representing with *E. coli* urosepsis associated with unexplained heart murmur and anemia, and therefore being proven of tricuspid valve endocarditis by transesophageal echocardiography, was reported. She survived after extended period of antimicrobial therapy. Surgery is probably no longer to be mandatory in treating this serious infection. (J Intern Med Taiwan 2010; 21: 373-377)

Key Words： ***Escherichia coli;*** **Endocarditis; Native valve; Tricuspid valve**

Introduction

Despite the most common occurrence of infection and bacteremia caused by *Escherichia coli,* endocarditis due to this microorganism is very rare. To date, less than 40 cases of *E. coli* endocarditis have been reported in the English literature[1,2]. In gram-negative endocarditis, the prognosis is always poor and need prompt diagnosis and adequate antibiotic therapy to improve the prognosis. Herein, a case of a 53-year-old female with 2-week history of chills and fever proved of native tricuspid valve *E. coli* endocarditis was reported. This patient survived after extended period of antimicrobial therapy. The clinical characteristics and therapy from published literature associated with *E. coli* endocarditis are reviewed.

Case Report

A 52-year-old female was admitted with a 2-week history of chills and fever, fatigue, dizziness, and headache. She had the past history of poliomyelitis with quadriplegia since her childhood. Type II diabetic mellitus, hyperlipidemia and hypertensive cardiovascular disease were under control. She denied recent hospitalization, dental problem, or receiving antimicrobial therapy in recent 6 months. She didn't have history of anemia.

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On physical examination, she was awake, alert, and oriented. Her vital signs included heart rate of 108 beats/min, a respiratory rate of 22 breaths/min, a blood pressure of 100/63 mmHg, and a body temperature of 38.8℃. Cardiorespiratory examination revealed abnormal findings, including rapidly regular heart rate and a grade II-III/VI sy stolic murmur over right upper sternal border, left sternal border and apical area. There was no ocular or cutaneous evidence of emboli. Other physical findings were not remarkable. Laboratory investigation revealed white blood cell count of 16.0 x $10^3/\mu$L (reference, 3.6-9.6 x $10^3/\mu$L) with a left shift; hemoglobin, 11.0 gm/dL (reference, 12-16 gm/dL); hematocrit, 33.5% (reference, 33-47%); platelet count, 506 x $10^3/\mu$L (reference, 121-325 x $10^3/\mu$L); blood glucose, 374 mg/dL (reference, 70-115 mg/dL); C-reactive protein (nephelometry), 28.5 mg/dL (reference, ＜0.80 mg/dL); serum sodium, 132.6 mmol/L (reference, 135-145 mmol/L); serum potassium, 3.03 mmol/L (reference, 3.3-4.5 mmol/L); alanine transaminase, 15 U/L (reference, 0-40 U/L); aspartate transaminase, 35 U/L (reference, 0-40 U/L); blood urine nitrogen, 7 mg/dL (reference, 6-20 mg/dL); serum creatinine, 0.4 mg/dL (reference, 0.5-0.9 mg/dL); HbA1C, 10.8 % (reference, 4.8-5.9%). HIV screen test (ELISA) was negative. The urine sediment showed 10 to 15 white blood cells per high power field, positive for urine leukocyte, and negative for urine nitrate test. A chest radiograph showed cardiomegaly, atherosclerotic change of the aortic arch, and scoliosis of the thoracic and lumbar spine (Fig. 1). Treatment was initiated with cefmetazole (1.0 gm every 6 hours intravenously) and gentamicin (80 mg every 8 hours intravenously) for a presumed urinary tract infection. Abdominal sonography showed fatty liver. Two sets of blood culture yielded *E. coli,* negative for extended spectrum beta-lactamase, susceptible to amoxicillin/clavulanate, trimethoprim/sulfamethoxazole, cefaclor, gentamicin, and ceftriaxone, but resistant to ampicillin. Culture of urine also yielded *E. coli* with the same antibiotic susceptibility test. She continued to have intermittent fever in the subsequent days. A transthoracic echocardiogram was requested in the consideration of infective endocarditis and it revealed a suspicion of infective endocarditis with the finding of vegetation over right antrum near tricuspid valve. Hence, transesophageal echocardiography was made and it confirmed the

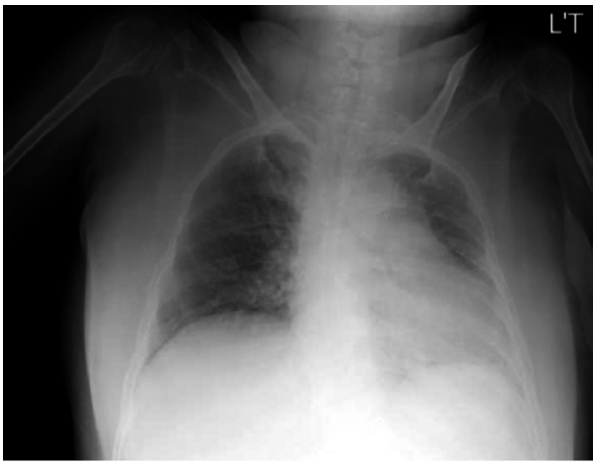

Fig. 1. A chest radiograph showed cardiomegaly, atherosclerotic change of the aortic arch, and scoliosis of the thoracic and lumbar spines.

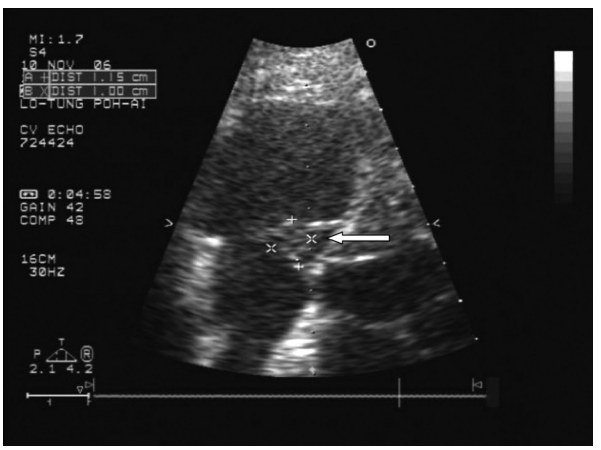

Fig. 2. Transesophageal echocardiography demonstrated the presence of huge mobile vegetation (arrow) with the size of 2.47 cm x 2.45 cm over tricuspid valve.

presence of huge mobile vegetation with the size of 2.47 cm x 2.45 cm over tricuspid valve (Fig. 2). A central mild-to-moderate tricuspid regurgitant jet was found in this examination. This patient fulfilled the modified Duke clinical criteria for definite infective endocarditis (two major criteria)[3]. Accordingly, antimicrobial therapy was adjusted to ceftriaxone (1.0 gm every 12 hours intravenously) and surgical intervention was considered for this huge gram-negative tricuspid valve endocarditis. However, cardiovascular surgeon did not agree with that.

Subsequently, she continued to receive antimicrobial therapy (ceftriaxone) and close reassessments. Her fever subsided 2 weeks after treatment. A following transthoracic echocardiography 4 weeks later revealed regressive change of the tricupsid valve vegetation. Follow-up blood cultures yielded no more microorganisms. She was discharged with stable condition after an 8-week course of antimicrobial therapy with ceftriaxone alone. Six months following completion of therapy the patient was doing well, the vegetation disappeared.

Discussion

Even though *E. coli* was the causative microorganism secondary to Salmonella spp in Enterobacteriaceae endocarditis according to the study of Carruthers et al. in 1977[4], the incidence of native valve endocarditis from *E. coli* remains rare. The incidence of native valve endocarditis by gram-negtive bacilli was estimated 5.3% by a study conducted by Hricak et al in 1998, and *E. coli* was not present in them[5]. In a more recent series of non-HACEK gram-negtive endocarditis, *E. coli* accounted for 30%(14/49)[6]. To date, less than 40 cases of Duke criteria-definite *E. coli* native valve endocarditis have been reported in the literature[1,2,6]. Usually, endocarditis involves the left-sided valves. Right-sided endocarditis was rare, if happened, it often developed in intravenous drug users[7]. In 2006, Micol et al. underwent a thorough review of *E. coli* native valve endocarditis that revealed a higher frequency of *E. coli* native valve endocarditis in elderly patients and he expected an increasing incidence in the following years[1]. There were some characteristics in this study: a trend in aged people (＞70 years), frequently involved mitral valve, urinary tract infection as the most common portal of entry, and most of the patients with no cardiac risk factor. However, the case report of *E. coli* native valve endocarditis does not seem to increase significantly according to the recent survey in the literature using PubMed search with the following key words: endocarditis, *E. coli,* native valve. To date, there is only sporadic case report of *E. coli* native valve endocarditis after 2006. The present case was typical in terms of the urinary source of infection, diabetic and the absence of previous heart disease, but was unusual in having tricuspid valve involvement and younger age comparing with study by Micol et al in 2006.

As we know, *E. coli* is the most prevalent agent leading to the most common bacterial infection, including urinary traction infection, bacteremia, and gastrointestinal infection and it results in substantial morbidity and mortality in both of community-acquired and healthcare associated infections. Despite the fact that *E. coli* is a common cause of bacteremia, it remains an extremely uncommon etiology of endocarditis. In a 1990 review of 861 cases of *E. coli* bacteremia, only two patients had evidence of endocarditis[8]. The rarity of *E. coli* endocarditis may be due in part to its poor adhesive ability to endothelial cells and the bactericidal activity of the complement system against most isolates that cause bacteremia[1,9]. In 2005, Branger et al reported 7 cases of *E. coli* endocarditis and also made a review in 32 cases from the literature[2]. Elderly patients (＞70 years) with previous heart disease, persistent *E. coli*

bacteremia and embolic phenomena were considered to be the predisposing factors. Among these patients, mitral valve was the most common involved valve and the prosthetic valve predominated. These results were in accordance with the findings in gram-negative endocarditis reported in the literature[10,11]. In a large, prospective, multinational cohort study by Morpeth et al in 2007[11], more than one half of all cases of non-HACEK gram-negative bacillus endocarditis were associated with healthcare contact, and implanted endovascular device was the most important risk factor. However, people without previous valvular disease still possibly develop gram-negative endocarditis. Undoubtedly, urinary tract infection was the most common portal of entry in *E. coli* endocarditis according to the literature review[1,2]. Although different strains of *E. coli* associated with particular virulence factors had been proposed as the causative agent in endocarditis[1]. However, the pathogenesis of *E. coli* endocarditis needs to be elucidated in the future studies.

Despite recent improvement in diagnostic and therapeutic strategies, infective endocarditis is still associated with high morbidity and mortality, especially in gram-negative endocarditis[10,11]. The overall mortality rate in *E. coli* endocarditis was 65% in the review by Branger et al[2]. Nevertheless, the mortality rate associated with *E. coli* endocarditis seems to decline in recent studies[1,2,11]. Surgery has been considered the only way in treatment of endocarditis caused by gram-negative bacteria. In the study by Branger et al in 2005, 31% (11/37) of the patients with *E. coli* endocarditis had received surgical treatment[2]. However, antimicrobial agents used alone have been successfully in treating part of the patients with *E. coli* endocarditis according to the recent studies[11,12]. Hence, surgery is probably no longer to be mandatory in treating this serious infection. Nevertheless, the classic indications for surgical treatment in endocarditis including persistent sepsis, the presence of congestive heart failure, cardiogenic shock, and peripheral embolic phenomena should still alert the clinicians. For native valve *E. coli* endocarditis, a broad-spectrum cephalosporin (e.g., ceftriaxone) with or without aminoglycoside (e.g., gentamicin) for a combination therapy for 4 to 6 weeks should be the drug of choice[12].

In conclusion, this case demonstrates the association between infective endocarditis and *E. coli* bacteremia and emphasizes the need to perform echocardiography in time, particularly in patients with sustained fever, an unexplained anemia, and the presence of new-onset heart murmur for early diagnosis and appropriate treatment to infective endocarditis.

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大腸桿菌三尖瓣心內膜炎：一病例報告

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摘　要

大腸桿菌是各種感染症常見的致病菌，也是所有格蘭氏陰性菌中最常引起菌血症的細菌；然而，大腸桿菌卻很少引發心內膜炎。在此報告一位52歲女性病患無先前心臟病史，因爲大腸桿菌泌尿道感染合併菌血症而住院。住院後理學檢查發現病患有明顯之心雜音且血液檢驗發現不明原因之貧血，故安排心臟超音波檢查，因而證實病患罹患三尖瓣心內膜炎。病患接受8周靜脈注射抗生素治療而痊癒出院。以此顯示，格蘭氏陰性菌如大腸桿菌所引發心內膜炎並不全然需要外科手術治療，較長時間靜注抗生素治療之內科保守性治療仍能治癒此嚴重之病症。