VIA MEDICA

CASE REPORT

Cardiology Journal
2007, Vol. 14, No. 6, pp. 589–591

ISSN 1897–5593

Myocarditis related to *Salmonella enteritidis* infection

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Abstract

Myocarditis associated with bacterial enteritis has only rarely been described in literature. The clinical manifestation of the disease is often oligosymptomatic, so the real incidence could be underestimated. A case of myocarditis in a 31-year-old male patient having Salmonella enteritidis *infection is reported. The clinical course and problems concerning the diagnosis are discussed. The possibility of myocardial infection should be considered in any patient with cardiac complaints during gastrointestinal infection.* (Cardiol J 2007; 14: 589–591)

Key words: myocarditis, *Salmonella enteritidis* infection

Introduction

Myocarditis is defined clinically as inflammation of the heart muscle. The postmortem studies suggest that myocarditis is a major cause of sudden unexpected death in young adults (20% of cases) [1]. The viruses are the most significant cause of myocarditis in Europe. Bacterial diseases are less common causes of myocarditis. We present the case report of a patient with myocarditis early in the course of *Salmonella enteritidis*.

Case presentation

A 31-year-old, previously healthy man presenting with a five-hour history of moderate morning, chest pain with dyspnoea was admitted to the hospital. The pain was spontaneous, was constant, retrosternal and non-radiating. Besides smoking ten cigarettes a day, the patient did not have any other coronary artery disease risk factors. Two days prior to admission, he developed watery diarrhoea (not bloody) and a fever (38.5°C). Two days before the onset of the diarrhoea he had eaten dumplings in a Chinese restaurant. Physical examination on admission to hospital revealed: blood pressure 140/85, heart rate 85 beats per minute, respiratory rate 14 per minute and temperature 37°C. The cardiac examination was normal (no murmurs or pericardial rub). Respiratory, abdominal and musculoskeletal examinations were normal. The laboratory investigations revealed: creatine kinase (CK) and creatinine kinase isoenzyme MB (CK-MB) were elevated to 407 U/L and 54 μg/L (norm: CK < 190 and CK-MB < 23, respectively), troponin I was 5.19 μg/L (norm < 0.1). WBC 13310. The electrocardiogram (ECG) showed: heart rate 50/min, high J point with ST segment elevation in limb and precordial leads (2 mm), high T wave amplitude in V2–V5, and PQ and QT intervals within normal limits. The echocardiography (ECHO) showed hypokinetic areas in the posterior, inferior and lateral walls with left ventricle ejection fraction 46% (Simpson). The initial diagnosis was acute myocarditis. The patient was admitted to the coronary care unit for intensive cardiac monitoring. The chest pain resolved within 2 hours of admission. Due to infectious diarrhoea,

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Received: 12.05.2007 Accepted: 16.06.2007

treatment with nifuroxazide (4 × 200 mg *p.o.*) and ciprofloxacin (2 × 500 mg *p.o.*) was initiated. Fecal cultures yielded growth of Salmonella enteritis. The diarrhoea resolved and troponin normalized on the fifth day. The controlled ECHO showed normal left ventricle function (EF = 65%). ECG on discharge revealed ST segment normalisation, biphasic T waves in I, II, III, aVF, V4 and negative T waves in V5–V6.

The final diagnosis of *Salmonella enteritidis* infection and related myocarditis was made based on the clinical and echocardiographical findings and laboratory results. The patient was discharged from the hospital in a stable condition after 8 days of treatment. At one-year follow up, the patient was well.

Discussion

As clinical manifestation of myocarditis is usually oligosymptomatic, the real incidence of the disease remains underestimated. Nevertheless, myocardial inflammation has been identified in 9% of routine postmortem examinations [1]. The spectrum of potential causative agents includes: viruses, bacteria, protozoa, fungi, parasites as well as toxins and autoimmunological reactions. In Europe and North America the most common cause of myocarditis are enteroviruses, whereas in South America *Trypanosoma cruzi* is more often found [2].

Bacterial infections of the gastro-intestinal system are rarely reported as a cause of myocarditis [3–9]. On the other hand, signs of the disease could easily be obscured by symptoms from the alimentary tract. In one study of 100 patients with bacteriologically or serologically documented enteric fever, the authors found 7 cases with clinical evidence of myocarditis but as many as 46 cases with ECG abnormalities suggesting myocarditis [10]. The pathogenicity of non-typhoid *Salmonella* seems to be limited, although in the study of Theler-Ballmer et al. [11] 8 of 103 patients with salmonellosis presented clinical, laboratory or ECG findings suggesting myocarditis. The pathophysiology of myocardial inflammation accompanying gastrointestinal infections is not understood well. The potential mechanisms include: direct invasion of myocardium, influence of toxins and immunologically mediated myocardial damage.

In the case presented, the diagnosis of *Salmonella enteritidis* enteritis and related myocarditis was made based on the clinical, laboratory, ECG and echocardiographical results. The appearance of chest pain, arrhythmia or congestive heart failure in young patients, without a history of heart disease, especially when it is concurrent with infection, should arouse suspicion of myocarditis. In our patient, chest pain developed within two days after the onset of diarrhoea, similarly to the cases described in literature, in which cardiac symptoms occurred 2 or 3 days after the first gastrointestinal complaints [9], which suggests direct bacterial invasion of the myocardium. The causative role of *Salmonella enteritidis* was determined based on the stool cultures and the absence of any other potential pathogens in the remaining bacteriological examinations. The *Salmonella enteritidis* is the most common causative factor of food poisoning in Poland [12], especially connected with the use of raw or undercooked eggs. In the presented case, the suspected source of the bacteria was the dish from the Chinese restaurant.

The ECG abnormalities with transient but widespread changes of ST-T segments are typical in myocarditis, but may require to be distinguished with acute coronary events, including the need of coronary angiography [2]. The rise of CK and troponin I is noted in myocardial damage of any cause; however, Smith et al. [13] found CK elevation in only 5.7% and troponin I elevation in 34% of patients with autoimmune myocarditis. Finally, echocardiographic abnormalities with global hypokinesia are reported in myocarditis and could help in differentiation with myocardial infarction. The absence of left ventricular dilatation and full return of ventricular function (presented by our patient) are characteristic of fulminant course of myocarditis, with low risk of progression to dilatated cardiomyopathy, whereas acute myocarditis with less severe hemodynamic compromise more often leads to persistent cardiac dilatation [14]. The complete restoration of cardiac function after antimicrobial therapy confirmed the diagnosis of heart inflammation related to *Salmonella enteritidis*.

In several cases, the diagnosis of myocarditis required an endomyocardial biopsy. Although, this invasive examination is recommended only when the disease cannot be diagnosed clinically or with routine biochemical tests. Moreover, the Dallas criteria used for the histological evaluation of biopsy specimens probably underestimates the true incidence of myocarditis [1]. In our case, we did not find an indication for this examination.

Summing up: temporal coincidence with gastrointestinal complaints, lack of any unknown myocardial disease, transient laboratory, ECG and echocardiographic abnormalities and quick and full recovery after antibiotic therapy allowed us to make a diagnosis of myocarditis caused by *Salmonella enteritidis*.

Conclusions

Myocarditis can be a complication of infectious, enteric disease. Patients with chest pain during diarrhoea should be diagnosed for myocarditis. ECG, cardiac enzymes, echocardiography and judicial use of coronary angiography may be necessary to reach proper diagnosis.

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