






Myocarditis related to *Salmonella paratyphi C* infection

Zapalenie mięśnia sercowego związane z zakażeniem *Salmonella paratyphi C*

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Abstract

Myocarditis related to bacterial gastroenteritis is rare, especially in immunocompetent persons. The clinical course of the disease is characterised by non-specific, sparse symptoms, which greatly impedes diagnosis. This paper presents a case of myocarditis in a 39 year-old man with a *Salmonella paratyphi C* infection. *Salmonella* infections rarely cause myocarditis, but they should always be considered in cases where myocarditis is suspected and there is no evidence of a viral aetiology.

Key words: myocarditis, *Salmonella paratyphi C* infection

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Introduction

Non-ischaemic myocardial injury may occur secondarily to a wide variety of cardiac diseases including myocarditis, or may be related to non-cardiac conditions. In patients with elevated cardiac troponin (cTn) levels, clinicians must differentiate between a non-ischaemic myocardial injury and one of the subtypes of myocardial infarction. If there is no data that would suggest myocardial ischaemia, myocardial injury should be diagnosed. According to the Fourth Universal Definition of Myocardial Infarction [1] (2018), myocardial injury is defined as detection of an elevated blood cTn value above the 99th percentile upper reference limit.

This paper presents the case of a patient with myocarditis which occurred early in the course of a *Salmonella paratyphi C* infection.

Case report

A previously healthy 39 year-old man was admitted to the hospital due to watery (bloodless) diarrhoea, a fever of 39 °C, and chills which had been persisting for two days. These symptoms were accompanied by muscle and joint pains. On admission, the patient did not report any symptoms in the chest area. Three days before being admitted to the hospital, the patient had gone to a party – two persons who also took part in this celebration were hospitalised at the Department of Communicable Diseases at the same time and due to similar symptoms. The man was obese [body mass index (BMI) of 38.7 kg/m²], denied having any chronic diseases, and was not taking any drugs on a permanent basis.

Table 1. Dynamics of changes in troponin T and creatine kinase myocardial bound (CK-MB) levels over time

Parameter	Time			
	6pm	8pm	10pm	10am (the following day)
CK-MB concentration [ng/mL]	16.1	12.47	16.47	47.41
Troponin T concentration [ng/mL]	0.22	0.205	0.305	0.835

During examination performed on admission to the hospital, the patient had blood pressure of 150/106 mm Hg, heart rate of 81/min, and body temperature of 38.9°C. No irregularities were found during cardiac examination. No deviations from the norm were found during respiratory, abdominal or musculoskeletal examinations. Stool culture was also performed in order to diagnose any communicable gastrointestinal diseases.

Laboratory tests revealed an increased activity of creatine kinase (CK), up to 1,516 IU/L, as well as elevated concentration of the creatine kinase myocardial bound (CK-MB) (reference value max. 6.73 ng/mL). Furthermore, increased values of troponin T (reference value max. 0.1 ng/mL) and C-reactive protein (CRP), the latter up to 263.31 mg/L (normal value max. 5 mg/L), were also observed. Detailed results are presented in Table 1.

Electrocardiogram (ECG) recorded pathological Q waves in inferior wall leads, ST segment elevation in I, aVL, V2 and V3 leads, and an inverted T wave in III lead (Figure 1). Echocardiogram revealed a mild segmental left ventricular systolic dysfunction (within the posterior wall), with an ejection fraction (EF) of 55%.

As infectious diarrhoea was suspected, ceftriaxone treatment was commenced, while cardiac symptoms led to administration of bisoprolol and perindopril. Coronary angiography was performed due to suspected acute coronary syndrome, but showed no changes in the coronary arterial image. Pharmacological treatment was continued at the Department of Communicable Diseases. During hospitalisation, the condition of the patient gradually improved and cardiac indicators returned to normal; ultimately, *Salmonella paratyphi C* infection was diagnosed.

Discussion

Myocarditis is defined as an inflammatory process within the myocardium. Postmortem examinations reveal that myocarditis is one of the main causes of unexplained deaths in young adults (20% of cases). The clinical picture typically involves multiple non-specific symptoms, which hinders diagnosis. Difficulties in diagnosing myocarditis also stem from varied intensification of symptoms. The

course of the disease may be asymptomatic, but it can also lead to cardiogenic shock or even death [2].

The pathogenesis of myocarditis is not fully understood. Studies suggest that testosterone, non-specific immunity, and pro-inflammatory cytokines play a role in the development of the inflammatory condition and a predisposition towards heart failure [3].

During the course of the disease, patients may exhibit changes in ECG records, abnormal heart rhythms, congestive heart failure and cardiogenic shock. Myocarditis can coexist with other, seemingly unrelated, clinical scenarios, especially gastroenteritis as in the described case [4].

Viral infections are the most common cause of myocarditis; currently, parvovirus B19 remains the most common aetiological factor. Salmonella infections rarely cause myocarditis, but they should always be considered in cases where myocarditis is suspected and there is no evidence of a viral aetiology [3].

As myocarditis is characterised by a large number of clinical symptoms, endomyocardial biopsy remains the 'gold standard' in making a final diagnosis. However, correct performance of such a biopsy is difficult; errors in sample collection, variability of interpretation, complications related to the procedure, and low sensitivity of the test (10–22%) all limit its usefulness in practice [3]. In the described case, performance of an endomyocardial biopsy was not indicated, as symptoms and test results did not suggest any causes other than salmonella infection.

Large tissue contrast and resolution of magnetic resonance imaging (MRI) of the heart enable precise assessment of the structure and function of the myocardium. Magnetic resonance also allows for detection of the presence and extent of myocardial oedema/inflammation, which makes it possible to differentiate between acute and chronic myocardial injury. For patients who may experience acute retrosternal pain, but exhibit no significant narrowing of coronary arteries, MRI can facilitate diagnosis of alternative conditions, such as myocarditis, takotsubo cardiomyopathy, embolic infarction, or myocardial infarction with spontaneous recanalisation [5].

A systematic review of published cases indicates that myocarditis occurs mainly in young adults and entails an

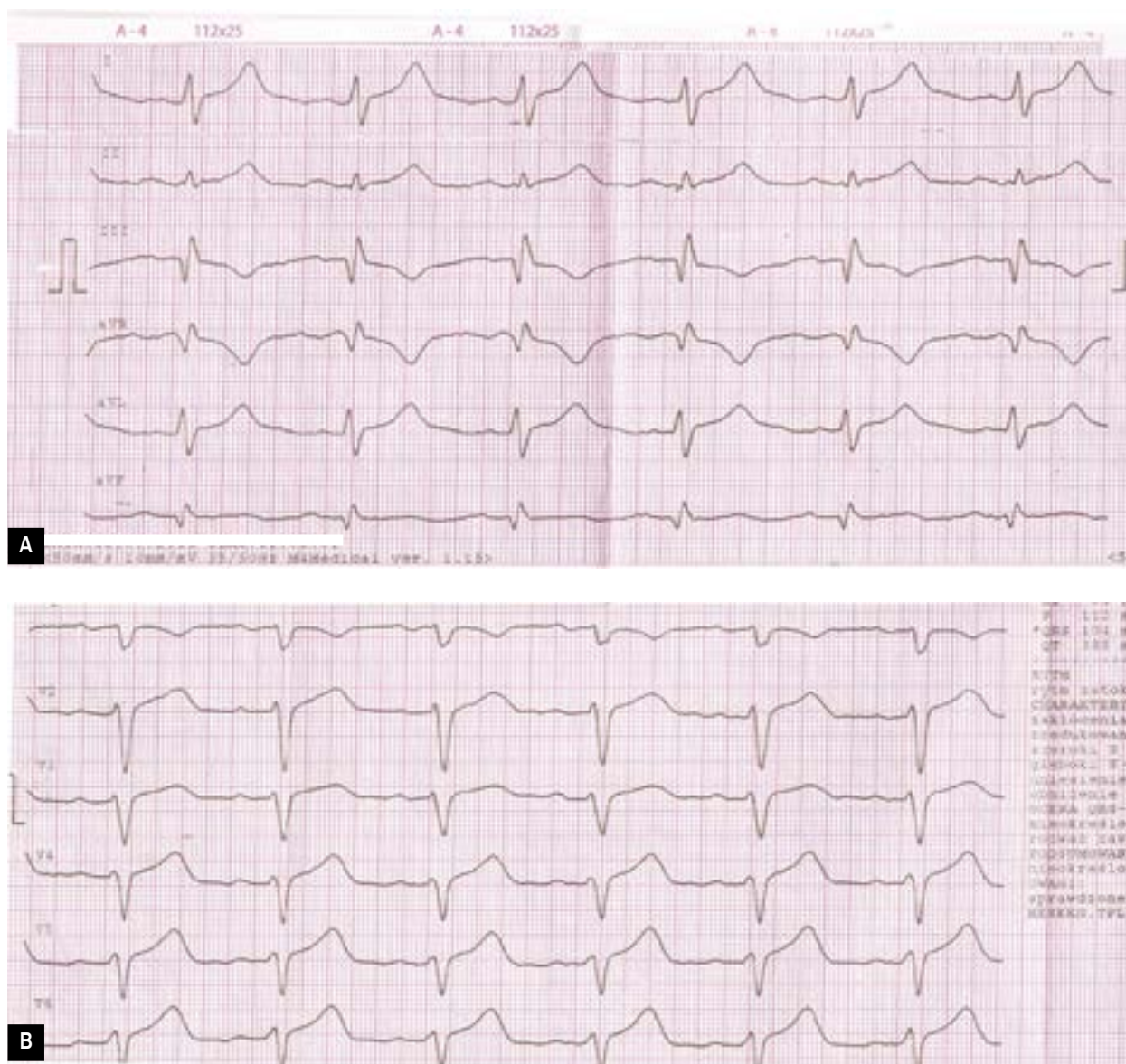


Figure 1A, B. Electrocardiogram of the patient from the second day of stay in the hospital, when the myocardial injury marker levels were at their highest

unfavourable prognosis. The initial diagnostic approach is similar to the approach taken for myocarditis of other aetiologies: ECG, echocardiography and coronary angiography. After diagnosis, patients should, apart from antibiotics, also receive treatment which supports the myocardium. Much like in all cases of bacterial myocarditis, the mortality rate

seems high, and in many cases admittance to an intensive care unit (ICU) is justified [6].

Conflict of interest

The authors report no conflict of interest

Streszczenie

Zapalenie mięśnia sercowego związane z bakteryjnym zapaleniem jelita występuje rzadko, zwłaszcza u osób immunokompetentnych. Przebieg kliniczny choroby charakteryzuje się niespecyficznymi, skąpyimi objawami, co znacznie utrudnia diagnozę. W pracy przedstawiono przypadek zapalenia mięśnia sercowego u 39-letniego mężczyzny z zakażeniem *Salmonella paratyphi C*. Zakażenia salmonellą są rzadką przyczyną zapalenia mięśnia sercowego, ale zawsze powinny być brane pod uwagę w przypadkach z podejrzeniem *myocarditis* w przypadku braku dowodów na etiologię wirusową.

Słowa kluczowe: zapalenie mięśnia sercowego, zakażenie *Salmonella paratyphi C*

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Piśmiennictwo

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