Sudden death due to asymptomatic myocarditis – a forensic case report

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Abstract: Myocarditis is a disease associated with inflammation and damage of the myocardium. It has a very diverse clinical manifestation from asymptomatic cases to fatal heart failure and sudden death. Early diagnosis and treatment is very important. In young people it is one of the common causes of sudden unexpected death. We present a case of a 31 year old man, who was found dead in his apartment. He never had complained of health problems, even prior to his death. Full forensic examination of the body was performed with subsequent chemical and histological analysis. The results showed that he suffered from asymptomatic myocarditis.

Key Words: sudden death, asymptomatic myocarditis, forensic analysis.

Myocarditis is an inflammatory disease of the heart muscle (myocardium) [1-6]. Depending on the rate of occurrence it can be acute or chronic, and based on the etiology - myocarditis with infectious origin caused by viruses, bacteria, spirochetes, rickettsia, fungi, parasites, protozoa [7, 8] and one with non-infectious origin after taking drugs, chemical elements and compounds, after influence of physical factors, insect bites, reptile bites, etc [1-3, 9]. Myocarditis can be related to direct invasion of the infectious agent in the myocardium, damage of the tissue from the toxic products of some microorganisms, infectious, allergic and immune mechanisms or direct effect of chemical and physical factors [10-15]. From pathological perspective changes can be focal and diffuse. Most often necrosis and degeneration of myocytes, and cellular infiltration into the interstitium can be observed and in some specific myocarditis granulomas are formed [5, 7, 16-18]. The clinical picture of myocarditis has very different presentation that varies from asymptomatic cases with mild focal myocarditis to rapidly progressing and fatal heart failure with diffuse, severe myocarditis, making diagnosis difficult. Acute myocarditis occurs differently depending on the degree of damage of the heart muscle [14, 19]. Patients have nonspecific symptoms - weakness, fatigue, low grade fever, sweating, palpitations, and heaviness in the heart area. In clinical prominent forms the most common symptom is pain, due to myocardial necrosis or concomitant pericarditis [2, 6, 8, 20-22].

Manifestations of congestive heart failure with shortness of breath, orthopnea, paroxysmal nocturnal dyspnea (cardiac asthma) are also observed. In addition all kinds of rhythm and conduction disturbances (sinus tachycardia, extrasystoles, AV block, left and right bundle branch block, etc.) can occur in myocarditis patients. Chronic myocarditis patients have shortness of breath, especially associated with movements and activity, they often feel weak and tired [23]. The pulse in most cases is accelerated and irregular, body temperature is normal or low-grade. Complications occur often and they include progression to heart failure, even cardiogenic shock, severe malignant arrhythmias or sudden cardiac death [1, 12, 17, 24].

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CASE REPORT

We present a case of a young man, 31 year-old, found dead in the bathroom at his home. According to his relatives, he never complained of any health problem, he was feeling perfectly healthy and vigorous the days before his death. During the forensic autopsy of the deceased the below listed changes were found:

Morphological changes associated with rapid deaths with acute venous stasis in the internal organs, swelling of the brain and lungs;
Adhesion of the pericardial sac to the epicardium and the visceral pleura of the left lung;
Dilatation of the left heart ventricle;
Diffuse type of myocardial fibrosis;
Several bilateral pleural adhesions;
“Brown” induration of the lungs;
Fatty degeneration of the liver;
Lack of traumatic injuries.

Full forensic analysis was performed with gathering of the following materials:
Samples of blood for chemical testing for the presence of alcohol, poison and other drugs, that do not give visible morphological changes in tissues and organs, including the samples were tested for the presence of carboxyhemoglobin;
Pieces of internal organs (brain, heart, lung, liver, kidney, spleen) for histological examination.

Chemical analysis was conducted by the methods of thin-layer chromatography, UV spectrophotometry, gas chromatography (gas chromatography with nitrogen-phosphorus detector GC / NPD THERMO FINNIGAN and gas chromatography with mass spectral detector quadrupole GC-MS model Thermo scientific). All the tests were negative for alcohol and other intoxicating substances, including carboxyhemoglobin.

Necropsy material is fixed in 10% formalin solution. Paraffin blocks were made and permanent histology samples stained with hematoxylin and eosin using standard techniques. Upon histological examination we found:

Brain tissue: pericellular edema, blood stasis;
Myocardium: interstitial edema, focal interstitial mononuclear infiltration, fragmentation of cardiomyocytes, blood stasis, focal interstitial hemorrhage (Figs 1-3);
Lungs: blood stasis, availability of fresh and old (siderophages) intra alveolar hemorrhage, interstitial blood stasis and presence of edematous fluid in the alveoli (Fig. 4);
Kidney: normal histologic structure, cyanosis;

Figure 1. Interstitial edema, focal mononuclear infiltration, fragmentation of cardiomyocytes, blood stasis, HE, 10x25.

Figure 2. Interstitial edema, fragmentation of cardiomyocytes and focal interstitial haemorrhage, HE, 10x25.

Figure 3. Expressed interstitial edema, fragmentation of cardiomyocytes, HE, 10x25.

Figure 4. Blood stasis, presence of edematous fluid and siderophages in alveoli, HE, 10x25.
Liver: brown atrophy, focal steatosis, reactive/satellite focal hepatitis;
Spleen: normal histologic structure, cyanosis.

**DISCUSSION AND CONCLUSION**

For pre-trial and trial proceedings is very important to clarify the cause of death in cases of deceased, especially when death occurs sudden, particularly in young individuals without clinical evidence of pre-existing health conditions. The main task of forensic experts in each case is the exclusion of violent death (death not due to a disease). Sudden unexpected nonviolent death is one that occurs suddenly in apparently good health, due to relatively subtle or atypical occurring disease or in conditions change the reactivity of the body [7]. The rate of death may be different - from seconds to minutes or hours.

Sudden death under the age of 35 is rare and usually due to cardiac causes [1-3, 5]. Studies show that about two-thirds of the autopsies of deceased young people are associate with a structural heart disease. The most common causes of sudden cardiac death in young adults are: hypertrophic cardiomyopathy, abnormal coronary arteries, Long QT syndrome, myocarditis, Brugada syndrome, and others [9, 19, 23]. On time diagnosis can save lives.

Acute myocarditis is a serious and severe disease with a relatively high mortality. From the analysis of data from the autopsy and conducted additional tests (histology and chemical analysis) we concluded that the cause of death of the 31 year old man is due to acute cardiovascular failure as a result of asymptomatic non-specific granulomatous myocarditis with presence of myocardium hypertrophy and fragmentation of cardiomyocytes, expressed interstitial edema, focal mononuclear infiltration and focal interstitial diapedesis hemorrhage.

**Conflict of interest.** The authors declare that they have no conflict of interest concerning this article.

**References**