Case Report

Acute Myocardial Infarction and Documented Sudden Death

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A sexagenarian man sought the emergency unit complaining of dubious chest pain and lipothymia. He was investigated and stratified. His serial electrocardiograms and serum markers for myocardial injury were negative for myocardial ischemia, as was his exercise test. However, the patient died suddenly inside the hospital while under continuous electrocardiographic Holter monitoring, which evidenced acute myocardial infarction complicated by complex ventricular arrhythmia (ventricular tachycardia and fibrillation), which culminated in death refractory to the cardiopulmonary resuscitation maneuvers.

Sudden death is the most feared initial manifestation of acute myocardial infarction, affecting approximately 50% of the cases. Complex ventricular arrhythmias are the major cause of this outcome [1,2]. With the creation of intensive care and chest units, as well as training and enabling of health care professionals and even of lay public, recognition and rapid and appropriate treatment of a sudden death situation have culminated in significantly successful reversion on many occasions [1,3]. However, such success may not always be obtained, even when inside a hospital [4].

Case Report

The patient was a 60-year-old man born and residing in the city of São José do Rio Preto, in the state of São Paulo, who smoked 20 cigarettes per day and was hypertensive on irregular medication (captopril). He sought the emergency unit complaining of chest pain that, although of difficult characterization, he identified as retrosternal, irradiating to the left inframammary region. According to the patient, the pain had no relation to physical exertion, had a variable duration ranging from seconds to hours, and stopped spontaneously. He denied any other symptom associated with pain in the preceding 15 days. On admission, the patient reported that that episode of pain had lasted for the preceding 13 hours. He also reported 2 episodes of lipothymia in the preceding days with no relation to the chest pain. He had a familial history of Chagas' disease.

On physical examination, the patient was in good general condition, hydrated, eupneic, acyanotic, afebrile, and had healthy coloring. His blood pressure was 160/100 mmHg, and his heart rate was 90 bpm. His heart rhythm was regular with frequent extrasystoles, and no murmurs could be heard in the carotid arteries. No abnormalities were observed in the remaining physical examination.

The patient received 200 mg of ground acetylsalicylic acid, sublingually, and oxygen. Venous access was obtained and continuous electrocardiographic monitoring was installed. Sublingual nitrate provided complete pain relief. The 12-lead electrocardiographic tracings performed before and after nitrate administration, as well as its serial 12-hour recording, showed sinus rhythm with total right bundle-branch block, alteration in the ventricular repolarization of the inferior wall, ventricular extrasystoles, and no dynamic alterations in the ST segment. The levels of myocardial injury markers (troponin-T) were normal. After 24 hours, exercise testing was performed, but no alteration suggesting myocardial ischemia was evidenced. The echocardiogram showed no ventricular dysfunction, and serology for Chagas' disease was negative. Continuous electrocardiographic 24-h Holter monitoring was performed, because of the complaint of lipothymia. In the 20th hour of Holter monitoring, the patient evolved to witnessed sudden death, immediately received resuscitation measures, but without success. The electrocardiographic recordings showed elevation of the ST segment in the CM5 and D2M leads, which was asymptomatic for 15 minutes, being then followed by complex ventricular arrhythmias that degenerated to ventricular fibrillation refractory to the cardiopulmonary-cerebral resuscitation maneuvers (figs. 1, 2 ,3 , 4, and 5).

Discussion

Heart disease is the major cause of death among North Americans and together with stroke is an important cause of disability, significantly contributing to an increase in the cost of public health in the United States. Coronary artery disease accounts for the greatest proportion of heart diseases, affecting approximately 12 million North Americans [5].

In Brazil, the cardiovascular diseases account for up to 32% of deaths according to DATASUS, with a 22% increase in prevalence in the past 19 years [6].

The most common manifestation of coronary artery disease is angina. The assessment of patients with chest pain in the emergency unit has posed several challenges due to their great number and extremely costly treatment. If on the one hand the inappropriate assessment of these patients may lead to their discharge from

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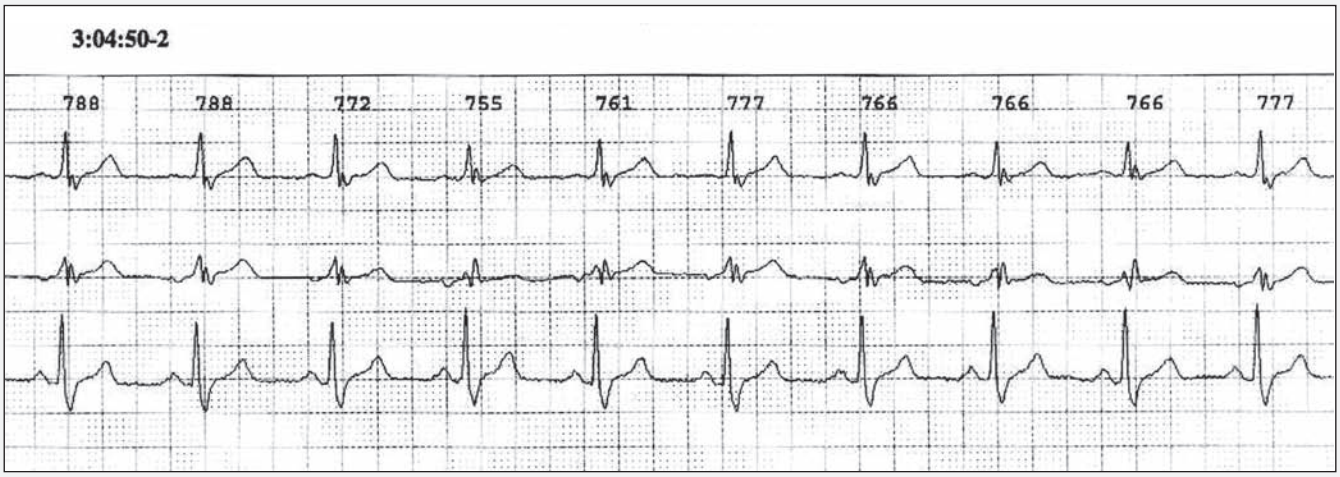

Fig. 1 - Modified Holter leads showing the baseline electrocardiographic tracing.

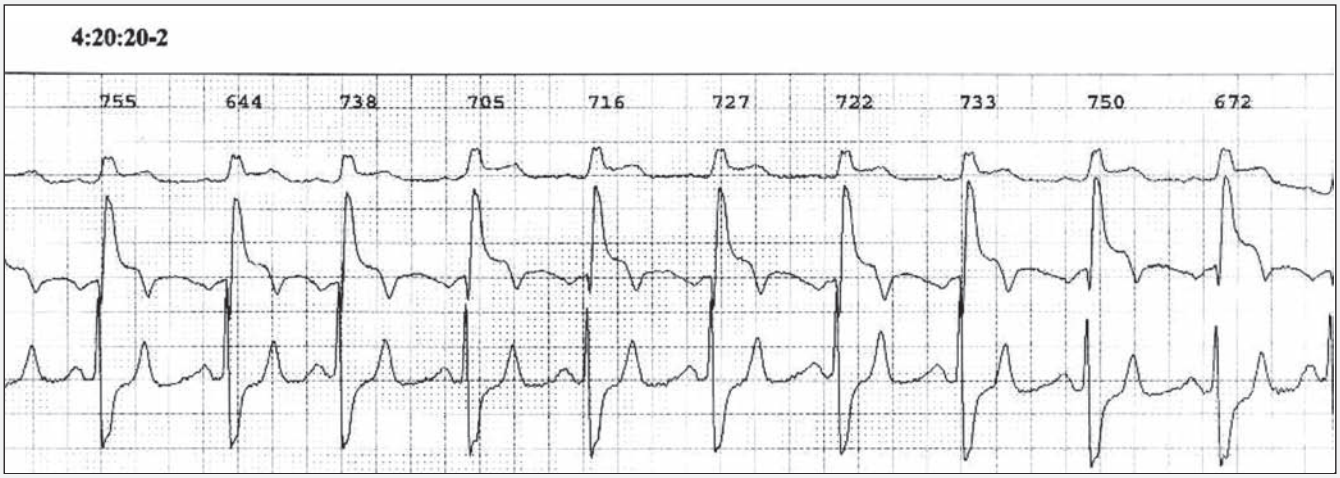

Fig. 2 - Modified Holter leads showing elevation in the ST segment.

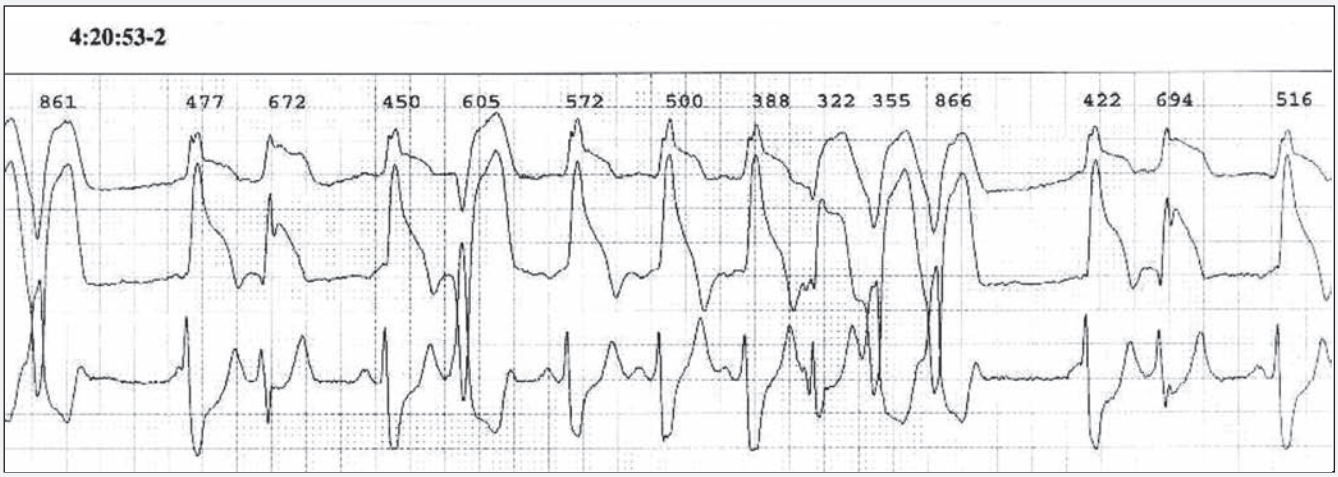

Fig. 3 - Modified Holter leads showing nonsustained ventricular tachycardia.

the emergency unit with undiagnosed acute coronary syndrome, which results in worsening of the prognosis and mortality rate, on the other hand, the indiscriminate admission of these patients for risk stratification, burdens the system and prevents rational medical care, because only 25% of the patients screened in the emergency unit require hospitalization due to ischemia [7].

Therefore, several protocols have been developed and used aiming at properly stratifying the patients with chest pain in the emergency unit, minimizing the risks of an inadequate discharge and allowing the rational use of the resources in patients who are actually at high risk for coronary events, mainly infarction, reinfarction, and sudden death.

This assessment is based on the association of clinical and electrocardiographic data and myocardial injury markers, in addition to investigation of ischemia in selected patients by using exercise testing or myocardial perfusion scintigraphy. Patients with no clinical characteristics of high risk (advanced age, prolonged pain at rest, signs of ventricular dysfunction, and arrhythmias), with

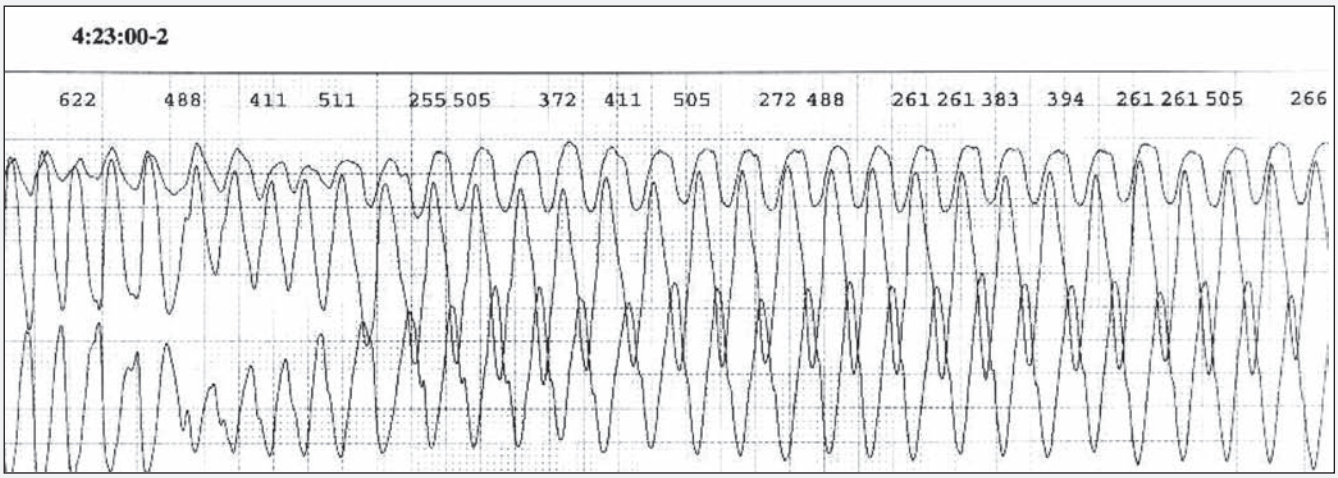

Fig. 4 - Modified Holter leads showing sustained ventricular tachycardia.

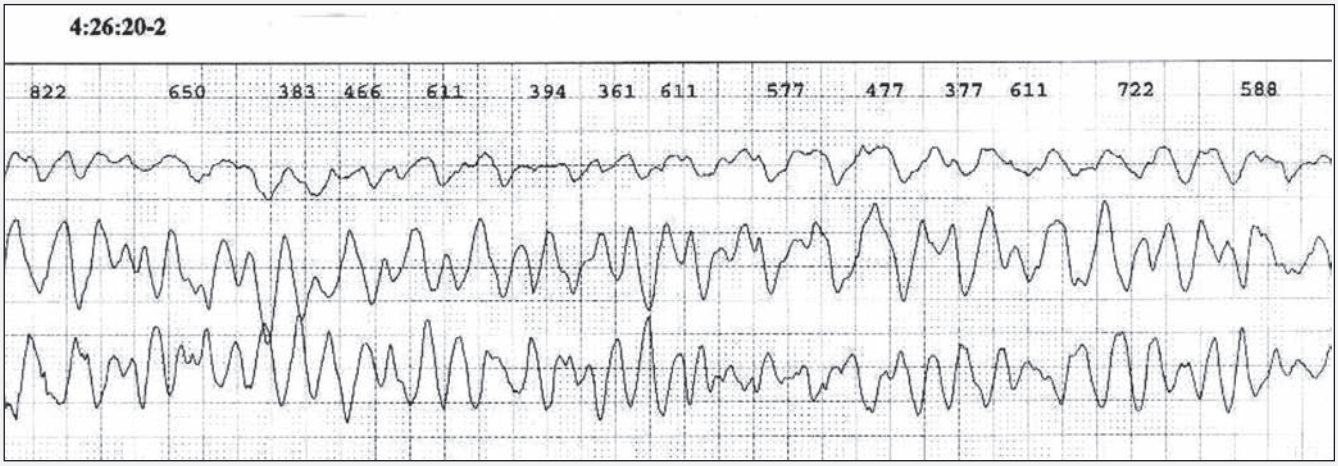

Fig. 5 - Modified Holter leads showing ventricular fibrillation.

no dynamic alterations in the ST-T segment, and with negative myocardial injury markers are considered low risk and can undergo an ischemia provocative test in the emergency unit. A negative exercise test indicates a low-risk patient for future events, who may be safely discharged from the emergency unit [8].

Coronary artery disease accounts for at least 80% of the cases of sudden death in the entire world. Many times, sudden death may be the initial manifestation of myocardial infarction. Fifty percent of the deaths in acute myocardial infarction occur in the first hour of evolution, and 80% occur in the first 24 hours [9].

Complex ventricular arrhythmias, such as ventricular tachycardia and ventricular fibrillation (VT/VF) are the major causes of sudden death. Despite the reduction in in-hospital mortality, the prehospital mortality has only been altered little [1].

Even international recordings in developed countries show that prehospital recovery from sudden death is also low, with a one-month survival of 5% in the general population and of 9.5% for those with VT/VF documented on the first electrocardiogram, as compared with 1.6% of those without those arrhythmias [2].

Adequate training of health professionals and even of the lay public for recognizing such an emergency situation could change the disease's history and evolution [1,3,4].

However, in atypical and dubious cases, even when all the steps in the emergency unit assessment of patients with chest pain are carefully followed, the coronary arterial disease may manifest with this lethal and unexpected outcome, and its reversion would be related not only to the time elapsed until medical care, but also to the extension of the ischemic myocardium and its electrical restabilization [9].

In the case presented herein, the patient was admitted to the emergency unit with dubious chest pain and was initially stratified with serial electrocardiographies and serum markers of myocardial injury, which were negative. After more than 12 hours of clinical observation, the patient underwent the symptom-limited exercise test, which was negative for myocardial ischemia. Respecting the negative predictive value of the test in such cases, the use of exercise testing for assessing chest pain of low and intermediate risk may warrant minimal cardiovascular complications if no myocardial ischemia is evidenced [8].

However, as the complaint of lipothymia was considered significant, the patient was admitted for Holter monitoring that documented the fatality of the occurrence of myocardial infarction complicated with complex ventricular arrhythmia, resulting in sudden death.

In conclusion, coronary artery disease may have a wide range of presentations, sudden death being its most feared and many times inevitable one, even when using all technical and clinical resources. It remains a challenge for the medical professionals working at the critical care sections of the hospital.

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