A PATIENT WITH MULTIPLE SUDDEN CARDIAC ARRESTS DUE TO CORONARY SPASM

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ABSTRACT

Aim: To report the case of a patient suffering multiple cardiac arrests due to coronary spasm. Prinzmetal's angina which is under-diagnosed can be responsible for myocardial ischemia with all its resulting complications, the most severe being conductive and ventricular rhythm disorders and asystole.

Methods: The Paris fire brigade's basic life support and mobile intensive care unit team's records as well as inpatient hospital records were the data sources for this report. The patient's consent was obtained before any data was utilized.

Case Report: A 66-year-old man with a long history (years) of undiagnosed fainting spells suffered four cardiac arrests the same morning. After two successful returns of spontaneous circulation resuscitative efforts, the patient exhibited a completely normal cardiovascular and neurological profile. After the second cardiac arrest, he complained of typical chest pain. Initially his ECG showed atrial fibrillation without any heart block or repolarisation abnormalities. After the cardiac arrest it changed to an inferior and lateral ST depression and then to an inferior ST elevation.

His coronarography showed no acute coronary lesion. Nonetheless, the Methergin® test confirmed a Prinzmetal's angina diagnosis.

Conclusion: The Prinzmetal's angina or angina inversa are terms used to indicate a clinical and physiopathological entity different from traditional angina. The guideline for resuscitation should discuss the use of adrenaline (epinephrine) in this particular setting where its alpha effects may worsen the spasms.

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INTRODUCTION

We report the case of a man suffering multiple sudden cardiac arrests due to a coronary spasm to enlighten an under-diagnosed lethal pathology. Data for this case study was obtained from our EMS system, basic life support and mobile intensive care unit teams' records and from in-hospital patient records, after patient consent was obtained.

CASE REPORT

Our patient was a 66 years old man suffering from high blood pressure, dyslipidemia, who stopped smoking in 2001 and with a family history of unspecified heart conditions. In 2001 and 2007 he had an ST elevation myocardial infarction. Since 2003, he presented with recurrent fainting which was never investigated. His usual treatment was verapamil, clopidogrel, aspirin, atorvastatin, molsidomine, lisinopril/hydrochlorothiazide.

In 2010, at 8:00 AM, the family of the patient called the dispatch center saying he had fainted at home. When the first aid team (three emergency medical technicians) arrived, the patient was gasping. Active compression decompression cardiopulmonary resuscitation (ACD-CPR) was provided by the rescue team and the patient returned to spontaneous circulation (ROSC) before automated external defibrillator activation. A few minutes later, ACD-CPR was provided again during a second Out-of-Hospital Cardiac Arrest (OHCA) with ROSC in less than a minute, and before the arrival of the mobile medical intensive care unit.

The first medical examination found the patient without any neurological defect. He recovered normal consciousness and suffered neither chest pain nor dyspnea. He exhibited no sign of shock, except an asymmetrical blood pressure (120/80 mmHg at the right arm and 140/120 mmHg at the left one). His cardiopulmonary examination was normal with a heart rate at 80 bpm. The first ECG showed an atrial fibrillation without any heart block or repolarization abnormalities.

The asymmetrical blood pressure led to the decision to transport the patient directly to the hospital radiology department to realize a Computer Assisted Tomography (CAT) scan to rule out an aortic dissection.

During transport, the patient had a left scapulalgia and a constrictive chest pain, but hemodynamic remained stable and there was no clinical sign of heart failure. ECG showed an inferior and lateral ST depression **(Figure 1)**.

Upon arrival at the hospital, the CAT scan showed no abnormalities. During transport and CAT scan, various ECGs showed inferior ST elevation with an anterior mirror **(Figure 2)**.

A few minutes after the CAT scan was performed, the ECG was completely normal.

Then, abruptly the patient started to vomit, exhibited a bradycardia and became unconscious. At this moment, a third cardiac arrest occurred and an asystolic heart rhythm was observed. Standard cardiopulmonary resuscitation was immediately started resulting in ROSC without pharmacological intervention. The patient was conscious again with normal heart and respiratory function. A few minutes later a new extreme bradycardia/asystole occurred. The patient was intubated and given 1 mg of atropine and 2 mg of adrenaline (epinephrine) intravenously. ROSC occurred after five minutes of CPR. The patient was transported to the Intensive Care Unit (ICU) and subsequently presented a new ventricular tachycardia which required two shocks to achieve ROSC.

To maintain hemodynamic efficiency an intra-aortic balloon pump (IABP) was installed and an infusion up to 6 mg/h of adrenaline was necessary.

The coronarography did not show any acute lesion.

Initial arterial blood gas analysis showed a mixed acidosis with a pH=6.99, hypercapnia, normoxy and lactic acidosis (11.4 mmol/L). The troponin concentration was 0.11 UI/L and peaked at day one at 2.8 UI/L. Other biological parameters were normal. Mild hypothermic therapy was administered for 24 hours. Hemodynamic status improved with fast catecholamine weaning, ablation of the IABP after 24 hours. The neurological outcome was favorable with a total recovery.

Five days after the initial cardiac arrest, the patient was transferred from the ICU to the cardiac rehab unit for etiologic studies.

During a second coronarography, a Methergin® test was positive after five minutes. The patient presented chest pain with ECG modifications. The coronarography showed an occluded left

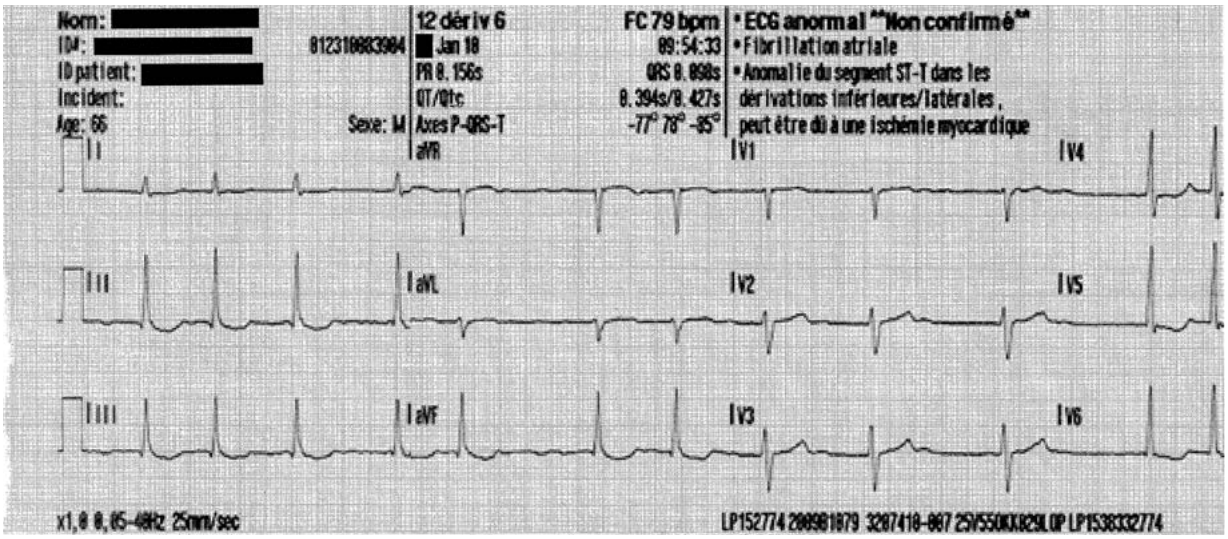

Figure 1: ECG during chest pain showing atrial fibrillation and inferior and lateral ST depression

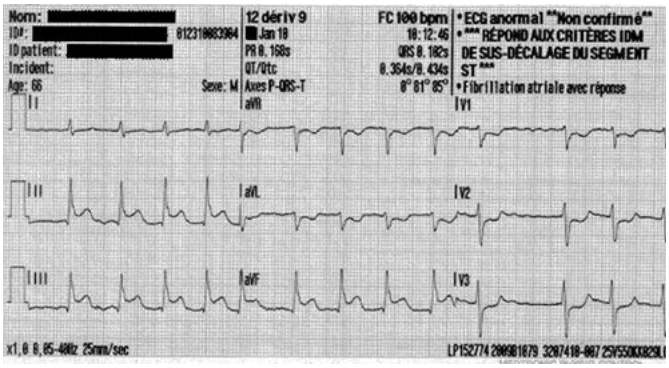

Figure 2: ECG during CT scan showing inferior ST elevation with an anterior mirror

anterior descending artery. The spasm disappeared after a single injection of 1 mg of isosorbide dinitrate. No further abnormal coronarography results were noted and no acute coronary lesions were found. Repeated Holter monitoring was carried out during his hospitalization without notable events.

A thorough medical history of our patient could have suggested this diagnosis by investigation the recurrent fainting. No acute factors of spasms were found for our patient.

DISCUSSION

Prinzmetal's angina or angina inversa are terms used to indicate a clinical and pathophysiological entity different from traditional angina. This pathology is under-diagnosed. According to a study on 300 cardiac arrests, 10 had a coronary spasm [1]. Classically, this spasm can occur on healthy coronary arteries, particularly in young patients but atheroma arteries are frequent. Except nicotinism and rupture of treatment, no other etiologic cause or acute factors causing spasms have been found.

The pathophysiology of the spasms, specifically the vasoconstriction-inducing stimuli, still remains unknown. Nicotinism, triptans, prostaglandins and cocaine may be risk factors [2]. Clinical and ECG signs are similar to classical myocardial infarction ones. They generally last between ten and twenty minutes and remain trinitro-sensitive with a complete return to normal. Sometimes electrocardiographic modifications can be recorded with repeated Holter monitoring [3]. Coronarography with a Methergin® test confirms the diagnosis but a negative test does not exclude the diagnosis. Severe coronary spasms can lead to myocardial ischemia that may be accompanied by classical complications, the most severe being conductive and ventricular rhythm disorders [4]. Asystole without preliminary rate/rhythm disorders are rarer but have been reported [5]. Treatment recommends calcium inhibitors and nitrate vasodilators.

In some cases a cardioverter-defibrillator/pacemaker can be implanted into the patient and the use of amiodarone has been discussed as a pharmacologic therapy for this condition.

The 2010 European Resuscitation Council guidelines for resuscitation do not specify a treatment protocol for cardiac arrest stemming from coronary spasms [6]. However, the use of adrenaline should be discussed due to its primary alpha effects during cardiac arrest which risk worsening the spasms. Recently sodium nitroprusside, a powerful vasodilator was proposed as an alternative for all types of cardiac arrest in an animal model of cardiac arrest enlightening the risk of spams secondary to adrenaline injection [7].

CONCLUSION

Repeated occurrence of cardiac arrest accompanied by chest pain should suggest Prinzmetal's angina. Sudden cardiac arrest associated with such diseases should be treated like any other cardiac arrest. The prognosis is favorable if early treatment is employed.

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