

Introduction

In the period immediately after cardiac arrest, there is a gradual arrest of spontaneous breathing activity within seconds to minutes followed by a period of agonal or terminal breathing or gasping in some patients. Gasping is associated with probability of a shockable cardiac rhythm during cardiac arrest and might result in better neurological one-year survival, higher rates of sustained ROSC and long-term survival compared to patients without any breathing activity [1–3]. Gasping is supposed to be easily recognisable sign of cardiac arrest by typical breathing pattern with very short inspiration and long expiration pause and dispatchers are trained to recognize cardiac arrest in spite of gasping. However, as stated in the ERC Guidelines 2021, gasping may be in fact often misinterpreted as normal breathing, i.e. a sign of life, which poses a problem for both lay people and healthcare professionals. Gasping, especially if it has a high frequency and relatively high tidal volumes, may remain a barrier to recognise out-of-hospital cardiac arrest (OHCA). We describe such an untypical cause of respiration after cardiac arrest, which was further confirmed by ECG as ventricular fibrillation.

Case Report

After emergency call from a layman, an Emergency Medical System (EMS) dispatcher evaluated situation as a cardiac arrest with gasping and telephone-assisted cardiopulmonary resuscitation (TA-CPR) was initiated. The patient's son, a 30-year-old man, performed chest compressions without artificial ventilation. EMS team with the physician arrived 6 minutes after the emergency call. The patient, a 56-year-old male, had on arrival of EMS team diagnosed cardiac arrest (OHCA) and the primary ECG revealed VF. The patient was gasping, having deep breaths with significantly longer post-expiratory pauses at a high rate of 24/min. The EMS team took over chest compressions, and immediately after the cardiac rhythm was evaluated, a defibrillation shock (200 J) was delivered, resulting in ROSC (Figures 1 and 2). The patient continued with abnormal breathing pattern on a Venti face- mask with oxygen supply 8 l/min and SpO₂ 100%. A peripheral venous catheter was inserted in his right forearm, and amiodarone 300 mg was administered. The patient had non-specific response to pain stimulation (Glasgow Coma Score 7) and within the next 2 minutes after ROSC, ventricular fibrillation returned. Second defibrillation shock (200 J) was performed, but did not result in ROSC (Fig. 3). After next 2 minutes, with continuing chest compressions and gasping with the same pattern as in the beginning, a third defibrillation shock (200 J) was delivered, leading to definitive ROSC (Fig. 4). Another dose of amiodarone 150 mg in a continuous infusion was administered. The total time interval from OHCA to ROSC was 12 minutes. After successful ROSC, the patient had the following circulatory parameters: blood pressure 102/83 mmHg, pulse 124/min, SpO₂ remained 100% with spontaneous ventilation using a Venti-mask with oxygen flow 8 l/min. The patient had still breathing pattern inspiration to expiration 1 : 3 and gasping-like face and chest movement, but gained consciousness and started to complain on dyspnoea and chest pain. During resuscitation we repeatedly solved the dilemma whether to transfer the patient to artificial pulmonary ventilation or to keep him on gasping. We did not find factors leading

to a clear-cut solution, and the advantages and disadvantages of each solution are given in the discussion below. In the end, the opinion not to start artificial pulmonary ventilation prevailed, although it was not an easy decision. He was administered fentanyl 0.1 mg i. v. in two increments and a normal breathing pattern returned gradually in approximately 5 min. Before transfer to a hospital, a 12-lead ECG was recorded (Figure 5) and acute anterior myocardial infarction (AMI) was diagnosed. The patient was referred to a coronary ICU for coronary intervention (PCI). Laboratory tests on admission confirmed adequate oxygenation (arterial pO₂ 19.07 kPa), alkalemia (pH 7.564) with hypocapnia (pCO₂ 2.49 kPa) and lactate 5.7 mmol/l. Subsequent selective coronary angiography revealed no significant lesion of the coronary arteries. The patient had after previous aortic valve replacement, currently with significant regurgitation. His left ventricular ejection fraction (LVEF) was 55%. The patient was implanted a cardioverter (BiV ICD) and was discharged after 4 days of hospitalization without any neurological deficit. In spite of verbal contact during transport, he had complete amnesia for the entire duration of all procedures including the first 2 hours of hospitalization.

Fig. 1. Initial ECG rhythm



Fig. 2. ECG rhythm after the first defibrillation shock



Fig. 3. ECG rhythm after the second defibrillation shock

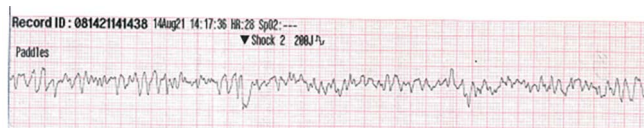
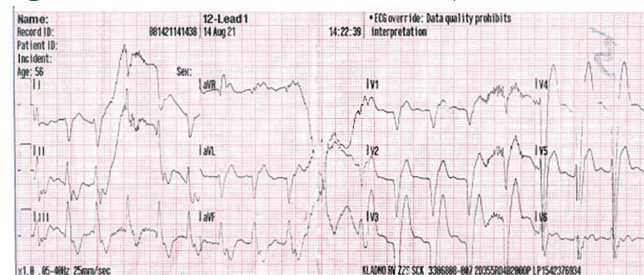


Fig. 4. ECG rhythm after the a third defibrillation shock



Fig. 5. 12-lead ECG before the transfer to the hospital



Discussion

We present a very abnormal agonal breathing during cardiac arrest and post-resuscitation period. This case opens questions when to start