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IS THE INTRA-AORTIC BALLOON PUMP A METHOD OF BRAIN PROTECTION DURING CARDIOGENIC SHOCK AFTER DRUG INTOXICATION?

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□ **Abstract—Cardiovascular medications are ubiquitous and are frequently implicated in accidental or intentional overdose. It is common that combined use of these drugs may lead to hypotension and even shock, followed by metabolic derangements. We report a case in which an intra-aortic balloon pump (IABP) was used in the management of self-poisoning with verapamil, amlodipine, metoprolol, and ibuprofen. In presenting this case of combined massive drug ingestion, we outline early strategy in the Emergency Department and some alternative treatment options. Beyond pharmacological and conservative procedures, we implemented an invasive approach that included temporary pacing, mechanical ventilation, and intra-aortic balloon counterpulsation (IABP). Such intense treatment was necessary due to the critical state of the patient. In our opinion, the use of the IABP contributed to the final recovery of our adolescent patient. Combined mechanical and pharmacological treatment may protect from multi-organ insufficiency, including permanent central nervous system injury. It is hoped that reporting our experience will raise awareness of alternative treatment options for ingestions of cardiovascular medications.** © 2010 Elsevier Inc.

□ **Keywords—Shock; IABP; overdose**

INTRODUCTION

Calcium channel antagonists and beta blockers are commonly used to treat angina, hypertension, and cardiac dysrhythmias (1). The incidence of accidental or intentional overdose has increased in recent years and seems to be associated with more frequent use of these drugs (2). According to the American Association of Poison Centers, these drugs account for 40% of cardiovascular drug exposures and represent 65% of deaths from cardiovascular medications (3). The combined use of those two medication groups can lead to refractory shock due to synergism occurring between them (4–7).

Another group of frequently prescribed and overdosed drugs is non-steroidal anti-inflammatory drugs. The overuse has been increasing due to their common availability. We report a case in which an intra-aortic balloon pump (IABP) was used in the management of self-poisoning with 2400 mg of verapamil, 290 mg of amlodipine, 500 mg of metoprolol, and 4400 mg of ibuprofen.

CASE REPORT

The city's Regional Emergency Centre Kielce, received a call for immediate transport of a 17-year-old girl. She admitted to having swallowed, in a suicide attempt, a large amount of cardiovascular drugs prescribed to one of her family members. The ingestion took place several hours before arrival of the rescue team. On arrival, the patient was conscious and complained of nausea and dizziness. The accompanying members of the family claimed they had found empty blisters of amlodipine,

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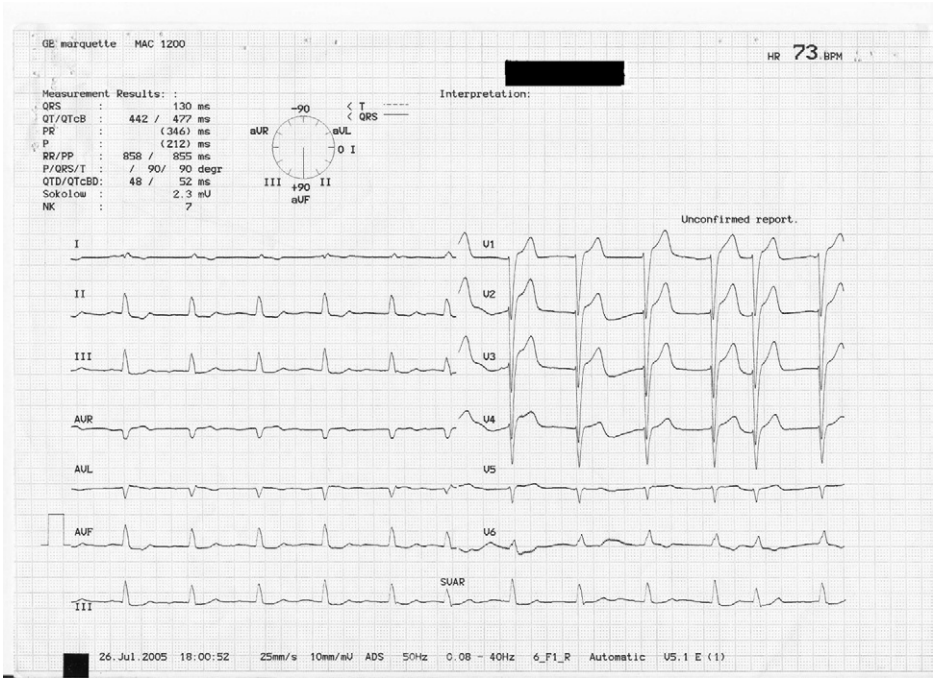

Figure 1. ECG on admission to our center.

metoprolol, and verapamil. The emergency team reported the patient to be in severe but stable, not critical, condition. The blood pressure was 110/60 mm Hg and heart rate was 60 beats/min; the patient was conscious and well oriented, the pupils were reactive, and the skin was sweaty and pale.

Saline infusion was immediately administered during transport to the Emergency Department (ED) of the Regional Children's Hospital. Several minutes after arrival at the ED, the patient's state deteriorated dramatically—the level of consciousness decreased, and signs of hypotonia were visible; the blood pressure dropped to 80/50 mm Hg and heart rate to 60 beats/min. Gastric lavage was performed but no pills returned. The ED Chief's decision was to admit the patient directly to the Pediatric Intensive Care Unit (PICU).

The patient's state continued to deteriorate. The blood pressure dropped to 60/0 mm Hg with bradycardia (50 beats/min). The patient's level of consciousness decreased, and verbal contact was weak.

On admission to the PICU, she was in advancing shock—comatose with periodic apnea. Signs of blood centralization were present, and she had cold and sweaty skin, pinpoint pupils, and slow light reflex. However, the pain reaction was normal, and no pathological reflexes were present. Breathing was spontaneous, although not sufficient, and the patient was orally intubated. On physical examination, hepatojugular reflex was present. Intravenous saline and calcium gluconate were administered. She developed ventricular fibrillation and was defibrillated, with post-procedure bradycardia. After 30 min of resuscitation and intravenous infusion of epinephrine (1 μg/kg/min), noradrenaline (1 μg/kg/min), and dobutamine (10 μg/kg/min), the mean blood pressure remained at 50 mm Hg. Despite intensive resuscitation, the patient's state was not stable; persistent bradycardia and hypotension led to hypoperfusion, and to anuria and undetectable vital signs.

Due to refractory shock, a long elapsed time period from onset of symptoms, the possibility of slow-release-type drug ingestion, and important logistic limitations of the PICU, the decision was made to start temporary intravenous pacing and use of intra-aortic balloon counterpulsation (IABP). Because the PICU was not adapted to treat cardiogenic shock in an invasive procedure, the patient was transported directly to the Catheterization Laboratory of our Cardiology Center.

On arrival in the Catheterization Laboratory, the patient was still in a coma and orally intubated, with a Glasgow Coma Scale score of 5. Blood pressure was 60/40 mm Hg. Bradycardia was still present. Electrocardiographic (ECG) monitoring revealed nodal rhythm with a heart rate of 60–70 beats/min (Figure 1).

The procedure of IABP and right ventricular pacing was performed without complications. The IABP action was synchronized with the peaks of the temporary pacemaker. Adjunctive therapy with dopamine in increasing dosages of 4, 6, 10, and 15 μg/kg/min, dobutamine 10