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Suicide attempt of young woman by Propafenone overdose - case report

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Summary:

Introduction and purpose: Over the last few years, the number of suicide attempts in Polish women has been steadily increasing. This report presents a case of a 18 years old woman hospitalized in the Toxicology and Cardiology Department due to poisoning with antiarrhythmic drug – Propafenone, taken for suicide purpose.

Brief description of the state of knowledge: Propafenone is an antiarrhythmic drug which belongs to class IC according to the Vaughan-Williams classification. The overdose of this drug can cause various symptoms and complications such as cardiac arrhythmias, liver damage, cardiac arrest and even death. This drug has no specific antidote.

Conclusions: Propafenone poisoning is a significant clinical challenge and the consequences are often unpredictable and life-threatening. Treatment options such as natrium bicarbonicum,

insulin, intravenous lipid emulsion, calcium gluconate seem to be good choices and the effects of treatment with these drugs are promising for the future.

Key words: Propafenone, Propafenone poisoning, cardiac arrhythmia

1. Introduction

Over the last few years, the number of suicide attempts in Polish women has been steadily increasing. Poisoning with drugs is the second most common after hanging method of suicide among Polish women, in 2019 accounted for 7.9% of all cases [1]. This report presents a case of a 18 years old woman hospitalized in the Toxicology and Cardiology Department due to poisoning with antiarrhythmic drug – Propafenone, taken for suicide purpose.

2. Case report

An 18-year-old female, transported by ambulance, was admitted to the Toxicology and Cardiology Department due to suicidal Propafenone poisoning. The medical history showed that the patient had taken about 30 tablets of the antiarrhythmic drug (Polfenone 150mg) 1,5 hours before arriving at the hospital. The drug belonged to the patient's grandmother.

On admission, the patient was conscious, with efficient cardiopulmonary function in verbal contact. She confirmed the use of the drug. A 12-lead ECG (electrocardiogram) was performed which showed: I-grade atrioventricular block, RBBB, ventricular conduction disturbances, and regular HR 70/min. Blood pressure 80/40 mmHg. The mother provided information that the patient have been attended meetings with a psychologist for some time due to the family situation. She has no chronic disease and not taking medications.

Table 1: Blood morphology test

RBC [4-5.20] [mln/µ]	4.1
HGB [12-16] [g/dl]	11.7 L
HCT [37-49] [%]	36.1 L
Leu [4.3-10] [10^3/µl]	7.1
MCH [27-34] [pg]	28.6
MCHC [32-36] [g/dl]	32.4
MCV [80-99] [fl]	88
MPV [7-11] [fl]	7.7
PLT [150-400] [10^3/µl]	236
RDW-CV [11.50-14.50] [%]	14.8 H

Table 2: Coagulation tests

PT [9.40-12.50] [sec]	14 H
INR [0.80-1.15]	1.24 H
APTT [25-36] [sec]	32
D-dimers [0-0.50]	0.19

Table 3: Biochemistry and immunodiagnostics tests

Creatinine [0.50-0.90] [mg/dl]	0.94 H
Urea [15-46] [mg/dl]	25.16
AST [5-32] [U/l]	25
ALT [5-31] [U/l]	11
Glucose [70-110] [mg/dl]	123.8
Na^+ [135-145] [mmol/l]	141
K^+ [3.50-5.10] [mmol/l]	4.5
Cl^- [98-107] [mmol/l]	107
Mg^{2+} [mmol/l]	0.7
eGFR [ml/min/1.73m^2]	>60
Lactic acid [0.50-2.20] [mmol/l]	1.4
CRP [0-5] [mg/l]	0.35
CK [26-192] [U/l]	49
Troponin hs [0-14] [ng/l]	<3.00
NT pro-BNP[0-125] [pg/ml]	64.61

From the moment of admission, the patient was in a very severe condition, unconscious, and without response to pain stimulation. Due to cardiac drug intoxication, it was decided to intubate the patient, and gastric lavage was performed without obtaining residues of the drug. A central line was inserted into the right external jugular vein. The patient was unresponsive during the medical procedures. Due to persistent hypotonia, it was decided to give the patient catecholamines. Occurring cardiac arrhythmias necessitated the placement of an endocavitary electrode. Effective cardiac pacing was not achieved. During electrode insertion, an episode of sudden cardiac arrest has occurred - pulseless electrical activity (PEA) lasting 1 minute. Approximately 4 hours after ingestion of the cardiological drug, sudden cardiac arrest occurred again (PEA). Immediate cardiopulmonary resuscitation was taken but was ineffective. After 80 minutes of resuscitation, further measures were discontinued and death was recognized.

Pharmacotherapy included: dobutamine, norepinephrine, epinephrine, natrium bicarbonicum, 0,9% NaCl, 5% glucose, multi-electrolyte fluid, hydrocortisonum and magnesium sulfate.

3. Discussion

Propafenone is an antiarrhythmic drug which belongs to class IC according to the Vaughan-Williams classification [2]. It exhibits a local anaesthetic effect (approximately equal to procaine) and has a stabilising effect on cell membranes, inhibits sodium channels causing reduction of excitation [3]. It is used for the treatment of supraventricular arrhythmias, especially in patients with symptomatic atrial fibrillation without organic heart disease and in Wolff-Parkinson-White syndrome. Rarely used in ventricular arrhythmias [4]. It was observed that a single oral dose of 600 mg Propafenone also acts as a class II antiarrhythmic drug by causing beta-receptor blockade, which may limit the avoidance of this drug in people with organic heart disease, but be aware of the potential to cause atrial flutter with rapid AV conduction and torsade de pointes [5]. Unfortunately this drug has no specific antidote.

Our 18 year old female patient made a suicide attempt by taking about 30 tablets of Polfenone a 150 mg (the total dose was therefore approximately a 4500 mg). In the hospital emergency department, the patient was still conscious, in verbal contact and slightly asleep, but after admission to the toxicology department her condition was deteriorated significantly. A 12-lead ECG was performed which showed: I-grade atrioventricular block, RBBB, ventricular conduction disturbances. Laboratory tests did not reveal any significant deviations from the norm. The patient was intubated, gastric lavage was performed, a central line was inserted and a continuous infusion of pressor amines was given due to persistent hypotonia. An endocavitary electrode was inserted due to rhythm and conduction disturbances. In the haemodynamics laboratory, the first Sudden Cardiac Arrest (SCA) occurred - one minute of CPR was effective. Other drugs such as natrium bicarbonicum, 0.9% NaCl, 5% glucose, multi-electrolyte fluid, hydrocortisone and MgSO4 were also used. The second SCA by PEA mechanism occurred four hours after the suicide attempt. Unfortunately, after 80 minutes of unsuccessful resuscitation death was recognized.

Reviewing the cases of Propafenone poisoning available in the literature, various treatments have been described to keep patients alive. Basak Bayram [6] et al. in a 15 year old female patient, after taking 6000 mg of propafenone, used intravenous insulin at a dose of 1U/kg and 500cc of 10 % dextrose during resuscitation. After 15 minutes heart rate, blood pressure and rhythm were observed. The use of high doses of insulin and glucose may reduce

mortality but experimental and clinical studies should be conducted to evaluate the effectiveness of this treatment method in cases of Propafenone overdose [6]. Treatment with insulin and NaHCO3 in a study of these substances in rats increased survival, but insulin was more effective, so treatment with glucose and insulin infusion should be considered for the treatment of acute Propafenone cardiotoxicity that does not respond to current therapies [7]. The case described by Xiaoyu Chen [8] et al. suggests that in Propafenone intoxication (this patient taking a 5000 mg), blood calcium concentrations should be checked frequently and a decrease of calcium should be picked up as soon as possible. They used calcium gluconate during resuscitation, which combined with plasmapheresis and other medical interventions led to a return of circulation. In other cases of Propafenone poisoning, intravenous fat emulsion (IFE) was used based on the lipophilicity of Propafenone. IFE resulted in a reduction in cardiotoxicity and the need for pressor amines, so it may be a good choice in cases not responding to standard treatment [9], [10], [11].

Propafenone overdose can cause various abnormalities in the 12-lead ECG. In our patient these were: I-grade atrioventricular block, RBBB, ventricular conduction disturbances. Mehmet Emre Ali and Filiz Ekici [12] reported a case of a 15 year old girl who demonstrated an electrocardiogram pattern similar to Brugada phenocopy after taking 1500 mg of Propafenone for suicidal purposes. On the ECG, they observed a long QRS interval and ST-segment elevation in the V1 to V3 leads, these retreated 4 hours after starting a treatment. A negative family history and a negative ajmaline provocation test (2 weeks later) showed that Brugada phenocopy was transient and caused by Propafenone intoxication [12].

Propafenone poisoning can lead to liver damage. In our patient, laboratory tests performed shortly after admission to the toxicology department did not show an elevation of liver parameters. In a 36-year-old previously healthy patient [13], who took 4900 mg of Propafenone, lab tests performed after prolonged resuscitation showed liver abnormalities: AST [225 U/l], ALT [153 U/l], LDH [1711 U/l]. In case of treatment with intravenous lipid emulsion [11], in that 21-year-old woman, liver parameters peaked 8 hours after taking the drug, and a next test after 24 hours showed a decrease in the values of liver parameters.

According to the ESC 2020 guidelines Propafenone can be used at a 'pocket pill' in patients with paroxysmal atrial fibrillation in a dose of 450-600 mg, when the safety and effectiveness of this drug has been confirmed during hospital treatment [14]. Markman TM, Jarrah AA, Tian Y [15] et al. in a cohort study of 273 patients using IC class antiarrhythmics drugs (45% used Propafenone) in the form of 'pocket pill' reported rare (in 7 patients)

complications such as symptomatic bradycardia/hypertension, 1:1 atrial flutter and unexplained syncope. These symptoms were observed in 3 patients using 600 mg Propafenone. The study authors suggest the necessity for prospective studies to evaluate lower doses of IC class antiarrhythmic drugs (as 'pocket pills') and their safety of administration in an unmonitored setting [15]. Hyun Kuk Kim [16] et. al described the case of Propafenone overdose in a 54-year-old man with paroxysmal atrial fibrillation who had taken 600 mg Propafenone three times within 12 hours in the form of pill in the pocket. He experienced palpitations after drinking alcohol and took two pills. In the morning of the next day, he took another dose. The total dose of the drug was 2450 mg (three times 600 mg and twice 325 mg sustained release tablets). A 12-lead ECG, performed in this patient on admission to hospital, showed wide complex tachycardia with RBBB morphology [16]. This case demonstrates the risk of Propafenone poisoning in patients taking a pill in the pocket to terminate an AF episode, especially after alcohol consumption.

Attempts to treat this described case of suicide attempt by taking a high dose of Propafenone can be called 'nothing to lose' due to the unavailability of a specific antidote. The above-mentioned treatment methods can be used and new solutions should be found in an overdose of this drug. The cases cited suggest that overdoses of this antiarrhythmic drug are more common in women.

4. Conclusions

The consequences of Propafenone poisoning are difficult to predict. Patients rapidly develop cardiac arrest due to high concentrations of this drug. The cardiopulmonary resuscitation is often prolonged and requires various interventions, which do not always result in recovery, as in the case of our patient who died. Treatment options such as natrium bicarbonicum, insulin, intravenous lipid emulsion, calcium gluconate seem to be good choices and the effects of treatment with these drugs are promising for the future.

Author Contributions

Conceptualization, M.W and M.Z.; methodology, D.G.; validation, M.Z; investigation, M.W., D.G. and M.Z.; resources, D.G. data curation, M.W.; writing—original draft preparation, M.Z.; writing—review and editing, M.W. and M.Z.; visualization, D.G.; supervision, D.G.; funding acquisition, not applicable.

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Data Availability Statement

Data and material will be available upon completion of this study on request.

Conflicts of Interest

The authors declare no conflict of interest.

Supplementary materials

Table 1: Blood morphology test

Table 2: Coagulation tests

Table 3: Biochemistry and immunodiagnostics tests

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