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Murder-Suicide by Tanax® - Pathology, Toxicology and Veterinary Analysis of a Forensic Case

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Abstract

Poisoning by Tanax® is uncommon as a suicide method, and it is even more unusual for murder-suicides. Tanax® is a veterinary drug used for euthanasia in animals and, as such, poisoning by Tanax® is almost completely limited to veterinary workers. Its active components are embutramide, mebezonium iodide and tetracaine hydrochloride. It acts as a general and local anesthetic, and paralyzes skeletal muscles by a curariform-like action. A literature review is provided with focus on embutramide and mebezonium concentrations detected in body fluids and solid organs of patients and victims. A unique case of murder-suicide by Tanax® poisoning is then detailed, leading to the medico-legal diagnosis of a complex suicide method following the murder. This case highlights the heterogeneity of information about lethal concentrations of embutramide and mebezonium in human body fluids and solid organs, the possible emergence of embutramide as a drug of abuse, and the delayed hepatotoxicity induced by dimethylformamide (DMF), contained in Tanax® as an organic solvent.

Keywords: Tanax®; Suicide; Abuse; Toxicology; Veterinary

Introduction

Tanax® is a drug used in veterinary medicine for euthanasia in animals. It is a solution of three components dissolved in a mixture of the organic solvent dimethylformamide (DMF) and water. The components of Tanax® are embutramide, mebezonium iodide and tetracaine hydrochloride. Embutramide, which is exclusively used in Tanax® [1] is a general anesthetic with a strong narcotic action: it causes deep anesthesia by paralyzing the breathing centers in the central nervous system. Mebezonium iodide has a curariform-like action, paralyzing the skeletal muscles with fast respiratory collapse. Tetracaine hydrochloride is a local anesthetic, used to avoid pain at the injection site [2].

Poisoning by Tanax® is a rare mode of suicide [3]. Murder-suicide is even less common, with only one case reported to date [4]. In addition to the effects of the three components, hepatotoxicity has been observed both in non-fatal and fatal human poisoning, and has been attributed to DMF [5,6]. The nature and use of the drugs almost completely confine self-poisoning by Tanax® to veterinary workers, who are at high risk of dying by suicide [7,8]. Literature case studies depict administration routes as oral ingestion, subcutaneous, intravenous and intracardiac injection [2] as well as analytical methods for embutramide and mebezonium detection

[9]. To date, lethal concentrations in blood, urine, liver and kidney have been reported and are summarized in (Table 1) [1,3,10,11].

Table 1: Embutramide, tetracaine hydrochloride and mebezonium iodide concentrations in body fluids and solid organs reported in literature in lethal cases.

	Embutramide	Tetracaine	Mebezonium
Femoral blood	4.10 - 43.00 mg/L	0.21 mg/L	6,50 - 13.80 mg/L
Urine	9.30 mg/L	14.00 mg/L	20.00 mg/L
Liver	1.21 - 3.80 mg/Kg		24.80 - 45.80 mg/Kg
Kidney	20.40 mg/Kg	0.35 mg/Kg	18.60 mg/Kg

Here we report a unique case of murder-suicide by poisoning with Tanax®, where a veterinarian murdered his dog and himself using 50ml of Tanax®. According to published data, the concentrations of embutramide and mebezonium in the veterinarian's blood and urine were not lethal, and he would have survived if he had been promptly assisted and admitted into intensive hospital care.

Case History

In January 2012 the bodies of a man and his dog were found dead in a wood near Parma, in north-eastern Italy (Emilia-Romagna



region). A passer-by spotted the human body from a distance, when he approached, he was surprised to discover a dog body lying next to it. The wood, a regional park of roughly 2,000 ha, has footpaths

and is a popular destination for joggers, walkers and cyclists during the warmer months (Figure 1). The police, the forensic team and the recovery team easily reached the bodies on foot.



Figure 1: Site of bodies recovery, a woody area in a regional park near Parma, Italy.

The bodies appeared close to one another and were scarcely strewn with leaf litter; the man was fully clothed, no insect colonization was observed on either body. No trauma to the bodies was evident at the scene, except a syringe with a clear liquid and a butterfly needle inserted within a vein in the man's left ankle. The deceased man was promptly identified as a veterinary clinician, and the dog was positively identified as his. Three days before the bodies recovery, the veterinarian's family had reported his disappearance to the local police. The prosecutors' office decided that a criminal investigation would be conducted to determine the manner and time of death of both man and dog.

The purpose of the investigation was to ensure that the man's cause of death was suicide, which was suspected based on the family reports about mental illness, depression and personality disorder, for which he was in the care of a psychiatrist.

Materials and Methods

At the death scene no traumatic findings were observed on either body (dog or man), except for a syringe with a butterfly needle inserted into a vein in the man's left ankle, where the jeans trousers and the socks had been moved to expose the skin. The 60 mL syringe contained 23 mL of a clear transparent liquid. Next to the bodies some objects were recovered: a bottle of sparkling wine (70 cl, 12% alcohol) with a quarter remaining; a dog leash; a small backpack containing an empty bottle of Tanax® 50 mL; its paper

box; and a 6 mL syringe containing six whole tablets and one half tablet of an unknown medication.

As agreed with the prosecutor, the forensic investigations started with the human body, and would later be extended to the dog body, if necessary. The external examination revealed a male, 30-35 years-old, of robust build (height 187 cm, weight 100 kg), with a needle puncture in the left ankle.

The autopsy showed cerebral oedema (1540g) and pulmonary bilateral oedema (1000g and 1050g), subpleural bilateral petechial hemorrhages, abundant mucus and foam in the bronchi lumen, light hypertrophy of the left ventricle (heart weight 440g), light hepatic steatosis, confirmed by histology, and surgical procedure of gastric binding, secured to the left rectus abdominis muscle. Toxicology analyses were performed on the human body biological samples by the Toxicology Section of the University of Milan, Italy, following a validated technique [12].

Results

The deceased was a 35 years-old Caucasian male, tall and muscular, allegedly suffering from depression and personality disorder, but overall in good health. At the death scene, suicide by self-poisoning with Tanax® was immediately suspected, both because of the objects found on site, and because of the known accessibility of the drug by veterinary workers. External examination confirmed an intravenous injection in the left ankle,

while the autopsy showed signs of asphyxia, which is the ultimate lethal mechanism of Tanax®. The results of toxicological analyses on the human body are shown in Table 2.

Table 2: Embutramide, tetracaine hydrochloride, mebezonium iodide and alcohol concentrations in body fluids and solid organs of the human body in the present case study.

	Embutramide	Tetracaine	Mebezonium	Alcohol
Femoral blood	2,57 µg/ml	< 0,005 µg/ml	1,25 µg/ml	0,14 g/L
Urine	1,71 µg/ml		4,66 µg/ml	
Liver	11,70 µg/g		6,22 µg/g	
Kidney	10,50 µg/g		12,24 µg/g	

Discussion

Recovery from Tanax® poisoning is reported in literature by means of prompt medical assistance and admission to intensive hospital care. Literature also reports of non-fatal poisoning cases indicated urine concentrations of embutramide between 1.45 and 2.83 µg/mL, or oral ingestion of Tanax® 0.75 ml/kg body weight [5,13,14]. In the only other reported case of (attempted) murder-suicide by injection of 50 ml of Tanax®, divided among a mother and her 2 children, aged 6 and 7 years, one child died while the sibling and the mother survived [4].

In the present case, the veterinarian wanted to ensure the death of his dog before committing suicide, and he had to split the 50 ml of Tanax® between them. A total of 23 ml of Tanax® was found remaining within the syringe, thus the veterinarian employed a total of 27 ml. Of these, about 7-12 ml were employed to kill the dog, he then proceeded to a self-intravenous injection with the other 15-20 ml. The known lethal dose of Tanax® in dogs is 0,3 ml/kg, an estimation of the dog's weight was 20-25 kg. The 15-20 ml self-injected by the veterinarian would not have been sufficient to cause death, because his weight was approximately 100 Kg, thus he would have needed at least 30 ml, or most likely the whole 50 ml bottle.

In a reconstruction of the event, the temperature proved to be the clarifying factor: in the coldest month of the year at that location (44°42'56.88"N, 10°12'50.4"E) in a continental climate, the temperature ranged between -5° C and 1° C. It is therefore likely that, after drinking a moderate amount of alcohol (500 ml of white wine containing 12% alcohol, leading to a postmortem alcohol detection of 0.14 g/L) and self-injecting 15-20 ml of Tanax® intravenously, the veterinarian lost consciousness. He had chosen an isolated outdoor location in mid-winter, where he probably survived unconscious before entering a coma state, from which he had made sure not to be rescued. By reason of this, the cause of death was not ruled as a simple suicide by self-poisoning, but as a complex suicide by the synergistic depressing actions of the breathing function in the central nervous system, performed by alcohol, Tanax® and a prolonged exposure to cold temperatures.

Conclusion

The present case study was filed as a complex suicide by a synergistic action of self-poisoning by Tanax® and a prolonged

exposure to cold temperatures. The complexity of the suicide method was attributed to the perceived necessity of the veterinarian to share the available Tanax® with his dog. The scarcity of taphonomic findings, considering the bodies preservation at low temperatures, defined the time of death as recent, and consistent with the deceased's family report of disappearance to the local police, three days before the recovery of the bodies.

Key Points

- I. Suicide by self-poisoning with Tanax® is a rare occurrence, and to date information about lethal concentrations in human body fluids and solid organs is heterogeneous.
- II. Suicide by self-poisoning with Tanax® is confirmed to mostly concern veterinary workers.
- III. Embutramide, an active component of Tanax®, might be emerging as a new drug of abuse.
- IV. Survivors of poisoning by Tanax® experience a delayed hepatotoxicity induced by DMF, contained in Tanax® as an organic solvent.

Acknowledgement

None.

Conflict of Interest

The authors declare that they have no conflict of interest.

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