

A Suicide with Neuromuscular Blocker

M. Varga and G. Somogyi

Institute of Forensic Medicine, Debrecen Medical University, P.O.Box 25, H-4012 Debrecen, Hungary

Summary. We experienced an autopsy case in which a 29-year-old woman committed suicide by parenteral application of a neuromuscular blocker combined with thiobarbitale. These medicines were easily accessible to the victim who was an anesthesiologist in a hospital. Paralyzing the respiratory muscles the usual dose of neuromuscular blockers can cause death unless a breathing apparatus is used. Unusual medicines given in small doses are difficult to detect in the autopsy materials. In our case in the course of forensic investigation we successfully indentified the traces of a neuromuscular blocker by mass spectrometry.

Key words: Suicide, neuromuscular blocker – Pipecuronium bromide intoxication – Intoxication, pipecuronium bromide

Zusammenfassung. Wir haben die Leiche einer 29jährigen Frau seziert, die sich durch i.v. Injektion von Thiobarbital und einen neuromuskulären Blocker umgebracht hatte. Da sie in einem Krankenhaus als Anästhesistin arbeitete, konnte sie leicht zu diesem Mittel kommen. Infolge der Lähmung der Atemmuskulatur führt das neuromuskulär wirksame Mittel schon in gewöhnlicher Dosis zum Tod, wenn die Atmung nicht durch eine Maschine gewährleistet wird. Es ist schwierig, das in kleinen Dosen konsumierte Arzneimittel nachzuweisen. In unserem Falle ist es gelungen, während einer gerichtsmedizinischen Untersuchung aus der Leiche die Spuren eines neuromuskulären Blockers mit der massenspektrometrischen Analyse zu identifizieren.

Schlüsselwörter: Selbstmord mit neuromuskulärem Blocker – Pipecuroniumbromid, Vergiftung – Vergiftung, Pipecuroniumbromid

Introduction

Some drugs are administered only in hospital. These drugs are not commonly known and accessible but the medical staff can use them wrongly. Sometimes

they are taken for the purpose of suicide. Without established methods it can be difficult to detect these drugs from autopsy materials. Recently, mass spectrometry has been proposed to be useful for detecting toxic substances in forensic pathology and toxicology [2, 4–7]. The present paper demonstrates the usefulness of this technique in actual forensic investigation of a fatal intoxication with a neuromuscular blocker.

Case Report

A 29-year-old anesthesiologist committed suicide in her flat by parenteral application of a neuromuscular blocker combined with thiobarbitale. According to some of her colleagues she had been depressed before her suicide. She injected to a vein of her left hand one ampule of neuromuscular blocker pipecuronium bromide (Arduan) and one ampule of thiobarbital (Inactin). She was found dead, and there were broken ampules, empty syringes, and a few small bloodstains beside her. A forensic investigation was prescribed.

Autopsy findings

The autopsy was carried out on the body of a well nourished and developed woman. Investigating the body surface wounds only on the hands could be found. There were some punctuated wounds on the back of the left hand and the volar side of the left wrist above the veins running through this area. The wounds were rounded by livid discoloration. There were 4 mm incised wounds on the radial surface of both index finger. Mild edema of cerebrum was found. The left ureter under the pylon was broken in an S shape, and the pylon contained greyish-white dense urina. Besides these findings no special alterations caused by intoxication were observed with the naked eye. Samples of blood, urine, gastric content, and liquor cerebri were taken apart for toxicologic examination. The blood alcohol level was 0.75‰.

Analytic Procedure [8]

Ten milliliter of blood was set to pH 9 in 10 ml 1M phosphate puffer and extracted with chloroform by shaking vigorously. This fluid was centrifuged (3000 rpm, 5 min) to obtain a clear supernatant. This procedure was repeated once more. The chloroform extract was evaporated to dryness in vacuum. The residue was dissolved in 1 ml chloroform and subjected to gas chromatography and mass spectra analysis.

Measurement Conditions

Gas chromatography (Hewlett-Packard 5710A) separation was made on a 1.8 m × 4 mm glass column packed with 5% SE30 on Chromosorb W, HP 80/100 mesh (Reanal). Conditions were: injection block temperature 270°C, column temperature 180°C; carrier gas: nitrogen at a flow rate of 40 ml/min. The electron impact mode mass spectrometry (VG 7035) conditions were: electron energy 70 eV, ion source temperature 200°C. The mass spectrometer was equipped with a computer-controlled data analysis system.

Chemicals

The Arduan (pipecuronium bromide: 2 β , 16 β -bis(4,4-dimethyl-1-piperasinium)-3 α , 17 β diacetoxo-5 α -androstane dibromide) was purchased from Richter Gedeon Pharmaceutical Work Hungary. It was introduced in the early 80's [1, 3]. The Inactin (acethyl-buthyl-thio-barbitale-Na) was purchased from Byk Gulden Hamburg (FRG). All the chemicals used were of the highest purity commercially available.

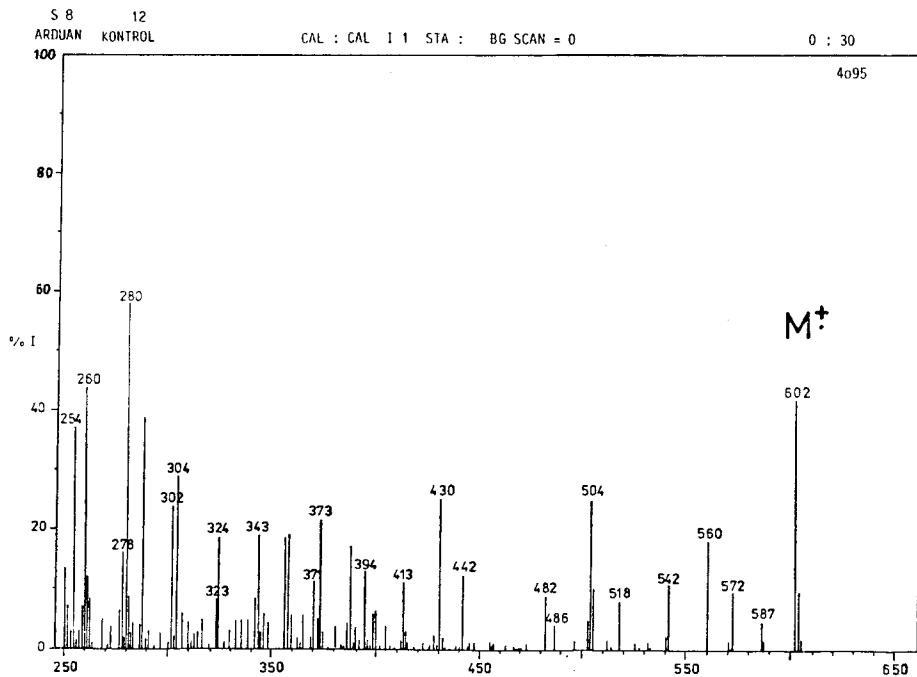


Fig. 1. Mass spectra of pipecuronium bromide

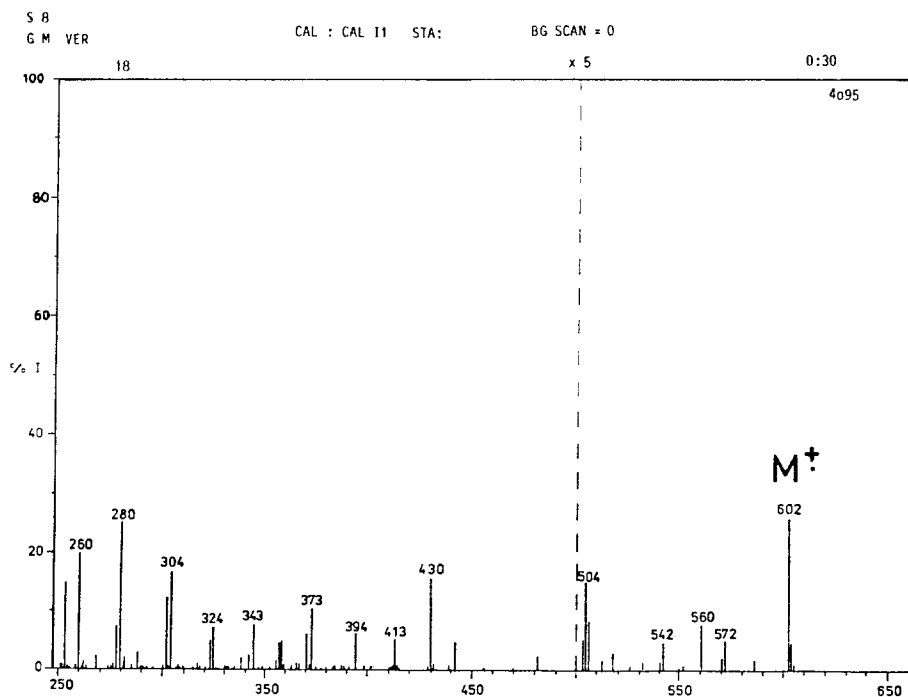


Fig. 2. Mass spectra of the extract of blood

Discussion

We experienced an autopsy case of an anesthesiologist intoxicated with a neuromuscular blocker and thiobarbital. The identification of Inactin containing thiobarbital was simple with thin layer chromatography. The neuromuscular blocker Arduan containing pipecuronium bromide could not be examined with gas chromatography because of its big molecule and difficulties in evaporation. However, measuring its mass spectra it could be identified as its characteristic peaks were not interfered with by any impurities. The background was very low. The ampules and the victims blood contained the same substances (Figs. 1, 2). There was no need to calculate their quantities because the therapeutic dose of these drugs are lethal without respiration control. In this case death was due to the lack of oxygen because of paralyzed respiratory muscles. As Inactin causes immediately sleep while the effect of Arduan manifests after about 5 min, the latter must have been injected in first. Our case indicates that there may be unusual intoxication especially in medical staff. As the neuromuscular blocker Arduan was introduced only in the early 80's in a restricted field of medicine it does not often appear in forensic practice. On the basis of our results of mass spectra determination we suggest this useful method for both screening and sensitive identification of drugs.

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