

CASE REPORT

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Autoerotic accident associated with self-applied ketamine

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Abstract We present a rare case of an autoerotic accident involving a fatal combination of asphyxia by suffocation and intoxication with self-administered intravenous ketamine. Of note in this case is the fact that the victim was an emergency medical technician. Ketamine causes complete analgesia with superficial unconsciousness and amnesia called “dissociative anaesthesia”. Furthermore low anaesthetic doses of ketamine induce alterations in mood, cognition and body image and the substance is an emerging drug of abuse. We discuss the death scene investigation, findings at autopsy and the toxicological report.

Keywords Autoerotic accident · Ketamine · Asphyxiation · Intoxication · Dissociative anaesthesia

Introduction

The forensic literature is peppered with descriptions of fatal autoerotic accidents involving the use of a wide variety of objects, often presenting bizarre situations [1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16]. In this report we define “autoerotic death” as accidental autoerotic death (AAD) [17] occurring during individual, usually solitary sexual activity in which a device, apparatus, or prop used

to enhance stimulation in some way resulted in the victim's death [18, 19, 20, 21].

The majority of autoerotic practices consist of sexual hanging [22, 23, 24] leading to asphyxiation and death after unanticipated failures of safety mechanisms [10, 25]. The minority included the use of nitrous oxide (laughing gas) [15, 25, 26, 27], electrocution [28, 29], anaesthetics [30], propane inhalation [31], nitrites [32], gasoline sniffing [33], tetrachlorethylene intoxication [34] and thoracic compression [35, 36]. This article describes an exceptional autoerotic accident involving the use of a complicated mechanical restraint and the self-administered injection of ketamine by an intravenous catheter. Ketamine is a barbiturate-free anaesthetic providing good analgesia with only moderate amnestic and hypnotic effects. Low anaesthetic doses of the drug produce a trance-like state, so-called “dissociative anaesthesia” with alterations of mood, cognition and body image, causing the patient to feel detached from his immediate surroundings without inducing drowsiness [37].

Case report and scene investigation

A 28-year-old man was found dead by his girlfriend in the apartment they shared, with several objects (lady's panties, net stockings, bra, corset, high-heeled shoes, several metal objects, rods, tight leather belts). Under the victim's hands lay a disposable syringe. Plastic tubing was connected to an intravenous catheter inserted in the right antecubital vein (Fig. 1) and a urethral catheter attached to a collection bag was inserted in the penis (Fig. 2). The victim's head was wrapped with an ace bandage, covering eye-patches and he was also wearing a “Stifneck” and his oral cavity was filled out with a rubber ball (Fig. 1). A bedside table contained the following items: syringe needles, facial tissues with reddish-brown stains, a package labelled Diazepam 10 and two full 10 mg ampules, a package labelled Paracetamol 500 and an almost empty bottle originally containing 10 ml ketamine hydrochloride (Fig. 3). Several sex magazines depicting bondage scenes and a vibrator were also found nearby.

Autopsy findings and toxicological analysis

Autopsy findings. Cerebral compression, overinflation of the lungs, foamy secretion in the oral cavity, conjunctival petechiae, liquid

This paper is dedicated to Prof. Dr. H. D. Tröger on the occasion of his 60th birthday.

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Fig. 1 Death scene showing bondage materials, female clothes, intravenous catheter, disposable syringe



Fig. 2 Death scene showing urethral catheter, intravenous catheter in the right antecubital vein

blood, cerebral oedema, hepatocellular oedema, pulmonary oedema with accompanying vascular hyperaemia, intra-alveolar and interstitial haemorrhages.

Toxicological examination. Ketamine concentration 2.5 µg/ml (femoral vein blood)

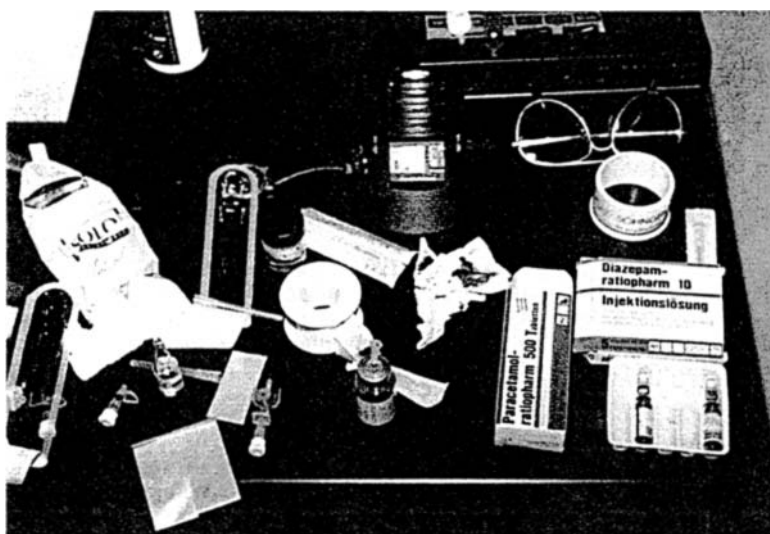
Discussion

The death described in this report fulfills three of the four criteria used by Walsh et al. [38] to define an autoerotic asphyxial death. However, in our case cerebral hypoxia was induced by a combination of an intravenous anaesthetic with narcotic effects and a gag, rather than by stran-

gulation. "Typical" autoerotic fatalities are the result of asphyxia due to mechanical compression of the neck, chest or abdomen, whereas "atypical" autoeroticism involves sexual self-stimulation by other means [39]. This report appears to be the first described case of an autoerotic death with self-administration of an intravenous anaesthetic (ketamine) via a self-placed intravenous catheter.

The term "dissociative anaesthesia" is used to describe the functional and electrophysiological dissociation between the thalamocortical and limbic systems with significant activation of the cerebral cortex and unaffected reticular formation brought on by ketamine. The result of anaesthetic doses is complete analgesia with superficial unconsciousness ("trance-like state") and amnesia [37, 40] and protective reflexes are maintained [37, 40, 41]. The hypnotic effect is minimal. Since ketamine is the only anaesthetic combining a stimulatory cardiovascular effect (tachycardia, rise in blood pressure, increasing of myocardial oxygen consumption) with a low level of respiratory depression, while respiratory depression will be increased by overdosing and rapid intravenous injection [40, 41]. Ketamine induces characteristic changes in breathing patterns, causing both phases of deep, less frequent breaths with brief apnoeic episodes as well as phases of sighing inspirations with high tidal volumes and an end-inspiratory plateau. The apnoeic episodes are most likely a result of the hyperventilation [37]. Ketamine is also associated with increased salivary and bronchial secretion, coughing and laryngospasms combined with raised laryngopharyngeal reflex and there can be a danger of aspiration in patients who do not have an empty stomach. Its effect of increasing intracranial pressure makes ketamine less suitable for use in patients with neurosurgical intervention [40, 41]. The drug is seldom used in the psychiatric patient because of its tendency to cause hallucinations and bizarre nightmares [41] and because of its hallucinogenic effects ketamine became a known drug of abuse at the end of the 1970s [42]. In recreational settings it is typically used in low anaesthetic doses (50–120 mg i.m.) causing

Fig. 3 Death scene showing the bedside table with several items



marked synesthesia and euphoria [43, 44]. The specific combination of effects may be in some respects similar to the experience of sexual orgasm [45].

Toxicological analysis of blood taken from the femoral vein (other specimens like urine and cardiac blood were not available) revealed a ketamine concentration of 2.5 µg/ml, well within the therapeutic range (1.0–6.0 µg/ml). This concentration may have been even higher in the final, agonal stage because ketamine is metabolised with a short half-life period by a hepatic cytochrome P₄₅₀-dependent enzyme system and will be further conjugated to glucuronide derivatives which subsequently undergo renal elimination [37].

The external (overinflation of the lungs, foamy secretion in the mouth, petechiae) and microscopic (pulmonary and hepatocellular oedema, vascular hyperemia of the lungs, haemorrhages in the lungs) findings are compatible with external asphyxiation by blockage of the respiratory tract, hence the sole cause of death can be seen as central paralysis. Both anoxaemia and/or the misuse of ketamine can result in cerebral oedema. That is why it cannot be ruled out that central paralysis is the only effect of ketamine. The resulting hypoxia could have been potentiated by the complicated gag mechanism inspired by pornographic magazines depicting bondage scenes.

In conclusion, the dual effects of the gag and a drug-induced respiratory depression combined with cerebral oedema caused the victim to become inadequately oxygenated, resulting in a central paralysis leading to fatal asphyxia. Blockage of the respiratory tract or consumption of ketamine or a combination of both could have led to lethal hypoxia.

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