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ETHER - a partially forgotten anesthetic

Kinga Pożarowska 1, <https://orcid.org/0000-0003-0691-0155>, kpozarowska@gmail.com

Agata Rosińska 1, <https://orcid.org/0000-0003-0308-656X>, agataros1996@gmail.com

Maciej Orczykowski 1, <https://orcid.org/0000-0002-2319-3082>,

morczykowski7@gmail.com

Marcin Tyszkiewicz 1, <https://orcid.org/0000-0001-5228-3741>,

mtyszkiewicz221@gmail.com

Magdalena Choina 2, <https://orcid.org/0000-0002-3412-6176>, ma.choina@tlen.pl

1- Medical University of Lublin, Lublin, Poland

2- Polish-Ukrainian Foundation of Medicine Development, Lublin, Poland

ABSTRAKT

INTRODUCTION: Ether is the common name for diethylether (CH₃-CH₂-O-CH₂-CH₃). It is a colorless, volatile and highly flammable liquid with a characteristic pungent odor. It was widely used as an anesthetic in the past and is now a component of solvents.

PURPOSE OF THE WORK: The purpose of this paper is to introduce ether as a potentially forgotten substance in the world of Western medicine. Its history, current use, potential for abuse for narcotic purposes, addiction, and the benefits of anesthesia with this agent in impoverished countries.

DESCRIPTION OF THE STATE OF KNOWLEDGE: Ether was first synthesized in 1540 by Valerius Cordus. Ether is characterized by rapid absorption, rapid distribution in the central nervous system and rapid, short-lasting effects. Ether has high solubility in blood/gas, which slows both induction and recovery of anesthesia. In developing countries, it is suggested that

ether be used as an intraoperative analgesia. But it should be remembered, despite the new psychoactive substances, other inexpensive and readily available intoxicants can be found, among them ether. It has been noted in numerous publications that abuse of ether is associated with abuse of other drugs and/or alcohol dependence.

SUMMARY: It is important to remember that ether compounds are widespread. People struggling with the urge to abuse substances can get these substances easily and cheaply. On the other hand, ether anesthesia is a great solution for developing countries. There are situations there that due to lack of funds, some operations are carried out without anesthesia. Ether is cheap, and administering anesthesia with it is quite simple, and could give wonderful relief to these patients.

KEYWORDS: ether, anesthesia, abuse

INTRODUCTION

Ether is the common name for diethylether (CH₃-CH₂-O-CH₂-CH₃). [1] It is a colorless, volatile and highly flammable liquid with a characteristic pungent odor. [2] It is highly susceptible to explosion, especially in the presence of oxygen due to its low boiling point and its volatility. [3] It was widely used as an anesthetic in the past and is now a component of solvents. [1] Ether has been used as a CNS analgesic and depressant since the mid-19th century. [4] Only after the introduction of halothane in 1956 did ether's popularity decline. [2]

PURPOSE OF THE WORK

The purpose of this paper is to introduce ether as a potentially forgotten substance in the world of Western medicine. Its history, current use, potential for abuse for narcotic purposes, addiction, and the benefits of anesthesia with this agent in impoverished countries.

DESCRIPTION OF THE STATE OF KNOWLEDGE

Ether is the common name for diethylether (CH₃-CH₂-O-CH₂-CH₃). [1] It is a colorless, volatile and highly flammable liquid with a characteristic pungent odor. [2] It is highly prone to explosion, especially in the presence of oxygen due to its low boiling point and its volatility. [3] It was widely used as an anesthetic in the past, and is now a component of solvents. [1]

It was first synthesized in 1540 by Valerius Cordus. At the time, it was very rarely used, and if it was, it was for narcotic purposes-among poor Britons who drank an ounce of ether when traditional alcohol was not available, or American students who held towels soaked in ether to their faces until they lost consciousness to achieve feelings of euphoria. [3] Ether has been described since the late 18th century as capable of producing psychotropic effects, such as euphoria and hallucinations. [5]

The first demonstration of ether anesthesia in a human took place on October 16, 1846 by William T.G. Morton. A patient who had a tumor excised from his neck was conscious during the procedure, but suffered no pain. [2] In contrast, ether was first used as a general anesthetic by Dr. Crawford Williamson Long on March 30, 1842. He did not immediately publish his achievements therefore, William T.G. Morton is credited with anesthetizing with ether. [3]

Ether is characterized by rapid absorption, rapid distribution in the central nervous system and rapid, short-lasting effects. [5] Ether has high solubility in blood/gas, which slows

both induction and recovery of anesthesia. [2] This characteristic of it, along with its odor and high flammability, has led to its discontinuation as an anesthetic agent. [6] According to Lambermont and colleagues, pulmonary injuries caused by large doses of ether administered intravenously have never been reported. [1] Ether has been used as a CNS analgesic and depressant since the mid-19th century. [4] It was only after the introduction of halothane in 1956 that the popularity of ether declined. [2] An interesting aspect is pointed out by Tadeusz Szreter, who used ether anesthesia early in his career-"More than once, on the streetcar carrying me home after a long day of using the open-drop anesthesia technique, I was constantly asked (especially by young ladies) what that pleasant smell was. It was the ether removed from my fatty tissue and exhaled by me." [7]

Today, ether is found as an ingredient in starting fluids for heavy-duty heavy machinery. [6] And its derivatives are used as a fuel, propellant for aerosols, refrigerant and in "freezing" sprays. [8] Interestingly, in developing countries, where medicine is not at the same level as in the West, and access to equipment and drugs is severely limited for financial reasons, it is suggested that ether be used as an intraoperative analgesia. It is not expensive, relatively safe, and provides excellent intraoperative pain control, which can extend for several hours into the postoperative period. [3]

Ether in therapeutic amounts is not toxic to vital organs and does not affect respiration or circulation. [6] It is a relatively safe agent, and its main side effect is postoperative nausea and vomiting. [3] Exposure to ether at therapeutic concentrations causes nasopharyngeal irritation, and exposure to higher concentrations can cause CNS depression with nausea, irregular breathing and decreased body temperature and heart rate. [6] It acts as a sympathomimetic agonist, stimulating cardiac output, respiratory rate and causing bronchodilation. [3] In overdose, respiratory depression occurs before severe cardiac depression, which is beneficial because the amount of ether taken up by the lungs decreases as respiratory depression progresses. [2] Blood ether concentrations are generally correlated with central nervous system depression. Blood concentrations between 100 and 500 mg/L cause analgesia, but not unconsciousness. Surgical analgesia occurs at blood concentrations in the range of 500-1500 mg/L. More than 90% of the ether dose is eliminated from the body through the lungs as an unchanged chemical compound, but a small amount of ether appears in urine, sweat and milk. [6] Ether is capable of producing a "high" comparable to ethanol and potentially more lethal. [4]

It should be remembered, despite the new psychoactive substances, other inexpensive and readily available intoxicants can be found, among them ether. [5, 8] It has been noted in numerous publications that abuse of ether is associated with abuse of other drugs and/or alcohol dependence. Ether in particular was described in the early 20th century as a cheaper alternative to alcohol. [5]

As early as 1885, Béluze made the first precise clinical description of the ether addiction syndrome. Table number 1 (Table 1.) shows its phases. [5]

Table number 1 (Tab. 1.) Phases of ether addiction syndrome.

PHASE	CLINICAL SYMPTOMS
Phase 1	Hyperactivity
Phase 2	Aggressivity
Phase 3	Drowsiness or sleepiness

Abuse of ether has been described as occurring by inhalation or by ingestion. The ease of inhalation of ether is due to its low boiling point of 34°C. [5]

A large number of compounds are ethers, with the general molecular formula R-O-R', where R and R' are organic -C radicals. Table 2 (Table 2.) shows some of the substances belonging to this group. [1, 9, 10]

Table number 2 (Table 2.) Some of the substances belonging to the group of ethers.

This group includes thousands of possible structures, such as:
<ul style="list-style-type: none"> ● known inhaled ethers (enflurane, isoflurane, methoxyflurane) ● Compounds such as ethylene glycol butyl ether (EGBE) ● Ethyl t-butyl ether (ETBE) ● Ethylene glycol monomethyl ether (EGME) and its acetate ester (EGMEA)

Table number 3 (Table 3.) shows selected applications of individual ether compounds. [1, 9, 10]

Table number 3 (Tab. 3.) Selected applications of individual ether compounds.

COMPOUND	APPLICATION
Ethyl tertiary butyl ether (ETBE)	is a motor fuel oxidizer used in reformulated gasoline
Ethylene glycol butyl ether (EGBE)	which is widely used as a solvent and diluent in resins, inks, perfumes and cleaning fluids
Ethylene glycol monomethyl ether (EGME) and its acetate ester (EGMEA)	they are used in paints, varnishes, stains, inks and surface coatings, screen printing, photographic and photolithographic processes, such as in the semiconductor, textile and leather finishing industries, the manufacture of food-contact plastics, and as an anti-icing additive for hydraulic fluids and jet fuel

As you can see, ether compounds are widespread in the objects of our daily lives. Thus, for example, EGME and EGMEA are effectively absorbed through the respiratory tract

as well as through the skin, and are considered toxic to both humans and animals. Since 1994, EGME and EGMEA have been listed by the European Union as reproductive toxicants and are not allowed in consumer products and are not allowed in consumer products (European Parliament and Council Directive 94/60/EG). [10] Cases of pulmonary edema, hemolysis after inhalation, injection or ingestion of some of these compounds have been reported. [1]

SUMMARY

It is important to remember that ether compounds are widespread. People struggling with the urge to abuse substances can get these substances easily and cheaply. Taking large amounts of them can carry disastrous consequences. Doctors working in Hospital Emergency Departments and Toxicology Departments should have "in the back of their minds" ether poisoning.

On the other hand, ether anesthesia is a great solution for developing countries. There are situations there that due to lack of funds, some operations are carried out without anesthesia. Ether is cheap, and administering anesthesia with it is quite simple, and could give wonderful relief to these patients.

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