

CASE REPORT

Simon P. Avis,¹ M.D. and J. Thomas Archibald,² M.Sc.

Asphyxial Suicide by Propane Inhalation and Plastic Bag Suffocation

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ABSTRACT: A 26-year-old male committed suicide by inducing asphyxia using a combination of plastic bag suffocation and propane-gas inhalation. This method has been reported in the literature, but it remains unusual. Autopsy findings were consistent with a hypoxic event, and blood, brain, and lung tissue tested positive for propane by gas chromatography. Propane, while possessing some narcotic properties, causes death primarily by displacing oxygen in the atmosphere with resultant asphyxia.

KEYWORDS: pathology and biology, suicide, asphyxia, propane inhalation

Methods used by individuals bent on self destruction are limited only by the ingenuity of the victim and the availability of the lethal instrument. While most suicide victims use well tried methods, occasional cases come to the attention of forensic investigators in which the victim has used a more unusual method of committing suicide. The following case illustrates an uncommon method of committing suicide using propane gas to produce a fatal asphyxia.

Case History

The deceased, a 26-year-old white male, was discovered in his room, by a roommate, approximately 24 hours after he was last seen alive. At the scene there was a noteworthy pungent, odor initially thought to be a product of decomposition. Scene examination revealed the deceased was lying prone, on his bed, covered by bed clothes, with a garbage bag placed over his head. The garbage bag was securely fastened around his neck with cellotape. Removal of the garbage bag revealed a folded towel placed in contact with the victim's face, into which an adaptor, attached to a 14 ounce (397 g) canister of propane gas, was inserted (Fig. 1). The valve of the canister was in the open position, and the canister of propane gas was empty. A search of the deceased's room

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¹Assistant Professor of Pathology, Department of Pathology, Memorial University of Newfoundland, St. John's, Newfoundland, Canada; and Deputy Chief Forensic Pathologist, Province of Newfoundland, St. John's, Newfoundland, Canada.

²Toxicologist, RCMP Forensic Laboratory, Halifax, Nova Scotia, Canada.



FIG. 1.—Propane canister and towel inside plastic bag.

discovered a letter to his ex-girlfriend, disclosing his distraught state of mind over their recent separation. A second empty canister of propane gas was present on the night table.

Interviews with the deceased's roommates disclosed on evidence of drug or solvent abuse. Medical history was positive for Crohn's disease but was otherwise unremarkable.

Autopsy examination showed marked dependent lividity that had an intense dark purple coloration. Thick frothy fluid was emanating from the nostrils and oral cavity (Fig. 2). Examination of the upper extremities showed superficial, linear, parallel, horizontal incised wounds to the anterior aspect of the left wrist. A similar wound was present in the left antecubital fossa. Internal examination was unremarkable save for prominent organ congestion, pulmonary edema, and frothy fluid present within the airways. Microscopic examination confirmed prominent organ congestion, particularly of the lungs, associated with focal intraalveolar hemorrhage.

Materials and Methods

Propane determination was performed on samples of brain and lung tissue sealed in airtight cans as well as blood preserved with fluoride. Samples were kept refrigerated until analysis was performed. The procedure used was as follows. One half mL volumes of head space from the samples were injected into the gas chromatograph using a Hamilton #1001 gastight syringe. The gas chromatograph was a Varian 3500 equipped with a flame ionization detector and containing a DB-1 column, 30 m long and 0.32 mm inside diameter. Injection and detector temperatures were 40°C and 300°C, respectively. Oven temperature was maintained at 10°C (isothermal). Between each sample run, a blank run of 0.5 mL of air was injected to ensure there was no contamination from one sample run to another. At the end of the sample and blank (air) runs, a blank blood (a blood sample not containing propane) was run. In addition, standard runs of propane and propane with butane were performed.

Under the gas chromatographic conditions, propane eluted in 1.66 min and butane in 1.72 min. Propane was detected in blood, brain and lung tissue (Fig. 3). Blood was



FIG. 2—Intense purple lividity.

screened for acidic, neutral and basic drugs as well as ethanol analysis, all of which were negative.

Discussion

Suicide by suffocation is unusual but has been reported in the literature [1]. Interestingly, while suicide by suffocation remains unusual, it is reported to be increasing as a method of committing suicide, particularly in males [2,3].

Death as a result of propane inhalation is uncommon, but has been reported, both as a result of accident [4], and suicide [5]. Propane gas is a low molecular weight aliphatic hydrocarbon with the formula $\text{CH}_3\text{-CH}_2\text{-CH}_3$, (C_3H_8), that is both odorless and colorless, and is primarily a simple asphyxiant, causing death by displacement of atmospheric oxygen. It also possesses mild narcotic properties that may depress brain function [6,7] and may make it subject to inhalation abuse [8]. This action however is not considered

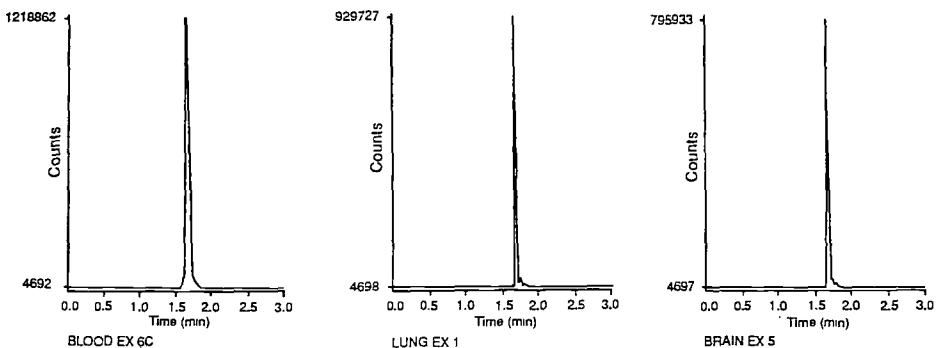


FIG. 3—Gas chromatograph demonstrating propane in body fluids and tissue.

significant in the mechanism of death. Propane is widely available as "bottled gas" and is commonly used for heating and cooking. Propane related deaths can also occur as a result of the explosive nature of propane, or as a result of incomplete combustion with the production of carbon monoxide [7].

The findings at autopsy of intense dark purple lividity are consistent with the asphyxiant nature of propane and suggest a significant hypoxia. Previous studies have also commented on the color of lividity in propane inhalation deaths [4]. This is in contrast to plastic bag suffocation in which findings are generally absent [9]. The presence of propane in blood and body tissue confirms a role for propane in the production of asphyxia.

The motivation for using propane as a method of suicide is probably as a result of a misconception, by the victim, that propane is a poisonous gas. The presence of a second canister of propane in the room would suggest either previous attempts by the victim, or an initial failure at suicide. The pungent odor present at the scene was most likely from the ethyl mercaptan added to propane to allow its easy detection and would suggest that propane was present in the atmosphere. Ethyl mercaptans were added to propane for safety concerns in the early 1960s in order to allow detection of the odorless gas and is usually added in a ratio of 8 to 10 parts propane to 1 part ethyl mercaptan, depending on the application of the gas. In addition to its pungent odor, ethyl mercaptans also help eliminate moisture and prevent freezing problems with gas lines. An important point to remember when entering such scenes is to ensure adequate ventilation and be sure to extinguish all sources of ignition.

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Address requests for reprints or additional information to
Simon P. Avis, M.D.
Dept. of Pathology
Memorial University of Newfoundland
Newfoundland
Canada A1B 3V6