New Suicide Modalities: The Use of Helium as an Oxygen Displacement Agent

Jorge G. Billoch-Lima, MD†
Darío Sanabria-Bellasai, MD‡
Irma Rivera-Diez, MD‡

† Department of Pathology and Laboratory Medicine, University of Puerto Rico, School of Medicine
‡Instituto de Ciencias Forenses de Puerto Rico

Abstract

In statistical terms, suicide (defined as the act of voluntarily taking his/her own life) in Puerto Rico has demonstrated a relatively stable trend during the last decade, shadowing the trend in the United States. Although the methods by which the act is performed have not varied much, new worrisome tendencies have been described in the literature. Suicide by hanging is the most common method used in Puerto Rico (both men and women) and the second most common in the United States. While the use of a plastic bag around the head as a suicide tool had been described for some time before, its practice was boosted in 1991 after the publication of the book "Final Exit: The Practicalities of Self-Deliverance and Assisted Suicide for the Dying". Directed towards terminally ill patients, the book presented multiple mechanisms for an honorable death, including, in full detail, the "Exit bag" mechanism. In 2002, the third edition of the book included a chapter on the utilization of inert gases as a faster way to reach their objective. Inert gases (argon, radon, helium) accelerate the death by effectively displacing or substituting the oxygen being aspirated, and depriving the body (specially the brain) from it. Only twenty suicide cases using this methodology have been reported in the international scientific literature. Since helium is seldom searched for in the toxicological analysis of a forensic autopsy, it has been theorized that the real incidence may be exponentially higher, maybe falling in the thousands. We describe the first known case in Puerto Rico of suicide by asphyxia utilizing this method.

Case Report

Medical History:

- Thirty year old male with bipolar disorder for the last five years.
- Treated with an unknown medication.
- Hospitalized two years ago.
- Family History: older brother with bipolar disorder.

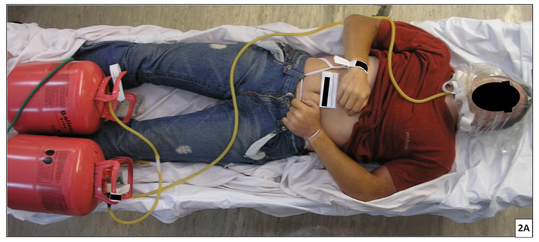
Social History:

- Employed by the US Armed Forces.
- Had to report back for duty.
- Last seen 2 weeks prior to decease.

Scene

Figure 1: **A.** The body was found in supine position, next to the bed, with an inflated plastic bag fitted with cloth tape and an elastic band closing it tight with the neck. Between the bag and the skin, a rubber tube was opening inside the bag, and said tube was connected by a T fitting to two helium tanks (14.8 ft³). The room showed no evidence of breaking-in. **B.** Detail of inflated bag

Autopsy



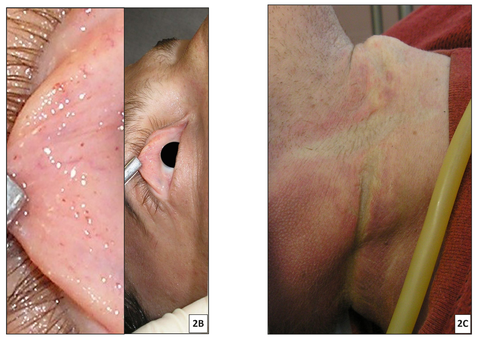


Figure 2: A. Body as was received at the Instituto de Ciencias Forenses (ICF). Note that the deceased used the same elastic material to bind his hands and in this way prevent the auto-removal of the bag. **B.** Right eyelid petechiae **C.** Pressure marks left by elastic band and tubing as it inserted underneath the bag

- Findings
  - Eyelid petechial hemorrhages
  - Pressure marks
    - Neck
    - Bilateral wrists
    - Waist
    - Consistent with paraphernalia found at the scene
  - Pulmonary congestion
  - Toxicology - Buspirone
- Cause of Death
  - Asphyxia secondary to helium inhalation
- Manner of Death
  - Suicide

Pathophysiology

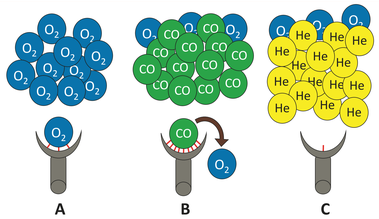
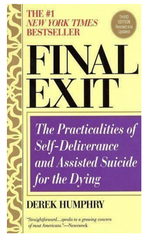


Figure 3: A. Normal oxygen concentration allows its binding to the receptor in hemoglobin. **B**. Carbon Monoxide (CO) in excess displaces oxygen off its receptor and has a stronger affinity to it, making it toxic. **C**. Helium in excess only produces a displacing effect.

Origins

- **"Exit Bag"**
  - Term coined by Derek Humphrey on his book Final Exit (1991)
  - "Right-to-die" movement
  - Directed towards terminally-ill patients
  - Provides step-by-step instructions
  - Assisted by alcohol or barbiturics
  - A localized hypoxic environment is created
  - Death occurs in around 30 minutes
  - Findings at the time of autopsy
    - Non-specific
    - Pulmonary congestion and edema
    - Mucosal petechiae (rare finding)
    - Mild impressions in skin due to ligatures (low pressure)



- **"Chapter 23. A Speedier Way: Inert Gases"**
  - Third edition of Final Exit (2002)
  - Based on technology displayed in the NuTech Conference (Seattle, WA - 1999)
  - Tolerance
    - Produces less "air-hunger" sensation compared to CO
  - Volatile
    - Disperse rapidly
    - Will not be a danger to others coming into the room (EMT's, family members)
  - Odorless and non-toxic
    - No or little evidence left for Police or Medical Examiner's to suspect any wrongdoing
    - Since these patients already have a terminal illness, the death is categorized as natural
      - Deceased escape the social stigma and family shame of being considered a suicide
      - Monetary compensation to family from life insurance
  - Rapid loss of consciousness
    - Helium inhaled from a globe: 15-18 seconds
    - Helium inhaled in a closed system: 10-12 seconds
  - Rapid death: 10 minutes

Easy Access to Literature

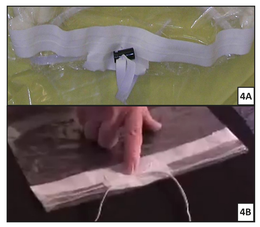


Figure 4: A. Bag found on the deceased. **B.** Bag shown on Exit International's "Doing it with Betty" video. **C.** Step-by-step instructions found in the book "Final Exit". **D.** Excerpts from "Final Exit". **E.** Deceased followed these instructions exactly.

Toxicology

- Extremely important at the time of autopsy
- Helps determine any other influence on the cause of death
- Special techniques needed to demonstrate the presence of helium in airway or stomach
- Gas chromatographer: Since helium is normally used as the carrier gas, it needs to be changed to nitrogen or other.
- Entire respiratory apparatus and stomach needs to be kept intact in order to recover the headspace air for analysis
- These analyses are not standard procedure, so findings at the scene or circumstances of death need to trigger suspicion

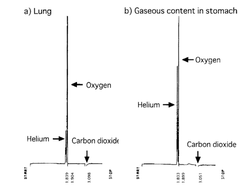
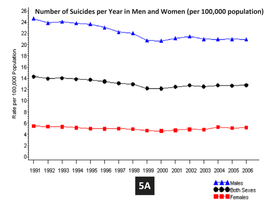
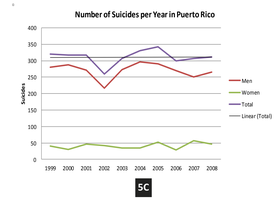


Figure 5: Demonstration of helium content in pulmonary and stomach headspace. The helium in the stomach was better preserved than in the lungs [graphic from Yoshitome, et al (5)]

Suicide

- 11th cause of death in US
- Above 65 y/o has decreased, but below has stayed





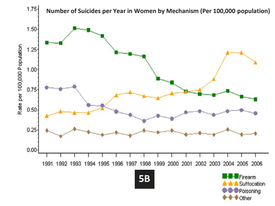


Figure 5: A. Decreasing trend in male suicide, while female stays stable. **B.** Increasing trend in asphyxia and decreasing trend in firearm suicide in women. Coincidentally, the trend presents a spike after 2002 (year third edition of "Final Exit" was published). **C.** Suicide trends in Puerto Rico

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