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Homicide by Fire

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Summary. A study of homocide perpetrated by fire was performed on the case files of the Office of the Medical Examiner of Metropolitan Dade County in Miami, Florida, during the years from 1977 until 1984. A total of 26 cases were collected and analyzed as to age, race, sex, and the cause of death of the victim along with the blood alcohol content, the drugs detected at autopsy, and the blood carboxyhemoglobin level. Additionally noted were the geographic location of the terminal incident, the scene circumstances, how the fire started, who started the fire, and the reason for the fire. The most common victim was a 31-50-year-old white man who died from smoke inhalation while sober. Commonly, drugs detected were negative, and the carboxyhemoglobin levels were elevated. The fire occurred at "home" while the victim was sleeping. Usually, a flammable liquid was poured and ignited by a drifter who was a brief acquaintance and earlier involved in an argument with the victim.

Key words: Fire deaths, homicide – Homicide, fire deaths

Zusammenfassung. Es werden die Tötungen durch Feuer im Bereiche des „Office of the Medical Examiner of Metropolitan Dade County in Miami, Florida" während der Jahre 1977 bis 1984 untersucht. Es werden 26 Fälle hinsichtlich Alter, Rasse, Geschlecht und Ursache des Todes analysiert. Blutalkoholuntersuchungen, Drogenanalyse und Feststellung des CO-Hämoglobin werden ausgewertet. In der Mehrzal der Fälle handelt es sich um 31–50 Jahre alte weiße Männer. Sie sind nüchtern, frei von Drogen und haben einer erhöhten CO-Hämoglobingehalt. Angriffspunkt des Feuers ist die Wohnung. Bevorzugt werden brennbare Flüssigkeiten.

Schlüsselwörter: Gewaltsamer Tod, durch Feuer – Tötung, durch Feuer

Fire deaths are a tragic occurrence of modern urban society. Commonly, they are accidental, occasionally they are suicidal, and rarely they are homocidal. It is with this latter group of cases that this study concerns itself. Anecdotally, most forensic pathologists would recollect that such cases are rare, given modern

society's preoccupation with handguns. Furthermore, while there is a large volume of psychiatric literature on arson [1, 2], little exists on the forensic pathology of those people killed by fire by another individual.

Material and Methods

Metropolitan Dade Country is a community of 2,000 square miles and a 1980 population of 1,600,000. It is a traditional resort and retirement area encompassing Miami and Miami Beach. The Office of the Medical Examiner is empowered by law to investigate those deaths in the county of a violent, unnatural, or unexpected means. Some 3,500 cases are investigated annually and of these some 2,800 cases are autopsied. For this study, the case files during the 8-year period (1977–1984) were examined for those cases in which the primary cause of death was attributable to fire and the manner of death was certified as a homicide. Twenty-six cases were collected of the 3,499 homicides that occurred during this time period. These cases were then analyzed as to age, race, sex, and the cause of death of the victim along with the blood alcohol content at autopsy, the drugs detected at autopsy (commonly using a Urine EMIT drug screen), and the carboxyhemoglobin level obtained at the portmortem (using a CO-oximeter). Additionally noted were the geographic location of the terminal incident, the scene circumstances, and the following information: how?, by whom?, why? the fire started along with how long the victim may have survived the incident.

Results

Table 1 gives the age distribution with most of the victims between the age groups of 31–50 years. In reviewing these cases, 18 were white and eight were black; these were 17 men and nine women.

Table 2 gives the cause of death as listed on the death certificate. A word concerning the nomenclature used in Miami, Florida, is in order. Commonly, the term "smoke inhalation" is used realizing it is not so precise a term as "carbon monoxide intoxication". These are different reasons for this. First, carboxyhemoglobin may not be readily ascertained in a patient who receives

Table 1. Age distribution of homicide by fire victim

Age (years)	No. of cases
0–10	2
11–20	1
21–25	0
26–30	1
31–35	0
36–40	7
41–45	1
46–50	5
51–55	0
56–60	3
61–65	0
66–70	2
Over 70	4

Table 2. Cause of death of homicide by fire victim

Cause of death	No. of cases
Smoke inhalation	16
Thermal burns	5
Smoke inhalation and thermal burns	3
Gunshot wound of chest and vehicular conflaguration	1
Myocardial infarction and respiratory distress syndrome due to smoke inhalation	1

hospitalization and later succumbs to the injury (*vide infra*, re ten of these cases). Secondly, "smoke inhalation" can be documented anatomically at the gross findings or histologically. Such documentation is usually uncontestable in a court of law which is especially important with a homicide case compared to other types of fire deaths. Third, while carbon monoxide is a lethal component of "smoke", other noxious gases (e.g., benzene, cyanide) are also released in a fire and these are not always easy to analyze, although it is possible [3]. Accordingly, "smoke inhalation" is a term commonly used for the death certificate in Miami, Florida, as an all encompassing term to reflect these points. Furthermore, it is realized that delineation of the amount of burns received either pre- or post-mortem can be problematic, and this is not routinely performed in this office. Two entries on Table 2 bear special mention. The entry with a gunshot wound of the chest refers to a case in which a person was shot and then, to conceal this, his motor vehicle was set on fire. However, at the postmortem, soot in the peripheral airways along with an elevated carboxyhemoglobin level indicated that the victim was still technically alive at the time of the fire. The other entry of special mention is that of the victim who died of a "heart attack" during a fire and in which it was believed that the "stress" of the fire contributed to his demise.

Toxicologically, analyses for a blood alcohol (ethanol) content, a Urine EMIT drug screen, and a carboxyhemoglobin determination are commonly performed in such cases. In reviewing these cases, the blood ethanol content was not ascertained in four cases, negative in 14 cases, within the range of 0.01% up to 0.1% in four cases, and 0.1% or higher in four cases. The Urine EMIT drug screen was not ascertained in 16 cases and negative in ten cases. No positive screens were noted. The carboxyhemoglobin level was not ascertained in seven, within the range of 0 up to 20% in five cases, within the range of 21 to 40% in one case, within the range of 41%–60% in four cases, and higher than 60% in nine cases. No cases were noted with a negative carboxyhemoglobin level. The large amount of not ascertained results reflects in some measure the hospitalization or fire rescue intervention. In analyzing these data, some 16 persons were dead at the scene and without formal rescue intervention. Six persons lived for a few hours within the range of 0 to 12 h. Others lived for a variable period of time: one lived for 15 h, one for 1 day, one for 14 days, and one survived for 1 month.

Table 3. Geographic location of terminal inoident

Locale	No. of cases
Home, residential	8
Rooming house, transient hotel	8
Apartment	4
Ground, open field, tent	2
Drug rehabilitation house	1
Motor vehicle	1
Massage parlor	1
Pawn shop	1

Table 4. Scene circumstances

Scenario	No. of cases
Decedent, sleeping, fire set in building or adjacent area	21
Decedent sleeping, set on fire ("human torch")	4
Decedent shot, area doused with flammable liquid	1

Table 5. How the fire was started

How?	No. of cases
Flammable liquid poured, ignited (Specific liquid used:)	17
Isopropyl (rubbing alcohol)	3
Gasoline	6
Not specified	8
Newspapers, combustibles ignited	1
Campfire spread to victim	1
Unknown	7

Tables 3–7 give the nature of this type of fire death. Frequently, it occurs at home, apartment, or a boarding house (Table 3). Commonly, in the Miami, Florida area these residences are made from wood which may contribute to the frequency of such deaths. A real study of building material is beyond the scope of this study and would best be conducted by forensic engineers including construction and materials engineers.

The victim frequently was asleep (Table 4), and a flammable liquid was used as the agent of destruction (Table 5). The fire was started by a "drifter" who was a brief acquaintance of the victim (Table 6). The fire started over an argument in several of the cases (Table 7). A great deal of this information was from careful methodical police work which upon completion is commonly added to the case file of the Medical Examiner. Truly, a large amount of information is made available to the medical examiners in this agency.

Table 6. Who started the fire

Who?	No. of cases
Drifter (brief acquaintance)	6
Neighborhood youth	3
Sister	3
Brother (or decedent)	2
Wife	1
Live- in girlfriend	1
Owner of business establishment wife	1
Previous occupant	1
Passerby	1
Unknown	7

Table 7. Reason for the fire

Reason	No. of cases
Argument, not otherwise specified	5
Anger over being told to leave the area and not allowed to "break dance"	3
Anger over being chased away for prowling	3
Arson (building)	2
Argument over groceries	2
Argument over money	1
Perpetrator with a psychiatric history	1
Unknown	9

Discussion

Homicide by fire is a rarity. In this geographic location it accounted for 0.74% of all homicides in the past 8 years. Given the ready access to firearms in the United States, it is not surprising that the use of fire for the taking of life by another individual is uncommon. Despite such lack of frequency, such details still merit study both to compare them to other types of homicides and to other fire deaths.

This study of homicide by fire is comprehensive in that it includes all deaths of such a nature within this country over a specified period of time. However, there are limitations to this study. First, by design, only deaths are included. Attempted homicides, as, for example, those cases in which a fire was set but the victim escaped, are beyond the scope of this paper. Furthermore, those individuals who survive their burns or smoke inhalation, again cannot be studied effectively by the forensic pathologist. Still, a sufficient number of cases are included here to offer the reader the population demographics involved and to see the "pattern" of such cases. Accordingly, despite the limitations, one should be able to opine on such cases with the help of such studies as this.

In comparison to other fire death studies [3, 4], one notices that accidental fires are far more common and that suicidal fire deaths occur with roughly the same frequency. Furthermore, a different population group is involved. Most commonly accidents involve either a very young or a very old white male population [3]; suicides involve an older white female population [4]. However, homicide by fire affects a middle age white male population (Table 1). All populations, however, die from smoke inhalation and/or thermal burns [3, 4] (Table 2). All share in common being sober at the time of death and dying of an elevated carboxyhemoglobin level (see Results). Furthermore, the terminal incident occurs at home be it accidental, suicidal, or homicidal [3, 4] (Table 2).

Differences among the types of fire death are noted in the scene circumstances and how the fire was started. In accidental fires [3], one sees that cigarette/lighter-related or electrical problems are the common origin. However, in homicidal fire deaths (Table 5), an accelerant, e.g., gasoline or rubbing (isopropyl) alcohol is used to start the fire. Now, while an accelerant is also used in suicidal fire deaths [4], differences are apparent in that in suicidal fire deaths, the victim per se is usually found "on fire"; whereas, in homicidal deaths the victim is usually sleeping and the origin of the fire is elsewhere in the building or an adjacent area (Table 4). Furthermore, careful scene investigation and anxilliary information by police discloses depression in the former victim [4] and a vengeful perpetrator in the latter case (Tables 6 and 7). Accordingly, to determine the manner of death a correlation among the autopsy findings, the scene circumstances and the police investigation is essential.

One can also compare this type of homicidal death to other studies on homicide [5–7]. Essentially, the peak age group of 31–50 years in this study is similar to that reported by others as is the male preponderance [5]. The rate of occurrence of black victims is not so high as in other forms of homicide [5] or in other age groups, such as teenagers [6]. However, this type of homicide is similar to others [5, 6] in that the reason for the "killing" usually involves an argument with an acquaintance or a family member. Furthermore, the sober victim is common to many homicidal deaths [6, 7]. Accordingly, one can conclude that regardless of the differences in the "vehicle" used to express violence (e.g., handgun, knife, or fire), there are certain similarities in the homicidal act per se.

Now certain points should be studied in future work on homicide and on fire deaths. First, this writer encourages forensic scientists in other countries to write in contrast and comparison concerning all types of fire deaths in their location. Very few studies on non-accidental fire deaths exist in the English language, and there is a great need for articles on this aspect in particular, although some studies have been performed in Europe [8–10]. Secondly, as this type of fire death is publish in the news media, including television, it will be interesting to see whether the occurrence of this type of homicide changes.

In conclusion, this study has completed the trilogy on fire deaths in Metropolitan Dade County in Miami, Florida, in recent years [3, 4]. It has shown that homicidal fire deaths are a rarity involving a separate population group different from other fire deaths [3, 4] and are more similar to other types of homicidal deaths [5–7]. Furthermore, this study has pointed out such differences in a prac-

tical sense so that forensic scientists may use the data in all three studies to facilitate investigation of fire deaths.

References

1. Geller J (1984) Arson: An unforeseen sequela of de-institutionalization. Am J Psychol 141:504–508
2. Bumpass E, Fagelman FD, Brix R (1983) Intervention with children who set fires. Am J Psychother 37:328–345
3. Copeland AR (1985) Accidental fire deaths – The five-year Metro Dade County experience from 1979–1983. Z Rechtsmed 94:71–79
4. Copeland AR (1985) Suicidal fire deaths revisited. Z Rechtsmed 95:51–57
5. Jason J, Flock M, Tyler C (1983) Epidemiologic characteristics of primary homicide in the United States. Am J Epidemiol 117:419–428
6. Copeland AR (1984) Homicide during teenage years – The 10-year Metro Dade County experience from 1973 to 1982. Forensic Sci Int 25:167–173
7. Copeland AR (1985) Homicide among the elderly – The five-year Metro Dade County experience from 1979 to 1983. Med Sci Law (in press)
8. Winkler H (1943) Mord durch Verbrennen bzw. Mord und Verbrennen. Beitr Z Gerichtl Med 17:127–135
9. Bschor F (1965) Befunde bei Brandleichen und deren Bewertung. Arch Kriminol 136:93–105
10. Schneider V (1982) Bemerkenswerte intracranielle Befunde bei einer Brandleiche. Arch Kriminol 169:129–139

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