



Pathology & Biology Section – 2005

G43 The Relationship of Drug Abuse to Unexplained Sudden Death

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The goal of this presentation is to define the relationship between drug abuse and deaths where neither anatomical nor toxicological cause for death is found.

This presentation will impact the forensic community and/or humanity by recommending that decedents with a convincing history of drug abuse and no other anatomical or toxicological findings at autopsy have their cause of death certified as being due to chronic drug abuse.

Rationale: Cases of young adults with a history of drug abuse who have died suddenly and unexpectedly in whom neither anatomical nor toxicological cause for death is found at autopsy are received regularly. The common presence of a history of drug abuse, however, has led researchers to hypothesize that drug abuse not only induces some change that increases the risk of sudden death, but that this change persists after the drug is no longer detectable in the body. The first part of this study was presented at the 2004 Annual Meeting of the American Academy of Forensic Sciences in Dallas, Texas, where it was shown that deaths certified as undetermined in cause and manner have an increased likelihood of having a history of drug abuse when compared to a control group of medical examiner cases. In this second part of this study was tested the null hypothesis, "There is no difference in the frequency of drug abuse in a study group dying of undetermined cause when compared to the frequency of drug abuse in a matched control group of patients admitted for cholecystectomy," with the intent of establishing whether a history of drug abuse increases the likelihood of sudden death.

Methods: A retrospective case-control study conducted of deaths investigated by the Jefferson County Coroner/Medical Examiner Office, Alabama between 1986 and 2003. The study group consisted of decedents between 10 and 70 years of age whose cause and manner of death remained undetermined following an autopsy and toxicological analysis for ethanol and drugs of abuse. The control group was chosen from living patients who underwent cholecystectomy at the indigent care hospital serving Jefferson County, Alabama, a population similar to that seen in the medical examiner office. Three controls were matched to each study group member to within 5 years of the age of the study decedent and within two calendar years of the date of death of the study decedent (to keep social trends and testing methods comparable). The charts of both the study group (decedents) and of the control group (patients) were reviewed for evidence of drug abuse. All toxicology results were noted in the decedents, including the presence of cocaine, any other drugs or medications, and ethanol. Decomposed remains were included in the study group. The charts of the living control group were reviewed for a history of drug abuse and hypertension in accordance with the hospital Institutional Review Board.

Results: The study group of undetermined deaths consisted of 62 decedents, 24 of whom had some evidence of drug abuse (history, physical signs, positive toxicology for cocaine or its metabolites in urine or bile, opiates, or methamphetamine). In the matched control group 9 of 186 patients had a known history of drug abuse. Cases in the study group were seven times (odds ratio 7.0; 95% confidence interval 3.5-14.1; $p < 0.0001$) more likely to have a history of drug abuse than the controls. In other words, given the design of this study, an individual with an undetermined cause of death is seven times more likely to have a history of drug abuse than is a living patient chosen from a similar population. Given the small p-value, chance is an unlikely explanation for these results. Heart disease can cause sudden death by dysrhythmia, and should be considered as a cause of death in the decedents, but cases with heart disease sufficient to account for death were not considered undetermined as to cause of death and were thus excluded from the study group. This exclusion is reflected by statistical analysis that showed hypertension was less common in the study group than in the control group of cholecystectomy patients.

Conclusion: This is the second study to show that a history of drug abuse is far more common in decedents with an undetermined cause of death than it is in a control group chosen to represent a random sample of the population. Epidemiological theory indicates that for rare events, such as the death of an individual with a history of drug abuse, the measure of the association between the risk (here drug abuse) and the event (here death) is a valid and accurate predictor of the incidence of death due to a given risk factor. In other words, individuals who abuse drugs are at increased risk of dying suddenly because of their habit of abusing drugs, even if not acutely intoxicated at the time of death. Based on these findings, the authors recommend that decedents with a convincing history of drug abuse and no other anatomical or toxicological findings at autopsy have their cause of death certified as being due to chronic



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drug abuse.

Drug Abuse, Sudden Death, Pathology