H118 Armanni-Ebstein Lesions and Hypothermia: A Five-Year Retrospective Study From the Cook County Medical Examiner's Office

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After attending this presentation, attendees will understand the significance of Armanni-Ebstein lesions in the diagnosis of fatal hypothermia.

This presentation will impact the forensic science community by studying the association of these lesions in deaths due to hypothermia in one of the coldest counties of the United States.

Hypothermia is defined as a body core temperature below 95°F (35°C). The final cause of death is due to ventricular fibrillation, asystole, internal asphyxiation or hypoxia due to a left shifting of the oxygen-hemoglobin dissociation curve, or failure of enzymes and electrolyte dysregulation. Usually, the diagnosis of hypothermia is based on circumstantial evidence, but there are some morphological findings that can help the forensic pathologist reach the correct diagnosis: bright red postmortem lividity; hemorrhagic spots of the gastric mucosa (Wischnewsky's spots); several pancreatic changes, such as focal or diffuse pancreatitis, hemorrhagic pancreatitis, patches of fat necrosis; hemorrhages into the core muscles; and fatty changes in the heart, liver, and kidneys. Scene findings of paradoxical undressing or terminal burrowing may assist the pathologist in the diagnosis of hypothermia.

Researchers have found a possible association between the Armanni-Ebstein phenomenon and hypothermia deaths. Armanni-Ebstein changes are subnuclear vacuolization of renal tubular epithelial cells due to glycogen or lipid deposits. These lesions are typically observed in poorly controlled diabetic states.

According to the literature, Armanni-Ebstein changes are constantly observed in subjects with a history of diabetes mellitus. An association between diabetes mellitus and hypothermia has been described. Metabolic complications of diabetes mellitus can cause secondary hypothermia. Conversely, primary hypothermia can worsen a decompensated diabetic state. Hence, Armanni- Ebstein lesions can be found in cases of hypothermia and diabetic ketoacidosis.

Case files from the electronic database of the Cook County Medical Examiner's Office in Chicago, IL, were retrospectively reviewed over a five-year period from July 2011 to July 2016 for cases in which deaths were due to hypothermia. The search was performed using the keyword "cold" in the "Cause," "Due to," and "Injury description" fields. All cases had investigative reports. Cases in which a complete autopsy was performed were selected for this study. Autopsy reports were reviewed, and the age, gender, and pathological findings were summarized. Specific details about diabetic status, if available, were noted. In cases in which histological sections of the kidneys were available, the slides were examined for the presence of Armanni-Ebstein lesions. Periodic Acid-Schiff (PAS) and Oil-red staining were used to demonstrate the material in the lesions.

There were a total of 133 cases of fatal hypothermia, with autopsies performed in 111 cases. Histology slides were available in 44 of the 111 cases. The ages ranged from 0 to 99 years (average 55 years) with a male-to-female ratio of 2.7:1.

This research provides an interesting study targeted at demonstrating the significance of Armanni-Ebstein lesions in cases of fatal hypothermia. The results of this study will be discussed with attendees.

Armanni-Ebstein, Hypothermia, Forensic Pathology

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