H86 Carbohydrates That Kill: Death From Refeeding Syndrome?

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Learning Overview: After attending this presentation, attendees will: (1) be able to define refeeding syndrome, (2) understand the cellular mechanisms and metabolic changes associated with refeeding syndrome, and (3) have developed an awareness of the risk factors and special populations in whom refeeding syndrome may be a factor in causing sudden death.

Impact on the Forensic Science Community: This presentation will impact the forensic science and forensic pathology communities by raising awareness of refeeding syndrome, a paradoxical differential diagnosis of sudden death in malnourished persons that can present for forensic autopsy. Knowledge of refeeding syndrome in these cases is important for death investigators and forensic pathologists to ascertain a complete clinical history, correlate autopsy features, and order appropriate laboratory testing.

Two cases with possible refeeding syndrome were identified at the Travis County Medical Examiner's Office. A 21-year-old male visited the United States from Mexico. Upon arriving, family was concerned at his emaciated appearance and took him for a large meal. Shortly after eating, he began vomiting and experiencing constipation. His symptoms persisted for 24–36 hours before he was witnessed to collapse and succumb to a presumed illness. At autopsy his Body Mass Index (BMI, measured in kg/m^2) was 14.5 kg/m^2. His stomach and small and large bowel were empty. Vitreous analysis demonstrated hypernatremia consistent with dehydration and his recent history of emesis. Toxicology was negative for alcohols, illicit and prescription medications. In the second case, a 26-year-old male with a history of anorexia nervosa and prior inpatient and outpatient recovery treatment was found deceased in his residence. At autopsy is BMI was 14.8 kg/m^2. Internal examination demonstrated fluid within the chest cavities and lower extremity edema. Toxicology showed therapeutic level of citalopram. Vitreous analysis demonstrated low levels of sodium; however, the potassium concentration was slightly increased.

Refeeding syndrome is a relatively unknown entity that paradoxically potentiates sudden death in malnourished persons subsequently receiving oral, enteral, or parental nourishment. Earliest descriptions of refeeding syndrome were presented during the last century when emaciated prisoners of war clinically described as having marasmus or kwashikor were refed. Progressive knowledge of anabolic and catabolic states of metabolism, nutritional requirements, and electrolyte physiology has provided an understanding of the cellular mechanisms that underlie refeeding syndrome and supported the development of treatment protocols for gradually increasing nutritional intake.

Currently, however, there are challenges in recognizing refeeding syndrome due to the diversity of predisposing risk factors and populations affected, and variable electrolyte disturbances and their subsequent systemic effects. Predisposing risk factors for malnourishment may include malabsorption, infectious disease, eating disorders, low socioeconomic status, cachexia associated with malignancy, advanced age, and post-surgical patients, particular bariatric surgery patients. Electrolyte shifts may demonstrate combinations of hypophosphatemia, hypokalemia, hypomagnesemia, alterations of glucose, lipid, and thiamine, and changes in sodium and water excretion that can cause dehydration or extracellular fluid compartment expansion and edema. Symptoms leading to possible death may incorporate single or multiple bodily systems, including cardiovascular (arrhythmia, hypotension, heart failure), endocrine (hyperglycemia), gastrointestinal (vomiting, constipation, paralytic ileus, diarrhea), hematological (hemolysis, leukocyte dysfunction), neurological (delirium, seizures), renal (metabolic acidosis or alkalosis, acute tubular necrosis), respiratory (hypoventilation, pulmonary edema, respiratory drive failure), and musculoskeletal (rhabdomyolysis, ataxia, diaphragm weakness, muscle cramps, osteomalacia). Malnourished persons with refeeding syndrome can be evaluated in hospital for the aforementioned symptoms and underlying electrolyte abnormalities with a diagnostic battery of testing. However, such methods and diagnostic certainty are not available postmortem.

Refeeding Syndrome, Eating Disorder, Anorexia