



Pathology & Biology Section – 2008

G9 Suicidal Intoxication by Copper Sulphate

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The goal of this presentation is to present a case of suicidal intoxication by an unusual chemical compound.

This presentation will impact the forensic community by demonstrating how Intoxications (accidental, suicidal or homicidal) with copper sulphate are rare, as can be seen in the few cases described in forensic literature.

Introduction: Portugal is traditionally an agricultural country; therefore intoxications by pesticides are very common, especially with paraquat and organophosphorous. Copper sulphate is a fungicide used to control bacterial and fungal diseases of fruit, vegetables, nut, and field crops. It can also be applied in water treatment systems to control algae. This pesticide is available as dust, wettable powder, and liquid concentrate. In Portugal its major application is in vine plantation.

Copper sulfate solutions may irritate eyes, skin, respiratory and mucous membranes. Poisoning by this compound may affect the central nervous system, liver, kidneys, and capillaries, frequently causing renal failure and haemolytic anaemia.

Despite Portugal's major wine production, intoxications (accidental, suicidal, or homicidal) with this compound are relatively rare, as can be seen in the few cases described in forensic literature.

An 81-year-old male, diabetic with chronic renal insufficiency was admitted at the hospital with suspicion of voluntary ingestion of copper sulphate. Four days later he died. He was admitted in the Nephrology unit with acute renal failure and anaemia, and was treated with intensive hemodialysis and blood transfusions. Later on, he developed metabolic acidosis and there was a worsening of his anaemia. During admittance a 1.5 mg/L copper concentration was detected in his blood.

At the autopsy, it was possible to see a green coloration of the nails, ascitis, and pleural effusion on the right side. Samples from heart, kidneys, lungs and liver were taken for histopathological examination. The major microscopic changes were bilateral severe lesions of chronic pyelonephritis, renal arterioarteriosclerosis, epithelial cytoplasmic vacuolization, and basophilic discoloration of the renal proximal convoluted tubules, perivenular hepatotoxic lesions with necrosis, and mainly mononuclear sinusoidal and portal inflammatory cell infiltration.

Clinical features indicative of acute intoxication by copper sulphate were renal failure, anaemia, and high copper concentration in blood (the normal concentration being 1 mg/L). Nevertheless, autopsy findings weren't significant; the most common features like gastric and esophageal erythema or ulceration were absent. The diagnosis was based on the microscopic alterations. In fact, not only was there evidence of renal histologic changes related with diabetes and chronic renal insufficiency (arterioarteriosclerosis, chronic pyelonephritis), but also lesions suggesting copper sulfate poisoning: epithelial cytoplasmic vacuolization and basophilic discoloration of the renal proximal convoluted tubules. Furthermore, the histopathologic lesions observed in the liver were another clue to determining the diagnosis.

Copper Sulphate, Intoxication, Suicide