E18 The Faithless Nurse: A Strange Case of Hyperthermia

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Learning Overview: The goal of this presentation is to illustrate the risk of developing serotonin syndrome, particularly with cases involving administration of narcotics, such as methadone, in conjunction with other serotoninergic agents.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by enhancing awareness regarding co-administration of serotoninergic agents among heroin abusers who receive methadone maintenance therapy. This presentation will also stress the importance of developing the knowledge of mechanisms leading to hyperthermia and related to methadone consumption that have proven to be the culprit of serotonin syndrome.

Toxicological investigations are essential in identifying narcotics opioids overuse in suspected patients and should be performed routinely, but, unfortunately, the metabolism of methadone demonstrates extreme interindividual variation. This results in physicians not always performing a correct diagnosis in cases of serotonin syndrome. Clinical presentation includes a triad of autonomic instability (tachycardia, tachypnea, and hypertension), altered mental status (agitation and coma), and neuromuscular overactivity (increased tone). In life-threatening conditions, severe hyperthermia, hypertension, and tachycardia may lead to frank shock and coma. Typically, symptom onset occurs rapidly within hours of an increased dose of a serotoninergic agent. Data from the Centers for Disease Control and Prevention (CDC) reveal that the United States opioid overdose epidemic continues to worsen, and guidelines on the prescription of opioids in chronic pain situations do not recommend the simultaneous administration of narcotics with other serotonergic agents.

In the hot summer of 2014 in Foggia, in the south of Italy, many inmates of the local prison experienced illness due to high temperatures. A 51-year-old man was found unconscious in the bed of his cell, wearing nine sweaters and three pairs of pants, covered with a wool blanket. The windows and the blind (type of door) of the cell were closed and the jail cell temperature was 29° Celsius. The man was rescued, transported to the hospital, and died shortly after his arrival at the emergency department from a malignant arrhythmia. The anamnestic data revealed that the man was a heroin addicted in daily treatment with methadone, paroxetine, and quietapine, and suffered from both Klinefelter Syndrome with hormone replacement treatment and from an anxious-depressive disorder. Approximately four hours after death, his rectal temperature was 41° Celsius. The external examination conducted on the cadaver was negative for signs of acupuncture or traumatic injury. Autopsy of the convict was performed after two days, with a complete biological sampling for toxicological purposes. Not surprisingly, all organs exhibited unspecific gross alterations and the immunohistochemical staining of kidney samples revealed some lumens and epithelial cells of proximal and distal renal tubules positive to anti-myoglobin antibody. Serum samples, collected at the time of hospitalization, detected positivity for paroxetine, quietapine, and methadone. However, the kidney and liver failure made it impossible to quantify the rate of recruitment due to a slowdown in the reduction in the elimination rate.

The results of criminal investigation by the police revealed that the nurse who took care of him had given him two doses of methadone, claiming that the first dose was inadvertently dropped while being taken in the cell. This scenario was reconstructed. Positivity in serum of paroxetine, a drug usually taken by the prisoner, justified its predisposition. By virtue of the inhibition that this SSRI has on cytochrome CYP2D6 and 3D4, it allowed a greater sensitivity to the double dose of methadone, favored the rapid development of a serotonin syndrome associated with coma and malignant hyperthermia, and allowed the settlement and orientation of the known inconclusive gross and histological findings for the syndrome.

Methadone, Serotonin Syndrome, Hyperthermia