K61 Deaths Attributed to Intravenous Use and Nasal Inhalation of Oxycodone

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After attending this presentation, attendees will understand the routes of oxycodone administration, understand issues in cases of atypical routes of drug administration, and understand some factors that could affect oxycodone toxicity.

This presentation will impact the forensic science community by providing forensic toxicologists and pathologists additional factors to consider in interpreting oxycodone drug levels following non-oral routes of administration.

Oxycodone is a semisynthetic narcotic analgesic derived by chemical modification from codeine. It produces potent euphoria, analgesic and sedative effects, and has a dependence liability similar to morphine. Two cases of death from oxycodone are presented: one by intravenous and one by nasal insufflation.

The first case was a 50-year-old Caucasian male who was pronounced dead in hospital. A full autopsy was performed < 24 h after death. Autopsy findings included extensive systemic foreign body granulomatosis consistent with IV drug use. The second case was a 28-year-old male found deceased at a friend's home. A friend at the scene reported that the decedent "snorted" the drug. A full autopsy was performed <24 hours after death. Autopsy findings included pulmonary oedema and moderate diffuse cerebral swelling. Blood and urine specimens were collected at autopsy for toxicological analysis.

Blood and urine specimens were subjected to a thorough qualitative analysis. Screening was performed for illicit drugs including opiates, cocaine, barbiturates, benzodiazepines, amphetamines, phenycyclidine, and cannabinoids by immunoassay. Acidic and neutral drugs were screened for by liquid-liquid extraction followed by GC-MS electron impact detection. Volatile alcohols were assayed by GC-FID. Qualitative analysis in urine identified oxycodone and cannabinoids in both cases. Quantitation of oxy- codone and 11-Nor-Delta^{9}Tetrahydrocannabinol-9-CarboxylicAcid (THC-COOH) in urine and oxycodone in blood were performed by GC-MS. Oxycodone and its deuterated internal standard were extracted at pH 6.0 using solid phase extraction techniques. The eluant is evaporated, and the resulting residue is dissolved in pyridine. Acetyl derivatives of oxycodone are then formed by adding acetic anhydride and heating the mixture for 30 minutes at 50°C, then dried under nitrogen. The resulting residue is reconstituted in ethyl acetate and subsequently analyzed by gas chromatog- raphy/mass spectrometry using single ion monitoring; Oxycodone - 357, 314, 358 m/z; and Oxycodone-d_3 - 360, 317, 361 m/z.

The concentrations of oxycodone found in blood and urine for cases #1 were 0.518 mg/L and 21.7 mg/L respectively. The THC-COOH was 0.020 mg/L in urine. The concentrations of oxycodone found in blood and urine for cases #2 were 0.050 mg/L and 6.58 mg/L respectively. The THC-COOH was 0.081 mg/L in urine.

The usual adult oral dose is 2.5-5 mg every 6 hours, although patients with moderately severe pain may take 10-30 mg every 4 hours. Published pharmacokinetic studies involving oxycodone show that plasma concentrations are generally less than 0.100 mg/L. For example, the peak plasma concentrations in 12 patients receiving a 10 mg oral dose averaged 0.030 mg/L. There is little reported on the lethal levels of oxycodone in blood when administered intravenously or by nasal inhalation. For oral oxy- codone alone, a minimum lethal level of 5.0 mg/L has been suggested, and fatal concentrations involving oxycodone and at least one other depressant drug have been reported at 0.60 mg/L. Although the concentration of oxy- codone in these cases was lower, it is well known that for other opiates the minimum lethal level can be considerably lower when administered intravenously or by insufflation than when orally administered.

Based on autopsy findings, investigation at the scene, patient history, and toxicology findings, the cause of death in case #1 was ascribed to oxy- codone administered by intravenous route; case #2 was ascribed to oxy-codone administered by nasal inhalation; and the manner of death in both cases was determined to be accidental.

Oxycodone, Intravenous, Nasal Inhalation

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