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G68 Sufentanil Toxicity in Healthcare Professionals

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The goals of this paper are to present to the forensic community an awareness of two recent cases of sufentanil toxicity involving healthcare professionals.

This presentation demonstrates two autopsy cases from the Harris County Medical Examiner's Office involving sufentanil toxicity among healthcare professionals. Sufentanil citrate is available under its generic name of sufentanil and is often used in the surgical suite by anesthesiologists as an adjunct to general anesthesia. Sufentanil is available in Dosette ampules of 50-mcg/1 ml, 100-mcg/2 ml, and 250-mcg/5 ml. It is a Class II controlled synthetic narcotic, which is about 5 to 7 times as potent as fentanyl and 500 to 800 times as potent as morphine. The usual adult dose is 1 to 2 mcg/kg. Supplemental doses of 10 to 25 mcg may be given as needed. Profound analgesia is achieved with doses of 2 to 8 mcg/kg. Deep general anesthesia is achieved with doses of 8 to 30 mcg/kg. Sufentanil easily crosses the blood-brain barrier and is quickly routed to body tissues. After 24 hours, approximately 80% of the drug dose is excreted in the urine. Sufentanil is metabolized into N-desmethylsufentanil and O-desmethylsufentanil. Approximately 30% of a dose metabolizes as conjugates in both urine and feces. Sufentanil has a number of toxic effects including respiratory depression, acute respiratory arrest, seizures, hypotension (also sudden hypotension), euphoria, dizziness, muscle rigidity, drowsiness, nausea, vomiting, bradycardia, and irregular heartbeat. The literature reports 2 deaths in adults after self intravenous administration of sufentanil indicating blood levels of 1.1 and 7.0 mcg/L and liver levels of 1.8 and 3.4 mcg/L. It is not clear if these adults were healthcare professionals.

The following are details of two cases involving sufentanil toxicity that have occurred in less than a two-month period. Case one is a 41-year-old Caucasian male anesthesiologist who was found, in the bathroom, sitting on the toilet with his pants on and unresponsive. An empty syringe was found inside a dry beer can. A small vial of sufentanil 50 mcg, ¾ empty, was found in the bathroom. The autopsy findings included: a recent injection site in the left antecubital fossa with a 3/8 inch hematoma, cardiomegaly (450 grams) with moderate atherosclerotic cardiovascular disease, bilateral pulmonary edema and congestion, hepatomegaly (2550 grams), and erosions of the gastric mucosa.

Case two is a 34-year-old Caucasian male registered nurse who was found at work in the ladies bathroom face down on the floor with his pants and underwear down around his ankles. In addition to the 1 opened ampule of sufentanil, 15 different ampules, vials, and bottles of medications were found in the bathroom. In addition, 1 previously used syringe with needle and cap was found at the scene. The autopsy findings included: bilateral injection sites on the medial thighs, cardiomegaly (550 grams) with right ventricular dilatation and concentric left ventricular hypertrophy, and hepatomegaly (2400 grams).

Sufentanil can be assessed in the laboratory by multiple methods including gas chromatography with nitrogen specific detection, radioimmunoassay, and gas chromatography-mass spectrometry (GC-MS). The blood analysis for sufentanil was identified and quantitated by GC-MS method. Biological specimens were made alkaline (pH 13) using 2N, NaOH. Sufentanil was extracted using a mixture of hexane:ethanol (19:1). D5-fentanyl was used as an internal standard. The dried extracts samples were injected onto the GC-MS and the ions 250, target ions, 194, 195, 151 for D5-fentanyl and 250 (target ion), 290, 291, 140 for sufentanil were monitored. Postmortem blood in case one was positive for ethanol 0.12 g/dL and sufentanil 2.95 mcg/L. The syringe wash was also positive for sufentanil. No other drugs were identified. In case 2, sufentanil was the only compound in concentration of 2.63 mcg/L. The cause of death of death was sufentanil toxicity for both cases. The manner of death was ruled as accidental for both cases.

In conclusion, these 2 deaths resulting from sufentanil toxicity in Harris County Medical Examiner Office in less than 2 months are warning signs of the popularity of this potent, narcotic substance among healthcare professionals with substance abuse problem.

Sufentanil, Harris County Medical Examiner Office, Healthcare Professionals