

A 52-year-old man with fentanyl-induced muscle rigidity

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A 52-year-old man injected a mixture of opioids intravenously at Insite, a supervised consumption facility in Vancouver. Shortly after injection, he was found by nursing staff seated with elbows flexed, fists clenched, and neck flexed and stiff; his eyes were open, but he was unresponsive to verbal stimuli or sternal rub. He was cyanotic, had a rigid chest and was not spontaneously breathing. Artificial respirations were initiated with a bag valve mask on 25 L/min of oxygen, providing partial ventilation, and 0.4 mg of naloxone was administered subcutaneously. His oxygen saturation was 84%, and his heart rate was 92 beats/min with a strong carotid pulse. Two minutes following naloxone administration, it became easier to ventilate the patient and to position his airway. His saturation had improved to 100%, and he began to take respirations with stimulation. Within six minutes, his rigidity had fully subsided, with relaxed arms and neck, he opened his eyes when spoken to and he was breathing spontaneously at a rate of eight breaths/min. The patient fully recovered without any apparent sequelae. He reported that he had injected a mixture of heroin and methadone from a new supplier.

The cooker the patient had used to prepare his drugs was transported to Health Canada's Drug Analysis Service by a member of the Vancouver Police Department. The analyzed sample was found to contain fentanyl (N-(1-phenethyl-4-piperidyl) propionanilide), but cocaine, methamphetamine, other opioids or fentanyl analogues were not detected. (In a supervised consumption setting where there are limited resources and the client has responded to the intervention, further details and toxicology are not usually obtained and hence were not available for this case report.)

Fentanyl-induced muscle rigidity was diagnosed. Although the differential diagnosis includes seizure (toxicologic, hypoxemic or hypoglycemic), dystonia caused by antidopaminergic medication, anticholinergic overdose and hemorrhagic stroke, the acute onset of symptoms following fentanyl injection, the prompt reversal with naloxone and apparent complete recovery make other diagnoses unlikely.

Discussion

The recent opioid overdose crisis in British Columbia has caused substantial morbidity and mortality. Provisional data for 2017 show that fentanyl was detected in more than 1150 deaths (81%)

KEY POINTS

- Injection of illicit fentanyl can cause fentanyl-induced muscle rigidity.
- Signs of fentanyl-induced muscle rigidity include jaw clenching and chest rigidity, which can interfere with ventilation.
- Fentanyl-induced muscle rigidity requires immediate intervention, while taking care not to induce withdrawal symptoms, which may include vomiting.
- In the community, naloxone 0.4 mg intramuscularly should be administered immediately; if no response occurs, additional doses of intramuscular naloxone should be given at two-minute intervals.

from illicit drug overdose in BC, which was more than seven times the number in 2015.¹ Although the increased potency of fentanyl relative to other opioids is likely contributory to the increased deaths, fentanyl-induced muscle rigidity, also known as “wooden chest syndrome,” is a complication of intravenous injection of fentanyl and has been postulated to play a role in the increased mortality.² Current published literature is limited to clinical case reports in hospitals.

Fentanyl-induced muscle rigidity in the drug-injecting community in BC has been reported by paramedics attending overdoses in Vancouver and bystanders who have witnessed overdoses in the community, and documented by staff at Insite. Reports included descriptions of jaw and fist clenching, inability to insert an oral airway, chest or torso rigidity interfering with ventilation, and finger stiffness interfering with oxygen saturation monitors.

Fentanyl-induced muscle rigidity is well documented in the context of anesthesia induction in both adult and pediatric hospital settings,³ and has also been reported during bronchoscopic procedures.^{4,5} The pattern of rigidity described in the literature closely mirrors what has been observed at Insite. It is characterized by rigidity of the trunk, neck and jaw muscles after the injection of fentanyl or other synthetic, lipid-soluble opioids like acetylfentanyl, alfentanil and sufentanil.^{2,5} Laryngeal spasms occur in 50%–100% of cases of fentanyl-induced muscle rigidity, depending on the dose and injection rate.³ Decreased chest compliance and inability to open the mouth to insert an oral airway owing to masseter muscle spasm have been reported.³ These