Hydrocodone snorting leading to hypersensitivity pneumonitis

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We present a case of hypersensitivity pneumonitis caused by intranasal abuse of the prescription narcotic hydrocodone. The patient's clinical course was complicated by acute respiratory failure. A chest radiograph showed diffuse bilateral opacities. The patient was treated with noninvasive ventilation, a high dose of intravenous steroids, and bronchodilators, resulting in improvement of symptoms and radiographic appearance.

A common controlled prescription drug for pain is oral hydrocodone. According to a report from the National Center on Addiction and Substance Abuse at Columbia University, 99% of all hydrocodone in the world is used in the USA (1). Snorting is a new route of hydrocodone abuse, which results in a rapid onset of effects, causing almost immediate pain relief and euphoria. But when the drug is snorted, there is a much greater risk of toxic effects, including hypersensitivity pneumonitis causing respiratory failure. Such was the case in the patient described herein.

CASE DESCRIPTION

A 52-year-old Native American woman came in with symptoms of dyspnea, wheezing, hypoxia, dry cough, and subjective fever. She was a chronic smoker. She previously had coronary artery bypass graft and stenting at an outside facility. She reported snorting hydrocodone daily for the last 2 months.

On examination she was afebrile, tachypneic, and hypoxic on room air, with an oxygen saturation of 84%. Chest exam revealed wheezes. She had mild leukocytosis and a normal metabolic panel, cardiac panel, D-dimer, and brain natriuretic peptide (*Table 1*). A chest radiograph showed diffuse patchy areas of ground-glass airspace disease bilaterally (*Figure 1*).

High-resolution lung computed tomography showed mosaic attenuation of lungs with scattered areas of ground-glass opacity interspersed with more lucent areas of lung along with mild paraseptal emphysema (*Figure 2*). An echocardiogram showed normal left ventricular function with no regional wall motion abnormality.

The patient was treated with high-flow oxygen, bronchodilators, and high-dose intravenous steroids. She was also started empirically on antibiotics. The following day she remained dyspneic and hypoxic with an increased oxygen requirement

Table 1. The patient's laboratory values

Test	Result
Leukocyte count ($\times 10^9/L$)	11.5
Blood urea nitrogen (mg/dL)	8
Creatinine (mg/dL)	0.8
Brain natriuretic peptide (pg/mL)	50
Troponin (ng/mL)	<0.012
D-Dimer (mg/L)	0.44

of 8 L/min. She was started on noninvasive ventilation for acute respiratory failure.

Her dose of methylprednisolone was increased to 125 mg every 6 hours. Her condition gradually improved, and she was weaned off the bilevel positive airway pressure machine. She was

Figure 1. Chest radiograph showing a diffuse alveolar infiltrate with an associated reticular pattern.

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Figure 2. High-resolution computed tomography showing a ground-glass appearance in both lungs.

discharged from the hospital with near complete resolution of her symptoms. She was switched to oral prednisone, which was tapered during the next 2 weeks. A follow-up chest radiograph showed complete resolution of the infiltrate.

DISCUSSION

Hypersensitivity pneumonitis, also called extrinsic allergic alveolitis, is an immunologic reaction to a wide variety of inhaled organic and inorganic antigens. These include but are not limited to microorganisms (bacteria, fungi, mycobacteria, and virus), agricultural aerosols, animal protein, and many chemical reagents. Recurrent exposure leads to chronic inflammation and fibrotic lung disease. Therefore, early diagnosis and avoidance of the exposed allergen is the key to treatment.

Patients are exposed to these allergens as a result of their occupation or lifestyle. Dyspnea, dry cough, fever, weight loss, and easy fatigability are the most common presenting symptoms (2). Acute symptoms are seen within 4 to 12 hours of antigen exposure and are alleviated by removal of the offending agent. Repeat exposure after abstinence often causes recurrence of the symptoms. The disease presentation, severity, and latency are in-

fluenced by the concentration of the inhaled antigen, duration of exposure, frequency of exposure, and interval between exposures.

Several different criteria for diagnosis of hypersensitivity pneumonitis have been described, but they were developed before the advent of high-resolution computed tomography and bronchoalveolar lavage. They are usually for acute cases and depend on an abnormal chest radiograph or positive serum precipitins, which are often absent (3–5). Most of the diagnostic criteria include one or all of the following: (1) known exposure to the antigen; (2) compatible clinical, radiographic, and physiologic findings; (3) positive inhalation challenge test; (4) histopathology changes of noncaseating granuloma or mononuclear infiltrate or bronchoalveolar lavage with lymphocytosis. Imaging studies including chest radiograph and high-resolution computed tomography show reticular, nodular, and/or ground-glass opacities. Chronic cases due to repeated exposure show fibrotic changes with volume loss (6).

In our patient, the antigen was inorganic powdered hydrocodone, which after snorting triggered a severe allergic response leading to hypersensitivity pneumonitis and acute respiratory failure. Continued recreational abuse by patients over time could lead to parenchymal lung fibrosis. Drug counseling and rehabilitation should be part of overall management.

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