CASE REPORT

Baby Z was born at 36 weeks’ gestation with Apgar scores of 9 and 9. By examination he seemed to be a healthy 36-week infant with a birth weight of 6 pounds. He progressed satisfactorily and was discharged to home 2 days later.

At 29 days of age, baby Z was brought to the local hospital for evaluation of frequent cough and occasional vomiting, which had started the previous day. Physical examination at that time revealed a rectal temperature of 98.2°F, a pulse of 160, and respirations of 32. A chest radiograph showed no evidence of active cardiac or pulmonary pathology and the infant was diagnosed with an upper respiratory infection. Baby Z was discharged to home with instructions to treat with Triaminic syrup (Sandoz Consumer, East Hanover, NJ) and Pedialyte (Ross Laboratories, Columbus, OH).

The baby did not improve over the course of the day and returned to the hospital emergency department later that afternoon. Physical examination revealed a temperature of 97°F, a pulse of 160, and respirations of 28. The chest was clear, the heart was in normal sinus rhythm, and the abdomen was soft. The assessment at this time was a viral tracheitis. The patient was discharged to home with instructions to take 1 mL Novahistine DH (SmithKline Beecham Pharmaceuticals, Pittsburgh, PA) every 6 hours for 3 days (Novahistine DH contains 2 mg of codeine per milliliter, and in this infant, the dose would have been .63 mg/kg), to discontinue the Triaminic medication, and to see the pediatrician in 2 days.

At 8 pm the baby was given a 1-mL dose of oral Novahistine DH. At 2 am on the next day, a second 1-mL dose was given. At 3 am, the baby seemed to be in no distress according to the mother. At 4 am, the mother noted that the baby was unusually quiet and when she checked, the baby was not breathing. An ambulance was called, and the baby was transported to the hospital, where resuscitative efforts continued in the emergency department. Despite lifesaving measures, the patient died.

Autopsy and Toxicology Results

Notable findings at autopsy included severe bronchitis/bronchiolitis and mild bilateral pulmonary congestion.

Codeine and metabolites in postmortem samples of blood, urine, and liver extract were identified and quantitated by gas chromatography, mass spectrometry.1 Codeine is metabolized by several mechanisms (discussed below), and the metabolites can be analyzed either as the total (the combined free drug plus the hydrolyzed conjugates) or the free drug alone. The difference between the total and free drug concentrations equals the amount of conjugated drug.2 Postmortem toxicological findings are reported in Table 1.

The cause of death, determined by the chief medical examiner, was acute opiate intoxication with contributory findings of severe bronchitis/bronchiolitis.

DISCUSSION

Novahistine DH is an antitussive, decongestant, and antihistamine preparation. In each 5-mL formulation, there are 30 mg of pseudoephedrine hydrochloride, 10 mg of codeine phosphate, 2 mg of chlorpheniramine maleate, and 5% alcohol. With 2 doses of Novahistine DH, this infant received 4 mg of codeine within a 6-hour period or 1.26 mg/kg. Given the slower metabolism of codeine in infants,3 this dosage is consistent with the postmortem toxicological findings of .34 mg/L of free codeine (Table 1). Toxicological postmortem findings in the blood, urine, and liver of the infant in this case showed both codeine and its primary metabolite morphine. In addition, a trace of chlorpheniramine, an antihistamine, also was found in the blood.

Codeine is given to suppress the cough reflex by a direct effect on the cough center in the medulla. In addition, codeine provides mild analgesia and mild sedation. Intoxication results in somnolence, ataxia,
found in neonates. Longer half-lives of codeine and morphine have been found in small infants. This suggests that proportionally higher serum opiate concentrations are of lower clearance rates. This suggests that proportionally higher serum opiate concentrations are of lower clearance rates. This suggests that proportionally higher serum opiate concentrations are of lower clearance rates. This suggests that proportionally higher serum opiate concentrations are of lower clearance rates. This suggests that proportionally higher serum opiate concentrations are of lower clearance rates. This suggests that proportionally higher serum opiate concentrations are of lower clearance rates. This suggests that proportionally higher serum opiate concentrations are of lower clearance rates. This suggests that proportionally higher serum opiate concentrations are of lower clearance rates. This suggests that proportionally higher serum opiate concentrations are of lower clearance rates. 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